

Northwest
Silverdale, Washington

Final

Preliminary Assessment for Per- and Polyfluoroalkyl Substances at Former Naval Arctic Research Laboratory Barrow and Associated Special Areas

Utqiaġvik, Alaska

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Prepared for NAVFAC Northeast
by CH2M HILL, Inc.
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Acronyms and Abbreviations

µg/L	microgram(s) per liter
ADEC	Alaska Department of Environmental Conservation
AFFF	aqueous film forming foam
Air Force	United States Air Force
ARL	Arctic Research Laboratory
ASD	Assistant Secretary of Defense
bgs	below ground surface
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH2M	CH2M HILL, Inc.
CLEAN	Comprehensive Long-term Environmental Action — Navy
DASN	Deputy Assistant Secretary of the Navy
DEW	Distant Early Warning
DoD	Department of Defense
EI&E	Energy, Installations and Environment
ER	Environmental Restoration
FEMA	Federal Emergency Management Agency
FY17	Fiscal Year 2017
GIS	geographic information system
IAS	Initial Assessment Study
iNFADS	internet Naval Facilities Asset Data Store
JP	jet propulsion
m^3/year	cubic meters per year
MIL-SPEC	military specification
MOGAS	Motor Gasoline
NA	not applicable
NARL	Naval Artic Research Laboratory
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NPR-A	National Petroleum Reserve – Alaska
NSB	North Slope Borough
OEL	Other Environmental Liabilities
PA	Preliminary Assessment
PDF	portable document format
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PLO	Public Land Order

ppt	parts per trillion
PWS	public water systems
RfD	reference dose
RPM	Remedial Project Manager
SEAFAC	Southeast Alaska Acoustic Research Facility
SI	Site Inspection
UCMR3	Third Unregulated Contaminant Monitoring Rule
UIC	Ukpeaġvik Iñupiat Corporation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
US Survey	United States Survey
VSI	visual site inspection
WWTP	wastewater treatment plant

SECTION 1

Introduction

This preliminary assessment (PA) report of potential sources of per- and polyfluoroalkyl substances (PFAS) at current Department of the Navy (Navy) property associated with Former Naval Arctic Research Laboratory (NARL) Barrow has been prepared by Comprehensive Long-term Environmental Action—Navy for the Navy under Contract N62470-16-D-9000, Contract Task Order 4117. In addition to Former NARL Barrow, the following special areas have been addressed in this PA: Former Distant Early Warning (DEW) Line Station at Point McIntyre, Alaska; Former DEW Line Station in Icy Cape, Alaska; and the Naval Surface Warfare Center Carderock Division Southeast Alaska Acoustic Research Facility (SEAFAC) on Back Island, Alaska.

1.1 Preliminary Assessment Objectives

This installation-specific PA for PFAS is part of a Navy-wide installations assessment of potential historical sources of PFAS use. The objectives of this PFAS PA of NARL Barrow are to:

- Identify and catalog all potential or actual PFAS sources (see list herein).
- Eliminate from further consideration those areas where there is no evidence of a PFAS release or suspected release and document the rationale for their elimination.
- Identify areas requiring further PFAS investigation.
- Identify receptors and migration pathways (both on and off the facility).
- Determine whether an emergency response action is warranted because of current complete exposure pathways (for example, on-Base or off-Base drinking water source within 1-mile downgradient of potential source area).
- Set priorities for a Navy-owned/Base-wide Site Inspection (SI).

To accomplish these objectives, the following activities were completed:

- A review of existing information to identify and characterize potential PFAS releases.
- A review of existing information to identify potential off-Base receptors within 1 mile of the facility boundary.[1]
- Interviews conducted with relevant site personnel, former site personnel, and others with historical site knowledge to validate and verify data collected during the data review, and to provide supplemental information.
- A site reconnaissance of the facility (if PFAS release is suspected), to identify any evidence of PFAS releases and potential receptors and migration pathways, to identify all areas of concern, and to fill data gaps identified in the data review and interviews.

1.2 PFAS Background

PFAS have been identified by the United States Department of Defense (DoD) and the USEPA as “emerging contaminants”[2]. PFAS are of environmental concern because of their persistence in the environment and in

[1] This is less extensive than the study area defined in USEPA’s PA Guidance (USEPA, 1991), but will be expanded if necessary in later project phases if potential complete pathways beyond 1 mile are identified.

[2] Per DoDI 4715.18: “As identified by the [Assistant Secretary of Defense for Energy, Installations, and Environment], an emerging contaminant is a contaminant that: has a reasonably possible pathway to enter the environment; presents a potential unacceptable human health or environmental risk; and does not have regulatory standards based on peer-reviewed science, or the regulatory standards are evolving due to new science, detection capabilities, or pathways.”

organisms, their migration potential in aqueous systems (for example, groundwater), their historically widespread use in commercial products, and their possible health effects at low levels of exposure. PFAS are anthropogenic compounds with multiple, strong carbon-fluorine bonds.

1.2.1 General Uses of PFAS

The chemical properties of PFAS make them useful for many commercial products because they are heat resistant and can repel oil, grease, and water. PFAS have been manufactured for use in a wide variety of products including firefighting foam, nonstick cookware, fiber and fabric stain protection, food packaging, and personal care products. The pervasive use of PFAS in commercial and industrial products has led to the discovery of PFAS in soil, air, and groundwater worldwide.

1.2.2 Key PFAS Sources at Naval Installations

PFAS have been used in a variety of military applications, including as a component of aqueous film forming foam (AFFF), which was routinely used at firefighting training areas and firefighting equipment test areas. In addition, current and historical AFFF storage and transfer areas are of potential concern for release to the environment. As such, identification of areas where AFFF was released to the environment, either as repeated small releases or as a significant one-time release, is key to determining potential PFAS sources to environmental media.

PFAS from AFFF used in firefighting, firefighting training, and fire suppression systems are considered to have the greatest potential for release of PFAS to the environment in terms of mass and concentration at Navy installations. Other potential sources of PFAS to the environment include operations wastes (for example, from chromium electroplating), historical onsite land disposal areas and landfills of PFAS-containing materials, and wastewater treatment sludges and effluents. Areas of interest for this PFAS PA include those where AFFF may have been applied, released, or stored. These include current and former fire-training areas, equipment test and cleanout areas, buildings with firefighting infrastructure (for example, hangars, AFFF storage and handling areas, and pump houses), unplanned release areas (such as crash sites), and fire suppression systems located at fuel storage area(s).

Aqueous Film Forming Foam in Firefighting Training and Fire Suppression

AFFF containing PFAS was developed in the 1960s, for use on Class B fires (that is, fires in flammable liquids or vapors), and was put into routine use by the early 1970s. In November 1969, a military specification (MIL-SPEC) was issued that described characteristics that AFFF needed to demonstrate to be used by the military, including a requirement for formulations containing PFAS. Most AFFF used at military installations after the 1970s likely included some combination of PFAS.

Typically, AFFF concentrate was proportionally mixed into water lines using in-line eductors or other proportioning devices to create the necessary foam solution ranging from 3 to 6 percent of the concentrate. Class A firefighting foams were used to extinguish wood and grass fires, and do not contain PFAS. Therefore, Class A firefighting foams are not a concern for this PA.

Electroplating

Electroplating, specifically hard chromium plating, is an industrial activity where PFAS-containing mist suppressants may have been used. Electroplating consists of creating an electrolytic cell that enables a thin layer of metal to be deposited onto an electrically conductive metal surface. PFAS were sometimes used during the chromium electroplating process as a surfactant in chromic acid baths. As a surfactant, PFAS lowered the surface tension (adhesion of materials) by creating a thin, foamy layer on the surface of the chrome bath for mist-suppression. This mist-suppressant reduced the formation of airborne chromium aerosols during the plating process, which are known to be carcinogenic and allergenic. Areas where non-chromium electroplating operations were carried out would not be expected to have used PFAS-containing mist suppressants.

Landfill Operations, Waste Disposal Areas, and Wastewater Treatment Plants

Historically, landfills received wastes generated from military installations, including waste streams from operational areas (such as machine shops and electroplating operations), housing areas, and waste from wastewater treatment plants (WWTPs) and/or homeported ships. These waste streams may contain industrial and/or consumer products that were either manufactured with PFAS or contain PFAS constituents that may leach out of the landfill. Additionally, waste material biosolids and sludge from WWTPs can contain PFAS.

Other Potential Sources

Because of the widespread use of PFAS, there may be activities other than the ones mentioned previously, where PFAS were used. PFAS have been included in some anti-fouling and stain-resistant paint formulations. It is possible that in significant amounts, these could be sources of PFAS to the environment.

1.2.3 PFAS in the Environment

PFAS are a class of anthropogenic compounds characterized by carbon chains of varying lengths containing carbon-fluorine bonds. The strong electronegative force of the carbon-fluorine bond requires a large amount of energy to break, which makes PFAS extremely resistant to biodegradation, photo-oxidation, direct photolysis, and hydrolysis. In addition to their environmental persistence, PFAS are readily soluble in aqueous solution and therefore, have potential for migration to groundwater from soil and with groundwater flow to offsite locations. Because of their persistence and mobility, releases of PFAS to the environment present a unique set of challenges and concerns.

1.2.4 Potential Health Effects

Additional research is needed to more clearly understand the potential health effects that may be caused by exposure to PFAS compounds. To date, there is limited information on only a few of the thousands of PFAS. Currently, there are no Tier 1 toxicity values for any PFAS. Tier 1 toxicity values are the preferred source for toxicity factors in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act assessments.

The USEPA's Superfund Health Risk Technical Support Center has estimated a Tier 2 noncarcinogenic toxicity value for perfluorobutane sulfonate (PFBS) (USEPA, 2014). The reference dose (RfD) is based on kidney effects observed in female rats. Because of a lack of information in the current literature, toxicity values for inhalation exposure and cancer endpoints could not be estimated for PFBS.

USEPA Office of Water developed a RfD for perfluorooctanoic acid (PFOA) that is based on a developmental toxicity study using mice. The critical effects included reduced ossification in parts of the hands and feet and accelerated puberty in male pups following exposure during gestation and lactation (USEPA, 2016a). USEPA Office of Water also determined that PFOA should be classified as "suggestive evidence of carcinogenic potential" and estimated an oral cancer slope factor based on tumor development in rat testes.

USEPA Office of Water estimated a RfD for perfluorooctane sulfonate (PFOS) based on a developmental toxicity study in rats; the critical effect was decreased pup body weight following exposure during gestation and lactation (USEPA, 2016b).

PFOA and PFOS are known to be transmitted to the fetus in cord blood and to the newborn in breast milk. Because the developing fetus and newborn seem particularly sensitive to PFOA- and PFOS-induced toxicity, the RfDs based on developmental effects also are protective of adverse effects in adults.

1.3 Regulatory Background and History

1.3.1 PFOA Stewardship Program

In 2006, USEPA initiated the 2010/2015 PFOA Stewardship Program in which eight major companies in the United States committed to reduce facility emissions and product contents of PFOA and related chemicals on a global

basis by 95 percent no later than 2010, and to work toward eliminating emissions and product content of these chemicals by 2015. All companies have met the program goals. To meet the program goals, most companies stopped the manufacture and import of long-chained PFAS, and then transitioned to alternative chemicals. On January 21, 2015, USEPA proposed a Significant New Use Rule under the Toxics Substances Control Act, to require manufacturers (including importers) of PFOA- and PFOA-related chemicals to notify USEPA at least 90 days before starting or resuming new uses of these chemicals in any process.

1.3.2 Unregulated Contaminant Monitoring Rule

The USEPA issued the Third Unregulated Contaminant Monitoring Rule (UCMR3)[3] in May 2012. The UCMR3 required monitoring between 2013 and 2015, for 30 substances of all large public water systems (PWSs) serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people. Six PFAS compounds were included in the UCMR3 contaminant list. Of these six PFAS, USEPA issued health advisory levels for only two, PFOA and PFOS. The UCMR3 results found these two chemicals were present in less than 1 percent of the nearly 5,000 public water systems that sampled under UCMR3.

In December 2016, USEPA issued the Fourth Unregulated Contaminant Monitoring Rule (UCMR4). UCMR4 requires all large PWSs serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people to sample for 30 chemicals between 2018 and 2020. There are no PFAS included on the UCMR4 list of contaminants that require sampling and analysis.

1.3.3 USEPA Lifetime Health Advisories

In May 2016, USEPA Office of Water issued a drinking water lifetime health advisory for PFOA and PFOS. Health advisories are not enforceable, regulatory levels; rather, they are levels that would provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water. The health advisory is 70 parts per trillion (ppt) for PFOA and 70 ppt for PFOS. When both PFOA and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 70 ppt health advisory level.

1.3.4 State-specific Action Levels

The Alaska Department of Environmental Conservation (ADEC) has established drinking water action levels for six PFAS that ADEC considers to be hazardous under state law (ADEC, 2018a; AS 46.03.826(5)). These action levels apply to PFAS compounds detected in groundwater and surface water used as drinking water. When one or more of the following PFAS are detected, the sum of the detected concentrations is compared to a summed action level of 0.07 micrograms per liter (µg/L) (70 ppt):

- PFOS
- PFOA
- perfluorononanoic acid (PFNA)
- perfluorohexanesulfonic acid (PFHxS)
- perfluoroheptanoic acid (PFHpA)

The action level for PFBS is 2.0 µg/L (2,000 ppt).

ADEC has also has published soil and groundwater cleanup levels for PFOS and PFOA (ADEC, 2018b). The lowest soil cleanup values are for the migration to groundwater exposure scenario and are 0.0030 milligrams per kilogram (mg/kg) for PFOS and 0.0017 mg/kg for PFOA. Groundwater cleanup values for groundwater used as a drinking water source are 0.40 µg/L for PFOS and 0.40 µg/L for PFOA.

[3] The 1996 Safe Drinking Water Act amendments require that once every 5 years, USEPA issue a new list of no more than 30 unregulated contaminants to be monitored by PWSs.

1.4 Navy Policy

1.4.1 DASN (EI&E) Policy Memo, October 21, 2014

Because of Navy releases impacting PWSs tested under the UCMR3, the Navy issued a policy in October 2014, requiring on-Base drinking water sampling for PFOA and PFOS for bases where groundwater was used as drinking water and PFAS could have been released nearby in the past. Under this policy, all installations not previously tested under UCMR3 that produce drinking water from on-installation sources and have an identified or suspected PFAS release within approximately 1-mile upgradient to the drinking water source were required to sample their finished drinking water by December 2015.

No on-installation drinking water sources are present at Former NARL Barrow. As such, this policy did not require action by this installation. Former DEW Line Stations Point McIntyre and Icy Cape are not currently in use and did not prompt action. SEAFAC was not impacted by this policy as treated rainwater is the source of drinking water at the facility.

1.4.2 DASN (E) Policy Memo, September 14, 2015

This policy memo largely echoed the requirements laid out in the October 2014 DASN (E) policy memo. However, this memo specified that if levels of PFOS and/or PFOA in drinking water exceeded the current-at-the-time USEPA health advisory (that is, 2009 provisional short-term health advisories), then alternate drinking water must be supplied until the PFOA and/or PFOS levels were reduced to below the UUSEPA health advisory.

This policy did not affect Former NARL Barrow, Former DEW Line Stations Point MyIntyre and Icy Cape, or SEAFAC.

1.4.3 ASD Policy Memo, June 10, 2016

This DoD policy memo specified that decisions regarding drinking water should be based on lifetime health advisories issued by the USEPA Office of Water in May 2016, rather than the now outdated provisional short-term health advisories in 2009.

This policy did not affect Former NARL Barrow, Former DEW Line Stations Point MyIntyre and Icy Cape, or SEAFAC.

1.4.4 DASN (E) Policy Memo, June 14, 2016

This policy expanded the sampling of PFOA and PFOS at all Navy installations, where such sampling was not previously completed under USEPA's UCMR3 or the Navy's October 2014 policy. This memo also specified that, for instance, where drinking water from an installation is purchased from a public water system, but was not tested under UCMR3, that the installation must sample the finished drinking water to comply with this policy. Additionally, this policy included reporting requirements to the DASN (E) office for all PFOA and/or PFOS in drinking water results.

Because the Navy property at Former NARL Barrow and the Former DEW Line Stations Point McIntyre and Icy Cape is not currently in use, this policy did not apply. In accordance with this policy, on-Base drinking water at SEAFAC was tested in November 2016. Testing included analysis of PFOS and PFOA; neither were detected above laboratory reporting limits (Navy, 2016; Liebman, 2018, pers. comm.).

1.4.5 DASN (E) Policy Memo, June 17, 2016

This policy defines the Navy's intention to remove, dispose, and replace legacy AFFF that contains PFOS and/or PFOA, once environmentally suitable substitutes are identified and certified to meet MIL-SPEC requirements. This policy directs the following actions be taken until suitable replacements are certified:

- Immediately cease the uncontrolled environmental release of AFFF for shoreside installations, with the exception of emergency responses.

- Update and implement Navy and Marine Corps firefighting system requirements, as needed, to ensure fire and emergency service vehicles and equipment at Navy installations and facilities are tested and certified in a manner that does not allow the release of AFFF to the environment.
- By the end of Fiscal Year 2017 (FY17), remove and dispose of uninstalled PFOS-containing AFFF in drums and cans from local stored supplies for shore installations and ships to prevent future environmental releases.

1.4.6 DASN (E) Policy Memo, June 20, 2016

This policy required the Navy to identify and prioritize sites for investigation if drinking water resources, on- or off-installation, are thought to be vulnerable to PFAS contamination from past Navy and Marine Corps PFAS releases. Sites with drinking water sources within 1-mile downgradient from known or potential releases of PFAS were assigned the highest priority. This policy directed the sampling of off-Base drinking water at these high priority (Priority 1) sites within FY17.

The primary mechanism to identify potential PFAS release sites and areas of concern, was review of Environmental Restoration (ER), Navy records. To ensure that all potential PFAS release mechanisms were identified, installations were directed to review installations to identify areas that are not already part of the ER, Navy program. The Navy has completed the sampling for all off-base potentially impacted drinking water sources that were identified as a result of this policy and currently known exposure have been addressed.

During this evaluation, Imikpuk Lake (a lake adjacent to current Navy property at Former NARL Barrow [see Section 2]) was identified as a drinking water source located within 1-mile downgradient of the Airstrip Site at Former NARL Barrow, where a known release of AFFF occurred in 1970 to address fire risk from a fuel spill (NEESA, 1983). Five surface water samples were collected and analyzed for PFOA, PFOS, and PFBS, in accordance with USEPA Method 537/WS-DW-0004, Rev. 1.1 (sampling and analysis occurred before issuance of state-specific action levels for surface water used as drinking water described in **Section 1.3.3**). Laboratory results indicated that these three compounds were present in surface water samples collected from the lake, and the summed concentrations of PFOS and PFOA exceeded the USEPA lifetime health advisory of 70 ppt (CH2M, 2018; Alaska DHSS, 2017). In September 2017, an advisory was issued to not use Imikpuk Lake as a source of drinking or cooking water based on these exceedances (Alaska DHSS, 2017).

1.5 Report Organization

The PFAS PA Report for Navy installations is organized in the following sections:

1. Introduction
2. Facility Description
3. Assessment Methods
4. PA Results and Findings
5. Conclusions and Recommendations
6. References

The following appendixes are included:

A SEAFAC Fact Sheet
B Summary of Records Reviewed
C Interview Record

SECTION 2

Facility Descriptions

This PA was performed for Former NARL Barrow, a former Navy research facility located in the North Slope borough of Alaska, and the following associated special areas (**Figure 2-1**):

- Former DEW Line Station at Point McIntyre, Alaska
- Former DEW Line Station in Icy Cape, Alaska
- SEAFAC (also known as the Carderock Division Back Island Acoustic Research Detachment)[4] on Back Island near Ketchikan, Alaska

The PA considers property associated with these facilities that is currently owned or used by the Navy.

2.1 Former Naval Artic Research Laboratory Barrow

The following subsections present facility information relevant to this PA for Former NARL Barrow including facility background, environmental setting, and other PFAS investigations.

2.1.1 Facility Background

Former NARL Barrow is a former Navy research facility and support camp partially located within the boundary of the City of Utqiaġvik (formerly known as Barrow) on the coastal plain of Alaska's North Slope (**Figure 2-2**). Former NARL Barrow is not actively used by the Navy and no active ranges are present.

The Navy first arrived at the location of Former NARL Barrow in 1944 to support oil exploration activities. At that time, the Navy constructed an airstrip (at the Airstrip Site), a radio antenna array (at the Antenna Field Site), and established Point Barrow Camp[5], a cluster of support buildings along the coast between Middle Salt Lagoon and Imikpuk Lake (**Figure 2-2**) (NAVFAC, 2010). In 1946, the Navy established the Arctic Research Laboratory (ARL) under the Office of Naval Research (this laboratory was renamed NARL in 1965) (NAVFAC, 2010). In 1961, under Public Land Order (PLO) 2344, 4,972.6 acres were withdrawn from the National Petroleum Reserve No. 4 for the Navy for arctic research and associated purposes. This included Tract 1 (less a tract of land which had previously been withdrawn for use by the United States Air Force [Air Force]), Tract 2, and Tract 3 (**Figure 2-2**).

Former NARL Barrow supported a wide variety of arctic research activities and the laboratory itself was operated by academic institutions (NAVFAC, 2010). Point Barrow Camp was operated by various contractors over its history and supported laboratory and other Navy and Air Force operations (NAVFAC, 2010). It was leased to the Air Force from 1954 until 1971 (NAVFAC, 2010). In 1980, the Navy ended laboratory operations and support of the camp. The United States Geological Survey took over as site caretaker in 1980, and Ukpeaġvik Iñupiat Corporation (UIC) assumed caretaker responsibilities in 1984 (NAVFAC, 2010). In 1986, the Navy, UIC, and Department of Interior signed a land exchange agreement that initiated the transfer of government-owned land at the Former NARL Barrow to UIC (Agreement, 1986). As part of this agreement, the Navy agreed to the following:

- Clean up impacts from past practices to meet state and federal requirements for hazardous waste.
- Transfer ownership of the majority of PLO 2344 Track 1 to UIC including the former Bulk Fuel Tank Farm (also known as the Historical Tank Farm) and Former NARL Barrow main camp facilities ("Main Camp Area") located between Imikpuk Lake and Middle Salt Lagoon (**Figure 2-2**). Following the transfer of ownership of the Main Camp Area, this area became known as "UIC-NARL".

4 SEAFAC does not have an organizational relationship with Former NARL Barrow but is being assessed in conjunction with the Former NARL Barrow because of proximity and similar regulatory considerations.

5 Point Barrow Camp was later renamed NARL, Point Barrow (NAVFAC, 2010) and is now known as UIC-NARL.

- Retain ownership of other property, including the area east of the Middle Salt Lagoon referred to as the Antenna Field Site and the Airstrip Site. Current installation boundaries are shown on **Figure 2-2**.

In 1988, the Navy and UIC signed an amendment to the original land exchange agreement that clarified the Navy's environmental cleanup program and property ownership (Amendment to Agreement, 1988). Before the land transfer, the Navy performed an Initial Assessment Study (IAS) for Former NARL Barrow (NEESA, 1983). Potentially contaminated areas identified in the IAS that are on property retained by the Navy (the Airstrip Site and the Antenna Field Site) have been included in this PA.

2.1.2 Environmental Setting

Former NARL Barrow is located within the Arctic Circle in the northernmost part of Alaska adjacent to the Chukchi Sea (Arctic Ocean) (**Figure 2-2**). The local landscape consists of flat tundra with abundant lakes. Regional climate is impacted by the northern latitude and proximity to the ocean. Winters are long and cold, summers short and cool, and wind is persistent (USGS, 1994a; USGS, 1994b). Average monthly temperatures in Utqiaġvik range from a minimum of -5.4 degrees Fahrenheit (°F) in November to a high of 45.8 °F in July (WRCC, 2018). The average total annual precipitation is 4.67 inches, average total annual snowfall is 32.5 inches, and average maximum snow depth is 11 inches (WRCC, 2018a).

Geologic Setting

Former NARL Barrow is located on a gravel and tundra peninsula on the Arctic Coastal Plain (**Figure 2-2**). The geology at Former NARL Barrow consists of unconsolidated sediments overlying Cretaceous age bedrock (USGS, 1994b). The geologic sequence is composed of (from deepest to shallowest) the Topogorak Formation, a marine-clay shale sequence extending from 450 feet to at least 1,400 feet below ground surface (bgs); the Grandstand Formation, a claystone and sandstone sequence extending from about 50 to 450 feet bgs; and the Gubik Formation, an unconsolidated marine and nonmarine gravel, sand, slit, and clay sequence (URS Greiner, 2000). At Former NARL Barrow, the Gubik Formation extends from the ground surface to about 50 feet bgs (URS Greiner, 2000). Coarse sand and gravel are the predominant soil types and can reach a thickness of approximately 65 feet (URS Greiner, 2000). Overlying the gravel deposits are organic and clay or loam deposits of the tundra meadows. Some finer deposits of silt, clay, and peat occur in drained lake basins and along beach ridges. Where most of buildings have been constructed, the underlying soil consists of coarse-grained deposits. Newer buildings, toward the southeast of the Main Camp Area were constructed on top of sand and gravel fill that was placed over the tundra. The fill deposits are typically 2 to 4 feet thick but may be up to 10 feet thick in places (URS Greiner, 2000).

Permafrost is continuous in the region and acts as a confining layer (USGS, 1994a). Soil at Former NARL Barrow are frozen for the majority of the year. During the summer, between late June and late October, the upper layers of the permafrost slowly thaw, producing what is termed the "active zone". The maximum thawed depth of the active zone is reached by August or September and varies by year. Perturbations to overlying vegetation and organic-rich soil, which are insulating, result in increased thaw depths (NSB, 2015; USGS, 1994b). At Former NARL Barrow, the thaw depth is typically less than about 1.5 feet in undisturbed areas and deeper in unvegetated areas such as the Main Camp (generally less than 7 feet) (USGS, 1994b and 1995; URS Geiner, 2000). Deeper depths to permafrost ("thaw bulbs") are observed under heated buildings, other artificial structures, and lakes. For example, the depth to permafrost beneath a heated building near Utqiaġvik was measured to be 49 feet and the depth to permafrost beneath Imikpuk Lake is more than 160 feet (USGS, 1994b; USGS, 1995). The depth to permafrost is also increased by the chemical composition of groundwater (especially salinity) (USGS, 1994b; USGS, 1995). Where the active zone is saturated by saline or a mixture of hydrocarbons and water, the thawed layer may extend up to 11 feet deep (URS Greiner, 2000). Conversely, unheated structures and raised heated structures that block sunlight reduce the depth to permafrost (USGS, 1995). The depth to permafrost depth is also influenced by topography and can be shallower under elevated roads (USGS, 1994a). The permafrost thickness in the Utqiaġvik area has been estimated to be as thick as 670 feet, based on extrapolation of the thermal gradient (NAVFAC, 2009).

Hydrogeologic Setting

Groundwater at the Former NARL Barrow is seasonal and exists above the deeper permafrost during the thaw season, between June and October, when near-surface permafrost thaws to a depth of up to approximately 6 feet bgs. Because the active zone is only a few feet thick and remains frozen for most of the year, groundwater is not a viable source of potable water. Isatkoak Lagoon, located southwest of Former NARL Barrow (**Figure 2-2**) supplies potable water for the City of Utqiaġvik.

Frozen ground limits infiltration at the time of snowmelt (typically June); therefore, most of the snowmelt becomes surface runoff, with only minimal percolation to the active zone groundwater system. Summer precipitation contributes negligible recharge to the groundwater system at Former NARL Barrow because evapotranspiration typically equals precipitation during the thaw season (USGS, 1994a; USGS 1994b). Because of the confining nature of permafrost, there is also little movement of groundwater from the active zone above the permafrost and groundwater confined beneath the permafrost. As such, there is limited to no recharge from the active zone to confined groundwater beneath the permafrost at Former NARL Barrow. Infiltration of precipitation and runoff is limited to the active zone and is prevented from reaching deeper groundwater (NEESA, 1983). Refreezing of the active zone typically begins by September, progressing from the surface downward.

The direction of groundwater flow in the active zone is highly variable during the thaw season and can change from year to year because of the shallow depth of the active layer, changes to the active layer as the ground thaws, and ice-wedge polygon formation[6] (USGS, 1994b). Due to these dynamic arctic phenomena distinct groundwater flow regimes occur at scales ranging from centimeters to tens of meters rather than at regional scales (USGS, 1994b). Groundwater flow directions at Former NARL Barrow (past and current) are not well defined. Generally, the shallow groundwater flow direction within the active zone typically follows topography at the Former NARL Barrow, because, in general, the permafrost surface mimics the land surface (USGS, 1994a; USGS, 1994b). Active-zone groundwater at Former NARL Barrow is anticipated to generally flow towards the Arctic Ocean, Imikpuk Lake, or nearby lagoons with deviations related to the depths of the active zone (depth to permafrost) as further discussed in Section 4.2.

Hydrologic Setting

In the Utqiaġvik area, permafrost forms a barrier to infiltration of surface water. During snowmelt, the flat topography and lack of infiltration, cause seasonal thaw lakes to cover approximately 50 to 90 percent of the coastal plain. The coastal tundra is largely covered with water following snowmelt (URS Greiner, 2000). Small streams forming on the tundra surface are primarily the result of surface runoff immediately following ice breakup. The streams achieve maximum discharge within a few days of snowmelt (URS Greiner, 2000).

Imikpuk Lake and a series of salt water lagoons are the main surface water features at Former NARL Barrow. Imikpuk Lake is approximately 70 acres in area with a maximum depth of about 9 feet (Hart Crowser, 1998). The hydrologic interaction between Imikpuk Lake and the groundwater at the Airstrip Site has been assessed previously (USGS, 1994a). In this study, the total annual inflow to Imikpuk Lake was estimated to be approximately 300,000 m^3/year, with the primary source of inflow to the lake assumed to be precipitation. The groundwater flux from the Airstrip Site to Imikpuk Lake was estimated to be approximately 173 m^3/year, less than 0.1 percent of the estimated annual inflow to Imikpuk Lake (USGS, 1994a). This estimate is anticipated to overestimate the flux to Imikpuk Lake because it does not consider variations in land surface topography at the Airstrip Site and the potential presence of permafrost ridges beneath buildings and elevated roadways at the site may serve as impediments to groundwater flow (USGS, 1994a).

A formal Federal Emergency Management Agency (FEMA) flood hazard assessment has not been completed for this portion of Alaska (FEMA, 2018), but the area is susceptible to storm surges that may result in flooding and increased erosion (NSB, 2015). The largest storm of record occurred on October 3, 1963 (NSB, 2015). The surge associated with this storm led to flooding of the Main Camp Area at Former NARL Barrow and areas adjacent to

[6] Ice-wedge polygons are formed as soil cracks in response to low temperatures in a characteristic polygon pattern that covers the tundra. These cracks fill with water during the warmer months. As the water freezes during colder months it forms ice wedges. The cycle of thaw and freeze causes these cracks and ice wedges to become larger over time.

lakes and lagoons (NSB, 2015). Sea water overflowed into Imikpuk Lake, which prompted the use of desalination units to restore the lake (restoration was completed in 1969) (NEESA, 1983).

Ecological Receptors

The following Federally listed threatened and endangered species are known to or are believed to occur in the North Slope borough of Alaska and may occur within 1 mile of Navy property at Former NARL Barrow (USFWS, 2018a):

- Birds: Eskimo Curlew (*Numenius borealis*, endangered), Spectacled Eider (*Somateria fischeri*, threatened), Steller's Eider (*Polysticta stelleri*, threatened)
- Mammals: Wood Bison (*Bison bison athabascae*, threatened) and Polar Bear (*Ursus maritimus*, threatened)

No portion of Navy property at Former NARL Barrow falls within United States Fish and Wildlife Service- (USFWS-) mapped critical habitat (USFWS, 2018c).

Water Usage

Surface water is the primary source of potable water near Former NARL Barrow, as groundwater is not a viable source of drinking water. Navy-owned property at Former NARL Barrow is no longer in use and there is no regular need for potable water. Nearby UIC-owned buildings on disposed property are supplied potable water from the City of Utkiaġvik. The City of Utkiaġvik obtains potable water from Isatkoak Lagoon (**Figure 2-2**); this water is treated with micro- and nano-filtration (NSB, 2015). In 2017, the Barrow Utilities and Electric Cooperative, Inc. (BUECI) sampled the Isatkoak Reservoir and the post-treatment water (after filtration) for PFAS. The water from Isatkoak Reservoir tested above the USEPA lifetime health advisory for PFOS and PFOA, but the post-treated water results were non-detect. The results can be obtained from BUECI.

Imikpuk Lake, which is located adjacent to the Airstrip and Antenna Field Sites (**Figure 2-2**) historically provided drinking water for Former NARL and was used seasonally by hunters and fishers as a source of drinking water before September 2017. In September 2017, an advisory was issued to not use Imikpuk Lake as a source of drinking or cooking water based on the detection of PFOS and PFOA exceeding the USEPA lifetime health advisory (Alaska DHSS, 2017) (as described in **Section 1.4.3**).

2.1.3 Other PFAS Investigations

An investigation of PFAS in Imikpuk Lake was conducted in 2017, as described in **Section 1.4**. Laboratory results indicate that PFOA, PFOS, and PFBS were present in surface water samples collected from the lake. The summed concentrations of PFOS and PFOA exceeded the USEPA lifetime health advisory of 70 ppt (CH2M, 2018). No other PFAS investigations have been conducted at Former NARL Barrow.

2.2 Former Distant Early Warning Line Station Point McIntyre

The following subsections present facility information relevant to this PA for the former DEW Line Station located at Point McIntyre (Former DEW Link Station Point McIntyre) including facility background, environmental setting, and other PFAS investigations.

2.2.1 Facility Background

Former DEW Line Station Point McIntyre was previously a radar station and research camp located on Gwydyr Bay, along the arctic coast of Alaska (**Figure 2-1**). Former DEW Line Station Point McIntyre is not actively used by the Navy and no active ranges are present.

Former DEW Line Station Point McIntyre is located near Prudhoe Bay approximately 15 miles northwest of Deadhorse, Alaska (**Figure 2-3**). The historical boundary of Navy property associated with Former DEW Line Station Point McIntyre is defined by United States Survey (US Survey) 4044 and included Lot 1 and Lot 2 (NAVFAC NW Asset Management Land Surveyor, 2018, pers. comm.). The Navy currently owns the surface estate of US

Survey 4044 Lot 1, where Former DEW Line Station Point McIntyre is located, and the State of Alaska owns the mineral rights to Lot 1. The Bureau of Land Management (BLM) currently owns US Survey 4044 Lot 2, including the mineral rights. Former DEW Line Station Point McIntyre occupies approximately 17 acres on relatively flat terrain, consisting of a new Freezeback Landfill (constructed in 2013 to 2014), gravel pads, and concrete pads associated with the former buildings (**Figure 2-3**).

Point McIntyre was built during the 1950s by the Air Force. Air Force use was established by PLO 1571 on January 26, 1957. Several buildings, an airstrip, a fuel tank, and miscellaneous utilities were constructed at the site in support of the activities at the Former DEW Line Station Point McIntyre. In addition, a landfill (the Former Eroding Landfill) was constructed immediately adjacent to Gwydyr Bay (**Figure 2-3**). Site activities were limited to communications and vehicle maintenance, and the station had to supply its own electrical power, heat, and water. Former DEW Line Station Point McIntyre was deactivated in 1958. The land changed jurisdiction from the Air Force to the Navy by PLO 3780 dated August 10, 1965, for use as an arctic research station. Seasonal use by oil exploration and scientific field crews has also occurred in the past. During the operational period of the Former DEW Line Station Point McIntyre, miscellaneous waste material accumulated and was left onsite. The Navy ended arctic research support in 1980 and the station ceased to be used. In 2013 to 2014, waste and impacted soil at the Former Eroding Landfill was removed. Nonhazardous waste was placed in a new landfill (the Freezeback Landfill) collocated with a portion of the airstrip (Tetra Tech, 2016) (**Figure 2-3**).

2.2.2 Environmental Setting

Geologic Setting

The Former DEW Line Station Point McIntyre is located on an Arctic coastal plain with wet tundra. The site is typically flat with gravel and sandy soil at the surface (America North Incorporated and DOWL Engineers, 1988). Where site facilities have been constructed, the ground surface consists of 3- to 5-foot thick gravel pads overlying the tundra, on which the facilities have been built. The gravel pads consist of coastal gravels and sand, with some peat and organic soil found at a depth of approximately 2 feet below the pad, based on data from one test hole location (Hart Crowser, 1999). The soil below the gravel pad are typically 0.2 to 0.5 feet of peat overlying frost-susceptible silts. Permafrost has been encountered at 3.5 feet on the gravel pad and at 1.3 to 2 feet in undisturbed areas (Hart Crowser, 1999).

Hydrogeologic Setting

There are no known aquifers at the Former DEW Line Station Point McIntyre. Permafrost is continuous at the site and prevents freshwater recharge to groundwater below the permafrost. There is a seasonal active zone of 1 to 2 feet, where the shallow groundwater located above the permafrost thaws during the summer season. The permafrost then extends from 2 feet to a depth of 2,000 feet in the Prudhoe Bay vicinity (USACE, 1994). During a 2008 groundwater sampling event, seasonal groundwater within the active zone was present between 2 to 4 feet below ground surface (URS Group, Inc. 2011).

Hydrologic Setting

At the surface of the undisturbed tundra areas at Former DEW Line Station Point McIntyre, the ground is saturated above the permafrost. The amount of supra-permafrost water varies with the depth of the active layer but is frozen from mid-September to June. During a 1987 site investigation, standing water depths were estimated to be 1 to 2 feet (USACE, 1994). At the station, the natural movement of surface water above the permafrost has been interrupted by the gravel pads. Movement of water may be in any direction from the elevated gravel pad to undisturbed tundra. On the site, standing surface water exists in low spots and between the gravel roads and pads (USACE, 1994). A formal FEMA flood hazard assessment has not been completed for this area (FEMA, 2018).

Ecological Receptors

Federally-listed threatened and endangered species that are known to or are believed to occur in the North Slope borough of Alaska and may occur within 1 mile of Former DEW Line Station Point McIntyre are the same as those

presented for Former NARL Barrow in **Section 2.1.2**. No portion of Former DEW Line Station Point McIntyre falls within USFWS-mapped critical habitat (USFWS, 2018c).

Water Usage

This former facility is currently unused and uninhabited. Groundwater is not a viable source of drinking water due to the arctic climate. There is no known use of surface water at the former facility. Recent site inspections revealed no signs of activity at the site (Tetra Tech, 2016). Surrounding property is used for oil exploration and production.

2.2.3 Other PFAS Investigations

No PFAS investigations have been performed at this special area.

2.3 Former Distant Early Warning Line Station Icy Cape

The following subsections present facility information relevant to this PA for DEW Line Station Icy Cape including facility background, environmental setting, and other PFAS investigations.

2.3.1 Facility Background

Former DEW Line Station Icy Cape is a former radar station and research camp located on a small plot of land on the North Slope of Alaska approximately 130 miles southwest of Barrow, Alaska (**Figures 2-1** and **2-4**). Former DEW Line Station Icy Cape is not actively used by the Navy and no active ranges are present. This site consists of two noncontiguous parcels of land. Parcel 1, US Survey 5261, is located on the south shore of Kasegaluk Lagoon, and Parcel 2 is located northeast of Parcel 1 on the Arctic Ocean (**Figure 2-4**).

In 1957, the Air Force established Former DEW Line Station Icy Cape using land withdrawn under PLO 1571. This consisted of US Survey 5261 (Parcel 1) (**Figure 2-4**). In 1959, Parcel 2 was added to the Icy Cape site. The station was constructed on several raised, gravel pads and had two gravel airstrips: an older 1,000-foot strip on the southwestern end of the site (South Gravel Runway) and a newer 2,700-foot strip on the northeastern end of the site (North Gravel Runway) (**Figure 2-4**). Gravel roads connected the site facilities and airstrips and led northward to the nearby beach. The gravel pads, airstrips, and roads were all constructed directly on the tundra. DEW Line operations ceased in 1963 (The DEWLine, 2018; NAVFAC, 2013). In addition to being used as a DEW Line station, the facility was used as a NARL field research station (NAVFAC, 2010); no documentation regarding the dates of use as a research station was available for review. In August 1965, both parcels were transferred from the Air Force to the Navy (PLO 3780), and in April 1976 Parcel 2 was reassigned to the Naval Petroleum Reserve No. 4. In June 1977, Parcel 2 was transferred from the Navy to the BLM, at which time the Naval Petroleum Reserve No. 4 was renamed the National Petroleum Reserve - Alaska (NPR-A). Parcel 1 (**Figure 2-4**) was unintentionally not included in this transfer; this was not discovered until 2005. Parcel 1 is still owned by the Navy; however, based on the information gathered during this PA, it has not been in use since before the intended date of transfer to the BLM in June 1977.

2.3.2 Environmental Setting

Geologic Setting

The regional geology near Former DEW Line Station Icy Cape is characterized by extensive glacial till overlain by sedimentary alluvium. Icy Cape is part of the Arctic Coastal Plain Province, a flat, lake-dotted, tundra-covered lowland bounded on the south by the slightly higher and more rolling topography that merges with the northern section of the Arctic Foothills Province. The Icy Cape site is mostly flat with an elevation of approximately 35 feet above sea level. Soil at the site are mostly an organic sand and silt mix (NAVFAC, 2012).

Hydrogeologic and Hydrologic Setting

The Arctic Plain on which Former DEW Line Station Icy Cape is located is an area of low relief with very poor drainage due the existence of permafrost. There are numerous lakes, and boggy, wet tundra. During the summer months (late June through mid-September), surface water and shallow groundwater thaw, creating a seasonal active groundwater zone above the permafrost (NAVFAC, 2012). A formal FEMA flood hazard assessment has not been completed for this area (FEMA, 2018).

Ecological Receptors

Federally listed threatened and endangered species that are known to or are believed to occur in the North Slope borough of Alaska and may occur within 1 mile of Former DEW Line Station Icy Cape the same as those presented for Former NARL Barrow in **Section 2.1.2**. No portion of Former DEW Line Station Icy Cape falls within USFWS-mapped critical habitat (USFWS, 2018c).

Water Usage

This former facility is currently unused and uninhabited. Groundwater is not a viable source of drinking water due to the arctic climate. There is no know use of surface water at the former facility. A 2012 report notes that no development is present within several miles of the facility, except for a dilapidated hunting cabin a few miles southwest (NAVFAC, 2012).

2.3.3 Other PFAS Investigations

No PFAS investigations have been performed at this special area.

2.4 Southeast Alaska Acoustic Research Facility

The following subsections present facility information relevant to this PA for SEAFAC including facility background, environmental setting, and other PFAS investigations.

2.4.1 Facility Background

SEAFAC is an acoustic measurement facility located in southeast Alaska near Ketchikan (**Figures 2-1 and 2-5**). The facility is located on Back Island in Behm Canal. The facility consists of in-water acoustic measurement sites and a land-based Back Island Operation Center and supporting facilities (Navy, 2012) (land-based facilities are shown on **Figure 2-5**). All facilities are located within a restricted area of Behm Canal (Navy, 2012). No active ranges are present.

The Navy was granted use of a portion of Back Island for construction of SEAFAC from the United States Department of Agriculture Forest Service through a term special use permit in 1989 (USDA, 1989). SEAFAC became operational in 1992. The facility is used to passively measure the level of sound emitted by sea vessels (submarines or surface ships), which in turn are used to assess the vulnerability of the vessel and develop quieting measures (Navy, 2012). In-water facilities consist of two acoustic measurement sites (the Underway Measurement Site and the Static Site, shown on Figure 1 of **Appendix A**) and associated acoustical equipment and cables. These are described in **Appendix A**.

Data collected at the in-water measurement sites are relayed to the land-based Operations Center, which is located on the 5.5-acre Back Island (NAVSEA, 2018). Facilities on Back Island listed in the Internet Naval Facilities Assets Data Store (iNFADS) database include basic utility and communication systems (Navy, 2018a). Units listed in the Navy's Other Environmental Liabilities (OEL) database are an aboveground diesel storage tank and a glycol heat exchange unit (Navy, 2018b). Other structures include a project trailer, utilities building, water storage tank, and electrical substation (**Figure 2-5**). A waste disposal area is adjacent to the installation (**Figure 2-5**). No areas associated with SEAFAC are listed in ADEC's Spill Prevention and Response Contaminated Sites database (ADEC, 2018c).

2.4.2 Environmental Setting

Geologic Setting

The in-water facilities of SEAFAC are located in Behm Canal. Behm Canal is a large, deep, protected fjord that was carved out of bedrock during glaciation, by glaciers up to 4,000 feet thick. Some areas of Behm Canal are up to 2,000 feet deep. Back Island, on which the on-shore SEAFAC facilities were constructed, is located in Behm Canal and is composed of Upper Triassic slate with interbeds of sandstone. The bedrock is exposed between the low- and high-water marks, forming an intertidal bedrock shelf around the entire shoreline of Back Island. The bedrock is durable and not subject to excessive erosion by wave action. Above the bedrock, is a thin soil veneer that supports forest and brush-type vegetation (PNL, 1988).

Hydrogeologic Setting

No information regarding the hydrogeologic setting at Back Island was identified during preparation of this PA report. Groundwater on Back Island is not used as a source of drinking water.

Hydrologic Setting

On Back Island, there are no streams or creeks of any substantial size. A formal FEMA flood hazard assessment has not been completed for this area (FEMA, 2018).

Ecological Receptors

The following Federally listed threatened and endangered species is known to or is believed to occur in the borough of Ketchikan Gateway, Alaska and may occur within 1 mile of SEAFAC (USFWS, 2018b):

- Bird: Short-tailed albatross (*Phoebastria (=Diomedea) albatrus*, endangered)

No portion of SEAFAC falls within USFW- mapped critical habitat (USFWS, 2018c).

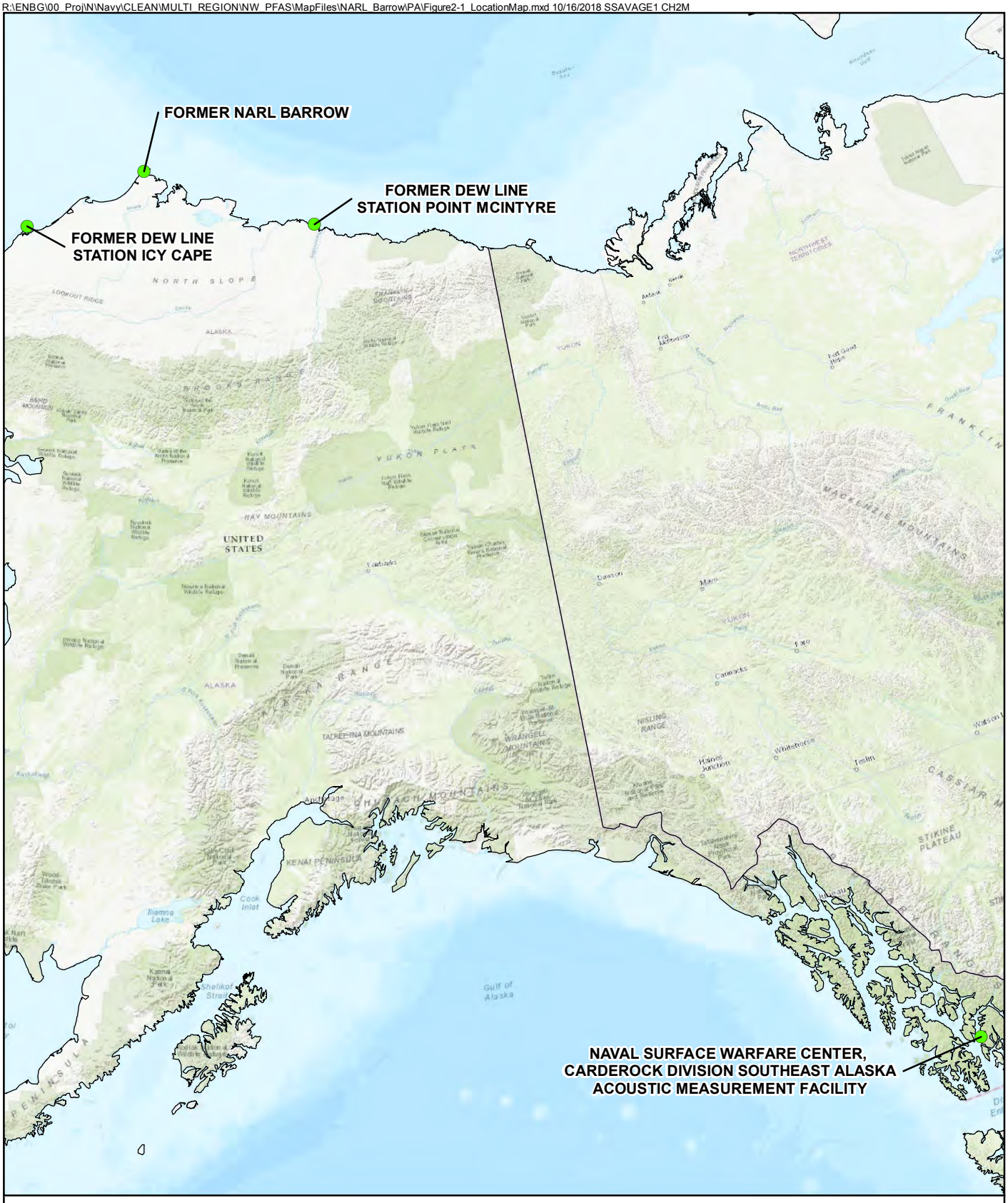
Water Usage

Water supplied to the facilities on Back Island is captured by a rooftop rainwater catchment system. Supplemental water needs are met by transporting water to the site by barge (PNL, 1988; Site Director, SEAFAC, 2018, pers. comm.).

2.4.3 Other PFAS Investigations

As described in **Section 1.4.2**, on-Base drinking water at SEAFAC was tested in November 2016. Testing included analysis of PFOS and PFOA; neither were detected above laboratory reporting limits (Navy, 2016; Liebman, 2018, pers. comm.).

R:\ENBG\00_Proj\N\Navy\CLEAN\MULTI_REGION\NW_PFAS\MapFiles\NARL_Barrow\PA\Figure2-1_LocationMap.mxd 10/16/2018 SSAVAGE1 CH2M



LEGEND

- Former NARL Barrow and Associated Special Areas

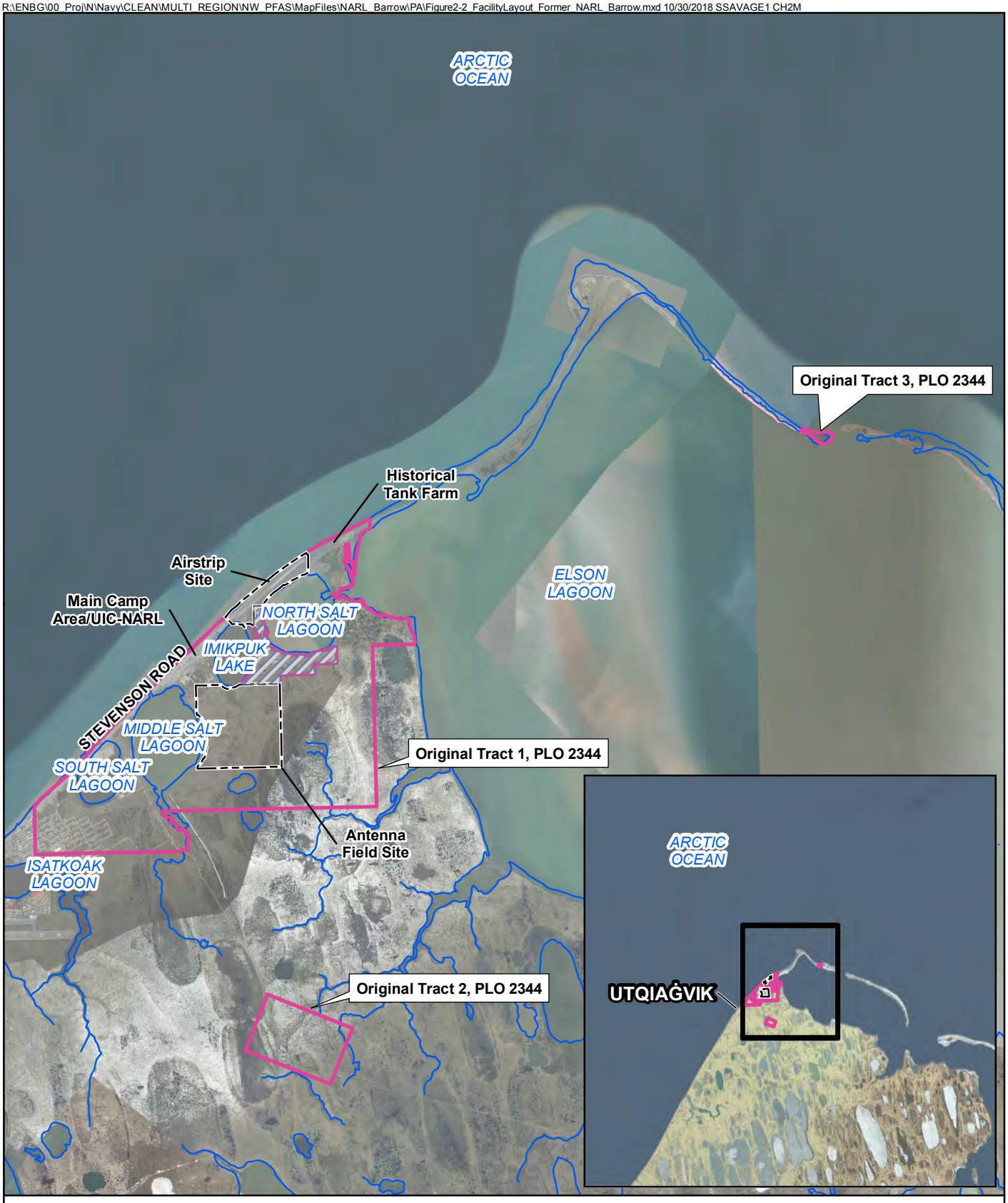
Figure 2-1
Location Map
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 75 150
Miles

1 inch = 150 mile

N

R:\ENBG\00_Proj\N\Navy\CLEAN\MULTI_REGION\NW_PFAS\MapFiles\NARL_Barrow\PA\Figure2-2_FacilityLayout_Former_NARL_Barrow.mxd 10/30/2018 SSAVAGE1 CH2M



LEGEND

- Hydrology
- Current Navy Property Boundary
- Historical Installation Boundary
- Current Air Force Property (not included in PLO 2344 Tract 1)

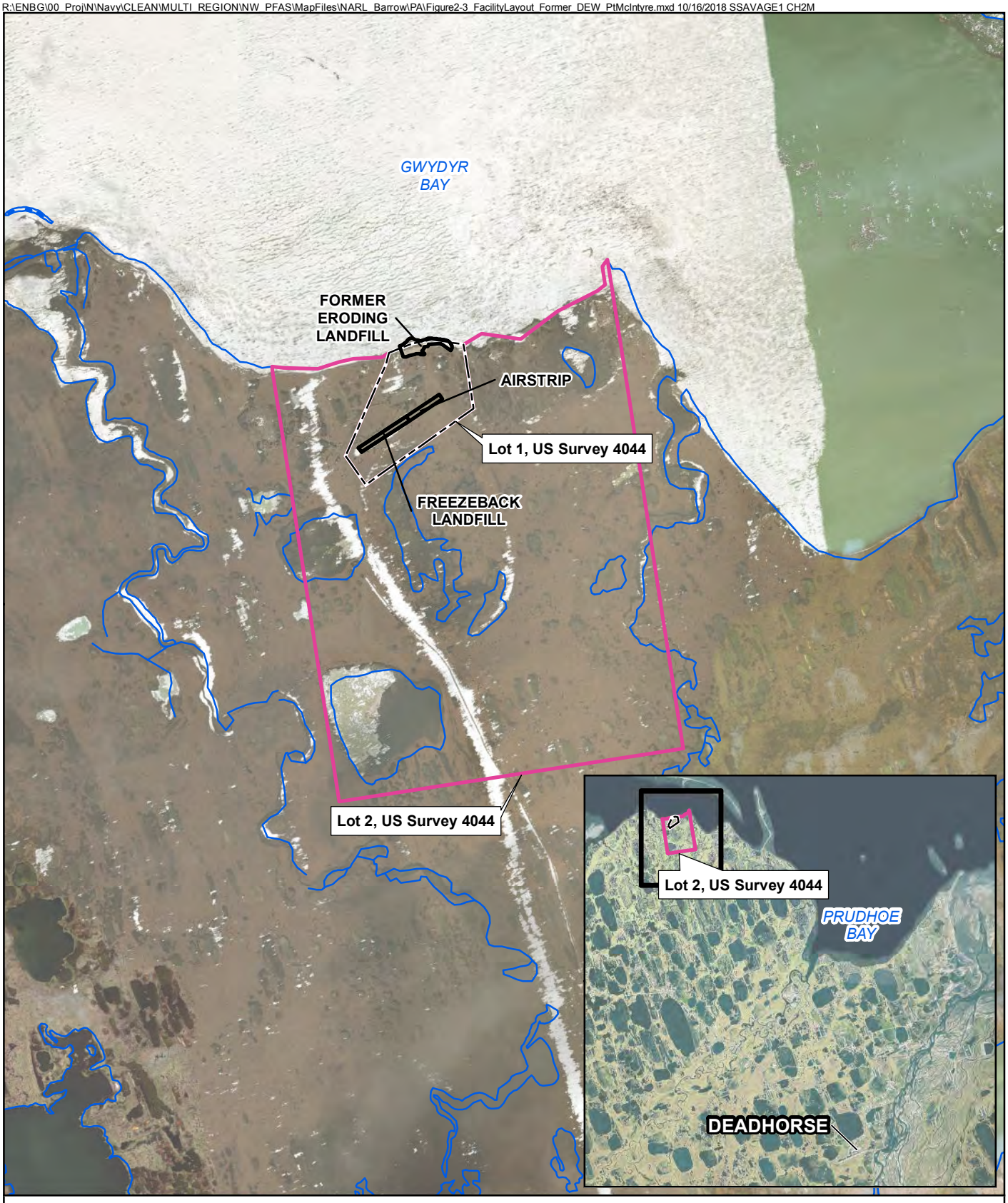
Figure 2-2
Facility Layout: Former NARL Barrow
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 0.75 1.5 Miles

1 inch = 1.5 mile

N

R:\ENBG\00_Proj\N\Navy\CLEAN\MULTI_REGION\NW_PFAS\MapFiles\NARL_Barrow\PA\Figure2-3_FacilityLayout_Former_DEW_PtMcIntyre.mxd 10/16/2018 SSAVAGE1 CH2M



LEGEND

- Hydrology
- Site Feature
- Historical Installation Boundary
- Current Navy Property Boundary

Figure 2-3

Facility Layout: Former DEW Line Station Point McIntyre

Preliminary Assessment for PFAS

Former NARL Barrow, Utqiaġvik, Alaska

and Associated Special Areas

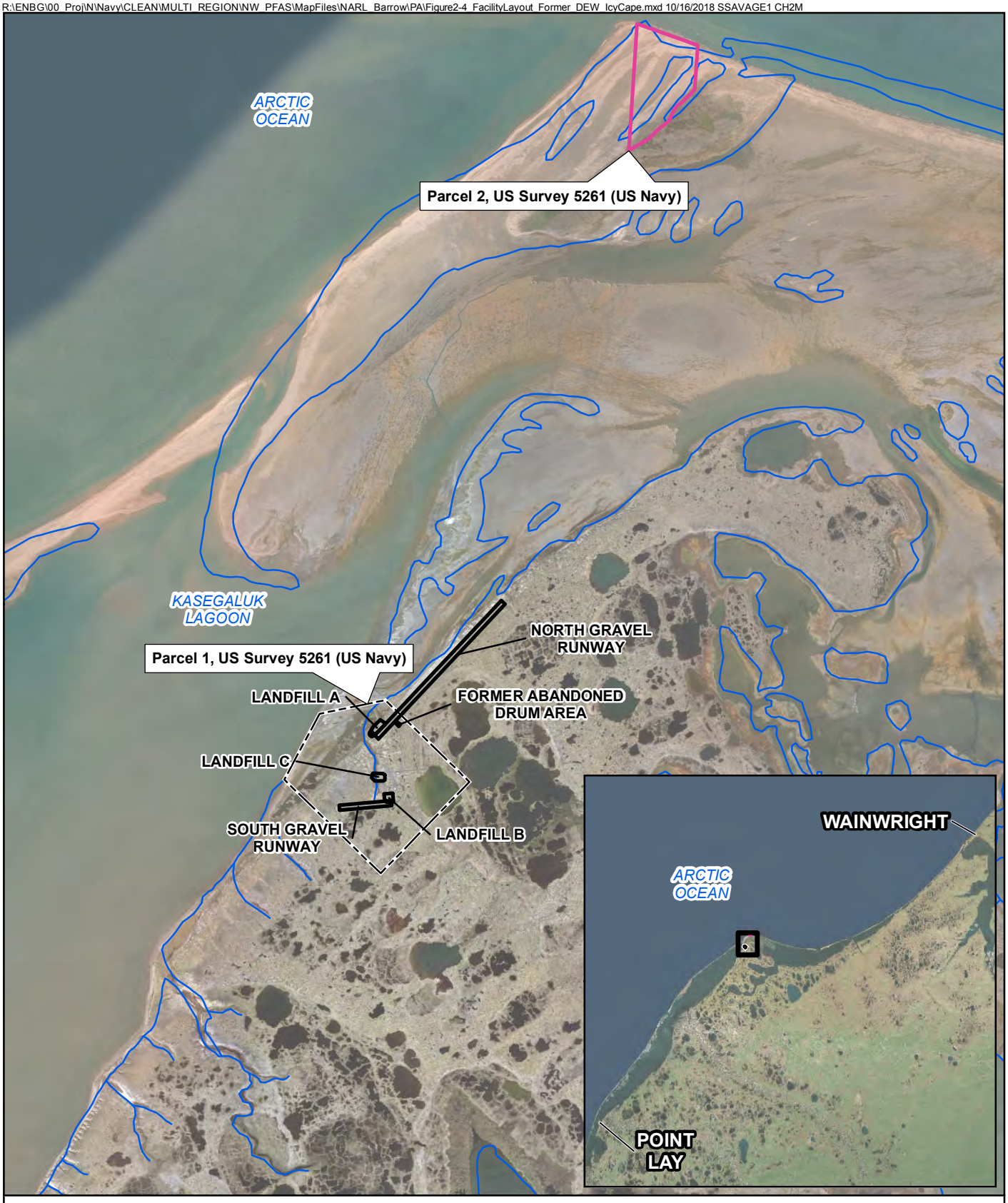
0 0.125 0.25

Miles

1 inch = 0.441919 mile

N

R:\ENBG\00_Proj\N\Navy\CLEAN\MULTI_REGION\NW_PFAS\MapFiles\NARL_Barrow\PA\Figure2-4_FacilityLayout_Former_DEW_IcyCape.mxd 10/16/2018 SSAVAGE1 CH2M



LEGEND

- Hydrology
- Site Feature
- Historical Installation Boundary
- Current Navy Property Boundary

Figure 2-4
Facility Layout: Former DEW Line Station Icy Cape
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 0.125 0.25
Miles
1 inch = 0.505 mile

N

R:\ENBG\00_Proj\N\Navy\CLEAN\MULTI_REGION\NW_PFAS\MapFiles\NARL_Barrow\PA\Figure2-5_FacilityLayout_SEAFAC.mxd 10/18/2018 SSAVAGE1 CH2M



LEGEND

- Hydrology
- Site Feature
- Navy Use Area Boundary

Figure 2-5
Facility Layout: SEAFAC
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Assoctiated Special Areas

0 0.125 0.25
Miles
1 inch = 0.284091 mile
N

SECTION 3

Assessment Methods

As described in Section 1, Introduction, the following activities were performed in support of this PA:

- A review of existing information to identify and characterize potential PFAS releases and to identify potential receptors.
- Interviews conducted with relevant site personnel to validate and verify data collected during the data review, and to provide supplemental information.
- A site reconnaissance of the facility (if PFAS release is suspected) to identify any evidence of PFAS releases and potential receptors and migration pathways, to identify all areas of concern, and to fill data gaps identified in the data review and interviews.

These activities are described in the following subsections.

3.1 Review of Existing Information

Existing information was gathered and evaluated to identify and characterize potential PFAS sources and potential receptors. The information was obtained from existing documents, databases, and records. All resources reviewed are documented in **Appendix B**. Electronic (portable document format [PDF]) versions of documents are also included in **Appendix B**. The following document types were evaluated.

Naval Installation Restoration Information Solution Records

Environmental Restoration Program reports and correspondence from the Administrative Record available in Naval Installation Restoration Information Solutions Records were searched for key terms to identify potential PFAS source areas, information on physical investigations, and potential pathways and receptors. Reports and correspondence were obtained digitally or viewed as hardcopies at NAVFAC Northwest, Bangor, Washington.

Internet Navy Facilities Asset Data Store and Other Environmental Liabilities Databases

The iNFADS, which is the official record of the Navy's real property assets, was queried for facilities associated with Former NARL Barrow (which also returned facilities associated with Former DEW Line Station Point McIntyre and Former DEW Line Station Icy Cap) and Naval Base Keyport (which included facilities associated with SEAFAC). In addition, separate queries were performed in the Other Environmental Liabilities (OEL) module to identify OEL units associated with Former NARL Barrow and the special areas. The resulting lists of facilities and OEL units were reviewed for facility or unit types associated with PFAS release. If a facility or unit was identified as a potential PFAS source, additional documentation associated with these facilities or units was obtained as necessary and reviewed.

Facility Operations Records

Former NARL Barrow, Former DEW Line Station Point McIntyre, and Former DEW Line Station Icy Cape are not active facilities, but historical operations records were reviewed where available. Spill records for SEAFAC were reviewed.

Internet Records

Internet search engines were used to find current and historical information regarding the installations and nearby receptors. Various internet databases were also queried for information; these included the Bureau of Accident Archives database, the Aviation Safety Network databases, and the ADEC Spill Prevention and Response Contaminated Site Search.

National Archives Search

A search of documents curated by the National Archives and Records Administration was performed using various search terms associated with Former NARL Barrow and the special areas. The resulting list of available documents was reviewed to identify those with the potential to contain information relevant to this PA. When available, relevant PDF files were downloaded and reviewed remotely. Relevant hardcopy resources were reviewed at the National Archives in Seattle, Washington.

Environmental Data Resources Reports

Aerial Photo Decade Package Reports (EDR, 2018a; EDR, 2018b) were reviewed for Former NARL Barrow and the surrounding area.

Aerial Photographs

Contemporary and historical aerial photographs of each facility were reviewed. These photographs captured the following years:

- Former NARL Barrow: 1955, 1973, 1974, 1979, 2004, 2005 through 2010, 2012, 2014, and 2016 (EDR, 2018a; Google Earth, 2018a)
- Former DEW Line Station Point McIntyre: 2006, 2009, 2012, 2014 (Google Earth, 2018b)
- Former DEW Line Station Icy Cape: 2006, 2011, and 2012 (Google Earth, 2018c)
- SEAFAC: 2005, 2009, 2017 (Google Earth, 2018d)

Geographic Information System and Map Data

Geographic information system (GIS) data and historical maps were reviewed to develop an understanding of current and historical facility boundaries, locations, and boundaries of site features and areas of environmental concern, and environmental setting information. GIS records reviewed were curated by Naval Facilities Engineering Command (NAVFAC) Northwest Asset Management, NAVFAC Georeadiness Center, the North Slope Borough (NSB), ADEC, FEMA, and the USFWS. Additional information was gathered from scanned maps available in reports and permits. Sources are referenced in the body of this report and/or in **Appendix B**.

3.2 Interviews

In-person interviews were conducted in Utqiaġvik and Anchorage, Alaska on July 9 to 12, 2018, with former personnel associated with Former NARL Barrow, UIC staff, and others with historical ties to Former NARL Barrow. Additional interviews were conducted over the phone between July and October 2018 with interviewees with knowledge of Former NARL Barrow, Former DEW Line Station Point McIntyre, Former DEW Line Station Icy Cape, and SEAFAC. The goal of these interviews was to gather pertinent information regarding the facility history and operations, validate and verify data collected during document and record reviews, and identify other information related to PFAS not previously found in historical documents.

The interviews were conducted in person or by phone. Each interview session was guided by and documented on a standard questionnaire[7]. Completed questionnaires are provided in **Appendix C.** The information from the interviews was also used to confirm and select additional locations to observe during site visits. This information is referenced throughout this report.

[7] A standard questionnaire was not on-hand for the interview with NAVFAC Northwest Historical Architect. Facility-specific questions were asked, and the information was recorded on a formal communication record form.

The following personnel were interviewed[8] (additional interviewee details are presented in **Appendix C**):

- Former NARL Fire Chief
- Former NARL Firefighter #1
- Former NARL Firefighter #2
- Former NSB Employee and Volunteer Firefighter
- Land Management Administrator, NSB
- NAVFAC Northwest Historical Architect (Former NARL Barrow, Former DEW Line Station Point McIntyre, Former DEW Line Station Icy Cape)
- Site Director, SEAFAC
- Vice President, UIC

3.3 Visual Site Inspection

Site reconnaissance was performed at facilities with potential PFAS source areas, as identified during the review of existing information and interviews. A visual site inspection (VSI) of Former NARL Barrow was completed on July 10 and 11, 2018. VSI of the specials areas was not necessary. During the VSI, accessible areas were visited to identify evidence of PFAS use and disposal, and to fill data gaps identified in the preliminary review. Physical site characteristics (for example, surface flow and drainage conditions) were documented for those areas identified during the preliminary review and interviews. Information gathered during the VSIs is summarized in **Section 4**.

3.4 Summary of Areas Evaluated

A list of all areas evaluated in this PA is presented in **Table 3-1** for current Navy property at Former NARL Barrow and **Table 3-2** for the associated special areas (Former DEW Line Station Point McIntyre, Former DEW Line Station Icy Cape, and SEAFAC). The tables indicate whether the areas were or were not identified as a potential PFAS source area, along with the rationale for that identification. Areas identified as potential PFAS source areas are discussed in detail in **Section 4**. Areas evaluated that were not identified as potential PFAS source areas are recommended for no further action. All areas evaluated are shown on the following figures: **Figure 3-1** (Former NARL Barrow), **Figure 3-2** (Former DEW Line Station Point McIntyre), **Figure 3-3** (Former DEW Line Station Icy Cape), and **Figure 3-4** (SEAFAC). These figures also show nearby parcels if potential PFAS source areas were identified at the facility (**Figure 3-1** only).

8 In addition to the interviewees listed here, CH2M HILL, Inc. (CH2M) contacted other potential interviewees with current or historical ties to Former NARL Barrow. Potential interviewees were identified by CH2M staff or suggested by other interviewees. A reasonable attempt was made to contact each potential interviewee. In some cases, CH2M did not receive responses to email and voicemail requests for interviews; in other cases, the potential interviewees responded to interview requests, but declined to be interviewed.

Table 3-1. Areas Evaluated as Potential PFAS Source Areas at Former NARL Barrow

Initial Screening of Potential PFAS Source Areas at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Area	Potential PFAS Source Area (Y/N)	Rationale
Firefighting Training Areas		
No current or former firefighting training areas were identified on Navy property at Former NARL Barrow	NA	NA
Fire Stations		
No current or former firefighting training areas were identified on Navy property at Former NARL Barrow	NA	NA
Hangars		
(Building 136 [Navy Hangar] is included in the Airstrip Site discussion below)	NA	NA
Buildings with AFFF Fire-suppression Systems		
No buildings with AFFF suppression systems were identified at Former NARL Barrow	NA	NA
Emergency Response Areas		
(Two potential emergency response incidents are included in the Airstrip Site discussion below)	NA	NA
AFFF Spray Test Areas		
No AFFF spray test areas were identified on Navy property at Former NARL Barrow.	NA	NA
Runways		
Airstrip Site	See below	The following nine sites fall within the Airstrip Site (**Figure 3-2**). Several areas were evaluated to identify the potential as a PFAS source area. Although the areas were evaluated separately, and not all areas were identified to be potential PFAS source areas, the Airstrip Site is managed as one unit (NARL Cleanup Team, 2002). The Airstrip Site is also referred to as "Site 5" in recent environmental documents, and includes fuel spills that occurred at Sites 5, 6, and 7, as identified in the 1983 IAS (NEESA, 1983). These spills are all addressed under one decision document for the Airstrip Site (Site 5) (NARL Cleanup Team, 2002).
Building 136 (Navy Hangar)	Y	Building 136 (Navy Hangar) (**Figure 3-1**) is the location of a documented release of AFFF and a potential structure fire. See **Section 4** for additional information and **Section 5** for the recommended path forward.
1970 Constellation Crash	Y	A Lockheed L-1049H Super Constellation crash occurred at or near the Airstrip Site in 1970. The suspected locations of this crash (Potential Crash Sites A and B) are shown on **Figure 3-1**. The nature of the accident and any ensuing emergency response actions is unknown; however, based on the date of the crash, it is possible AFFF may have been used. See **Section 4** for additional information and **Section 5** for the recommended path forward.
1978 Twin Otter Crash	Y	A de Havilland DHC-6 Twin Otter crash occurred at or near the Airstrip Site in 1978. The suspected locations of this crash (Potential Crash Sites A and B) are shown on **Figure 3-1**. The nature of the accident and any ensuing emergency response actions is unknown; however, based on the date of the crash, it is possible AFFF may have been used. See **Section 4** for additional information and **Section 5** for the recommended path forward.
Site 5 - 1976 MOGAS Spill	N	Site 5 **(Figure 3-1**) was identified in the 1983 IAS as the location of a 1976 MOGAS spill. No documentation regarding use of AFFF in the management of this spill was identified during this PA. Two former firefighters who collectively served from 1964 to 1982 did not recall use of AFFF in the management of any fuel spill other than the 1970 spill behind Building 136 (Navy Hangar) (Former NARL Fire Chief, 2018, pers. comm.; Former NARL Firefighter #1, 2018, pers. comm.). Therefore, no further action is recommended for this spill.
Site 6 - 1978 JP-5 Spill	N	Site 6 (**Figure 3-1**) was identified in the 1983 IAS as the location of a 1978 JP-5 spill. No documentation regarding use of AFFF in the management of this spill was identified during this PA. Two former firefighters who collectively served from 1964 to 1982 did not recall use of AFFF in the management of any fuel spill other than the 1970 spill behind Building 136 (Navy Hangar) (Former NARL Fire Chief, 2018, pers. comm.; Former NARL Firefighter #1, 2018, pers. comm.). There is no known release of AFFF or other PFAS-containined chemcials associated with this fuel spill, therefore, no further action is recommended for this spill. .
Site 7 - 1978 MOGAS Spill	N	Site 7 (**Figure 3-1**) was identified in the 1983 IAS as the location of a 1978 MOGAS spill. No documentation regarding use of AFFF in the management of this spill was identified during this PA. Two former firefighters who collectively served from 1964 to 1982 did not recall use of AFFF in the management of any fuel spill other than the 1970 spill behind Building 136 (Navy Hangar) (Former NARL Fire Chief, 2018, pers. comm.; Former NARL Firefighter #1, 2018, pers. comm.). There is no known release of AFFF or other PFAS-containing chemicals associated with this fuel spill, therefore, no further action is recommended for this spill.
Building 124	N	Building 124 (**Figure 3-1**) was an aircraft refueling location. This site was evaluated as a location where AFFF may have been staged (for example, on firetrucks) during refueling operations; however, no information gathered during this PA supports this hypothesis. There is no known release of AFFF or other PFAS-containing chemicals associated with this area; therefore, no further action is recommended.

Table 3-1. Areas Evaluated as Potential PFAS Source Areas at Former NARL Barrow

Initial Screening of Potential PFAS Source Areas at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Area	Potential PFAS Source Area (Y/N)	Rationale
Building 126	N	Building 126 (**Figure 3-1**) was an aircraft refueling location. This site was evaluated as a location where AFFF may have been staged (for example, on firetrucks) during refueling operations; however, no information gathered during this PA supports this hypothesis. There is no known release of AFFF or other PFAS-containing chemicals associated with this area; therefore, no further action is recommended.
Building 135	N	Building 135 (**Figure 3-1**) was an aircraft refueling location. This site was evaluated as a location where AFFF may have been staged (for example, on firetrucks) during refueling operations; however, no information gathered during this PA supports this hypothesis. There is no known release of AFFF or other PFAS-containing chemicals associated with this area; therefore, no further action is recommended.
Wastewater Treatment Plants and Associated Disposal Areas		
No waste water treatment plants were identified on Navy property at Former NARL Barrow.	NA	NA
Landfills and Waste Disposal Areas		
Site 1 – Old Waste Disposal Area	N	Site 1 – Old Waste Disposal Area (**Figure 3-1**) is a documented solid waste disposal area partially located within the Antenna Field Site. Site 1 was initially identified during the 1983 IAS (NEESA, 1983) as an area used for disposal of solid waste generated at Former NARL Barrow. Based on the IAS, Site 1 was used for disposal from the mid-1940s until the early 1950s, when use of a landfill at South Salt Lagoon was initiated (NEESA, 1983). PFAS such as PFOS and PFOA were not used in commercial products such as stain and water-resistant products until the 1950s and use of AFFF did not occur until the 1960s (ITRC, 2017) (the date AFFF was first present at Former NARL Barrow is unknown). No documentation or anecdotal information regarding use of the site by the Navy after the early 1950s was identified during this PA. Based on the reported dates of use of Site 1 for disposal (before the early 1950s), t jhis area is not anticipated to be a potential PFAS source area; therefore, no further action is recommended. If additional information regarding Navy use of the site after 1960 becomes available, reevaluation of this area may be warranted.
Specialty Paint, Cleaner, or Pesticide Use or Release		
No use or release of PFAS-containing specialty paints, cleaners, or pesticides was identified on Navy property at Former NARL Barrow. Some mosquito abatement is known to have occurred up until 1968, but generally, Former NARL Barrow did not have a problematic insect population (NEESA, 1983).	NA	NA
Chromium Plating Shops		
No chromium plating shops were identified on Navy property at Former NARL Barrow.	NA	NA
Potential PFAS Storage Areas		
No potential PFAS storage areas were identified on Navy property at Former NARL Barrow.	NA	NA
Other		
No other areas of interest were identified on Navy property at Former NARL Barrow.	NA	NA

Notes:

JP-5 = jet propulsion 5

MOGAS = Motor Gasoline

NA = not applicable

N = no

Y = yes

Table 3-2. Areas Evaluated as Potential PFAS Source Areas at Former DEW Line Station Point McIntyre, Former DEW Line Station Icy Cape, and SEAFAC

Initial Screening of Potential PFAS Source Areas at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Area	Potential PFAS Source Area (Y/N)	Rational
Firefighting Training Areas		
No current or former firefighting training areas were identified at any special area.	NA	NA
Fire Stations		
No current or former fire stations were identified at any special area.	NA	NA
Hangars		
No hangars were identified at any special area.	NA	NA
Buildings with AFFF Suppression Systems		
No buildings with AFFF suppression systems were identified at any special area.	NA	NA
Emergency Response Areas		
No emergency response areas were identified at any special area.	NA	NA
AFFF Spray Test Areas		
No AFFF spray test areas were identified at any special area.	NA	NA
Runways		
Former DEW Line Station Point McIntyre: Airstrip	N	The Airstrip at the Former DEW Line Station Point McIntyre is located in the southern portion of Lot 1 of US Survey 4044 on property currently retained by the Navy (**Figure 3-2**). No plane crashes at this location are identified in aviation records, and no releases of AFFF or other PFAS-containing materials are known to have occurred. No further action is recommended.
Former DEW Line Station Icy Cape: North Gravel Runway	N	The North Gravel runway at the Former DEW Line Station Icy Cape is partially located in the northeastern portion of Parcel 1 of US Survey 5261, which is currently retained by the Navy (**Figure 3-3**). No plane crashes at this location are identified in aviation records and no releases of AFFF or other PFAS-containing materials are known to have occurred. No further action is recommended.
Former DEW Line Station Icy Cape: South Gravel Runway	N	The South Gravel runway at the Former DEW Line Station Icy Cape is located in the southern portion of Parcel 1 of US Survey 5261 on property currently retained by the Navy (**Figure 3-3**) No plane crashes at this location are identified in aviation records and no releases of AFFF or other PFAS-containing materials are known to have occurred. No further action is recommended.
Wastewater Treatment Plants and Associated Disposal Areas		
No WWTPs or associated disposal areas were identified at any special area.	NA	NA
Landfills and Waste Disposal Areas		
Former DEW Line Station Point McIntyre: Former Eroding Landfill	N	The Former Eroding Landfill at Former DEW Line Station Point McIntyre was located along Gwydyr Bay (**Figure 3-2**). Waste was disposed in this landfill during active operation of Former DEW Line Station Point McIntyre by the Air Force (URS, 2011; Tetra Tech2016) (that is, prior to deactivation in 1958). Site debris may also have been buried at the Former Eroding Landfill during a 1973 partial cleanup of the site (USACE, 1994). After Air Force activities at Point McIntyre ceased, erosion occurred along the northern boundary due to wave action during storms. Landfill cleanup (removal of waste and impacted soil) was completed during 2013 to 2014 (Tetra Tech, 2016). The excavated area was covered with clean soil and seeded. Land use controls are in place (Tetra Tech, 2016). Based on information gathered during this PA, the landfill appears to have contained waste generated prior to 1958 (either disposed during Air Force operation of the DEW Line Station or placed during the 1973 cleanup activities). AFFF was not in use at the time the site was active as a DEW Line station and use of other PFAS-containing materials was not prevalent (ITRC, 2017). No documentation or anecdotal information regarding use of the site by the Navy after acquisition in 1965 was identified during this PA, other than that it was used as an outlying research site by NARL. Based on the timing of peak site use and considering the information gathered during this PA, the Former Eroding Landfill is not anticipated to be a potential PFAS source area. No further action is recommended for this area.
Former DEW Line Station Point McIntyre: Freezeback Landfill	N	The Freezeback Landfill at Former DEW Line Station Point McIntyre (**Figure 3-2**) was created in 2013/2014 when nonhazardous waste from the Former Eroding Landfill was moved to the rarely used airstrip. Containment was provided by inducing "freezeback" conditions[a]. Land use controls are in place, including restrictions on disturbing the landfill cap (Tetra Tech, 2016). Because the material within the Freezeback Landfill originated in the Former Eroding Landfill, it is not anticipated to be a potential PFAS source area. No further action is recommended for this area.
Former DEW Line Station Point McIntyre: Secondary Landfill	N	Previous site consonance identified a landfill at Former DEW Line Station Point McIntyre located 100 feet north of the Composite Building (USACE, 1994). The location of this landfill is shown on **Figure 3-2**. The 1994 PA presumed that that this landfill was associated with previous cleanup projects (USACE, 1994). This landfill was excavated in 2013 and nonhazardous material was placed in the Freezeback Landfill (Tetra Tech, 2015). Like the Former Eroding Landfill, this landfill likely contained materials from use of the site prior to 1958 based on information gathered during this PA. AFFF was not in use during this time and use of other PFAS-containing materials was not prevalent (ITRC, 2017). This area is not anticipated to be a potential PFAS source area. No further action is recommended for this area.

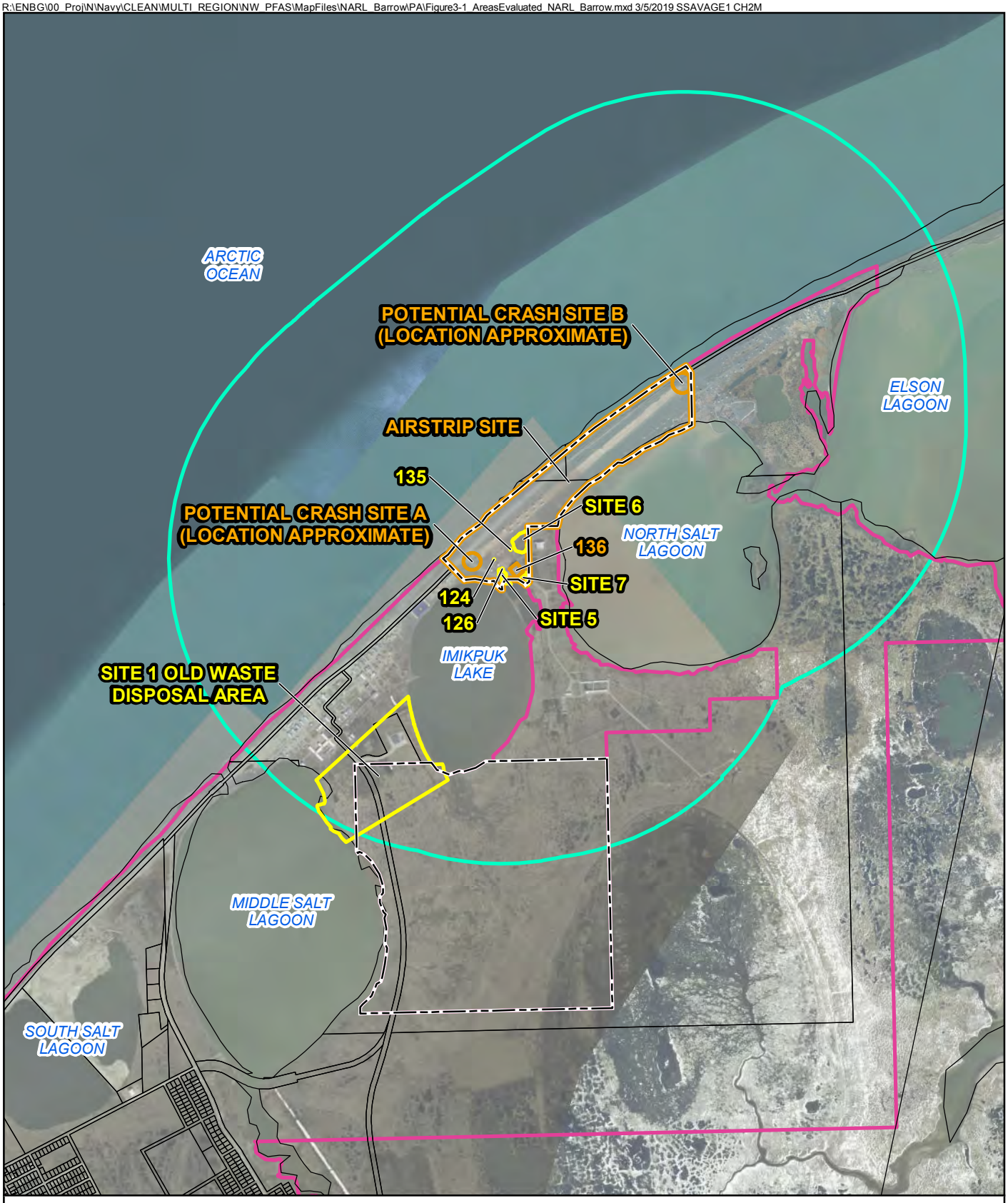
Table 3-2. Areas Evaluated as Potential PFAS Source Areas at Former DEW Line Station Point McIntyre, Former DEW Line Station Icy Cape, and SEAFAC

Initial Screening of Potential PFAS Source Areas at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Area	Potential PFAS Source Area (Y/N)	Rational
Former DEW Line Station Icy Cape: Landfill A	N	Landfill A (**Figure 3-3**) is one of three landfills at Former DEW Line Station Icy Cape that were operated by the Air Force from 1957 to 1963. Icy Cape was also used as a Former NARL Barrow field research station (NAVFAC, 2010); however, no documentation regarding the dates of these activities was available for review. In August 1965, both parcels were transferred from the Air Force to the Navy. It is assumed that use by the Navy was minimal and did not contribute PFAS-containing waste to the landfill. Based on this assumption, no further action is recommended for this area. If additional information regarding Navy use of the site becomes available, reevaluation of this area may be warranted.
Former DEW Line Station Icy Cape: Landfill B	N	Landfill B (**Figure 3-3**) is one of three landfills at Former DEW Line Station Icy Cape that were operated by the Air Force from 1957 to 1963. As stated for Landfill A, Icy Cape was also used as a NARL Barrow field research station (NAVFAC, 2010); however, no documentation regarding the dates of these activities was available for review. In August 1965, both parcels were transferred from the Air Force to the Navy. It is assumed that use by the Navy was minimal and did not contribute PFAS-containing waste to the landfill. Based on this assumption, no further action is recommended for this area. If additional information regarding Navy use of the site becomes available, reevaluation of this area may be warranted.
Former DEW Line Station Icy Cape: Landfill C	N	Landfill C (**Figure 3-3**) is one of three landfills at Former DEW Line Station Icy Cape that were operated by the Air Force from 1957 to 1963. Like Landfills A and B, Icy Cape was also used as a Former NARL Barrow field research station (NAVFAC, 2010); however, no documentation regarding the dates of these activities was available for review. In August 1965, both parcels were transferred from the Air Force to the Navy. It is assumed that use by the Navy was minimal and did not contribute PFAS-containing waste to the landfill. Based on this assumption, no further action is recommended for this area. If additional information regarding Navy use of the site becomes available, reevaluation of this area may be warranted.
Former DEW Line Station Icy Cape: Former Abandoned Drum Area	N	A former abandoned drum area at Former DEW Line Station Icy Cape (**Figure 3-3**) is identified in previous site documents for Former DEW Line Station Icy Cape (NAVFAC, 2013). Based on the timing of active site use as a DEW Line Station (1957 to 1963) and considering the information gathered during this PA, PFAS-containing materials are not expected to be present. No further action is recommended for this area.
SEAFAC: Waste Disposal Area	N	A Waste Disposal Area is located on Back Island northeast of the SEAFAC installation boundary (**Figure 3-4**). This property was previously used by the Navy for overburden disposal (USDA, 1989), but it is no longer in use by the Navy and was returned to the United States Forest Service in 1992 (NAVFAC NW Asset Management Land Surveyor, 2018, pers. comm.). This area was only used during construction of the facility as a temporary laydown area for overburden and is now overgrown; waste related to construction activities was disposed offsite (SEAFAC Site Director, 2018, pers. comm.). No historical releases of AFFF or PFAS-containing substances (that could have contaminated the overburden prior to or following disposal in the Waste Disposal Area) are listed in site spill records; furthermore, there is no documentation or knowledge of AFFF ever being present at the facility (SEAFAC Site Director, 2018, pers. comm.). No further action is recommended for this area.
Specialty Paint, Cleaner, or Pesticide Use or Release		
No use or release of PFAS containing specialty paints, cleaners, or pesticides was identified at any special area.	NA	NA
Chromium Plating Shops		
No chromium plating shops were identified at any special area.	NA	NA
Potential AFFF Storage Locations		
No potential AFFF storage locations were identified at any special area.	NA	NA
Other		
SEAFAC: Fuel Pipe Leak	N	A fuel pipe leak complaint/report for SEAFAC was received by ADEC in 2011 but was closed 1 day later with a no further action designation (ADEC, 2018). 1 gallon of diesel was released at an unspecified location. No records indicating AFFF use at this leak were identified. There is no documentation or knowledge of AFFF ever being present at the facility (SEAFAC Site Director, 2018, pers. comm.). No further action is recommended for this area.

[a] In areas with continuous permafrost, freezeback landfills can be used to contain and “freeze-back” waste.

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LEGEND

- Potential PFAS Source Areas
- No Further Action Recommended
- Parcels
- Historical Installation Boundary
- Potential PFAS Source Areas 1 mi Buffer
- Current Navy Property Boundary

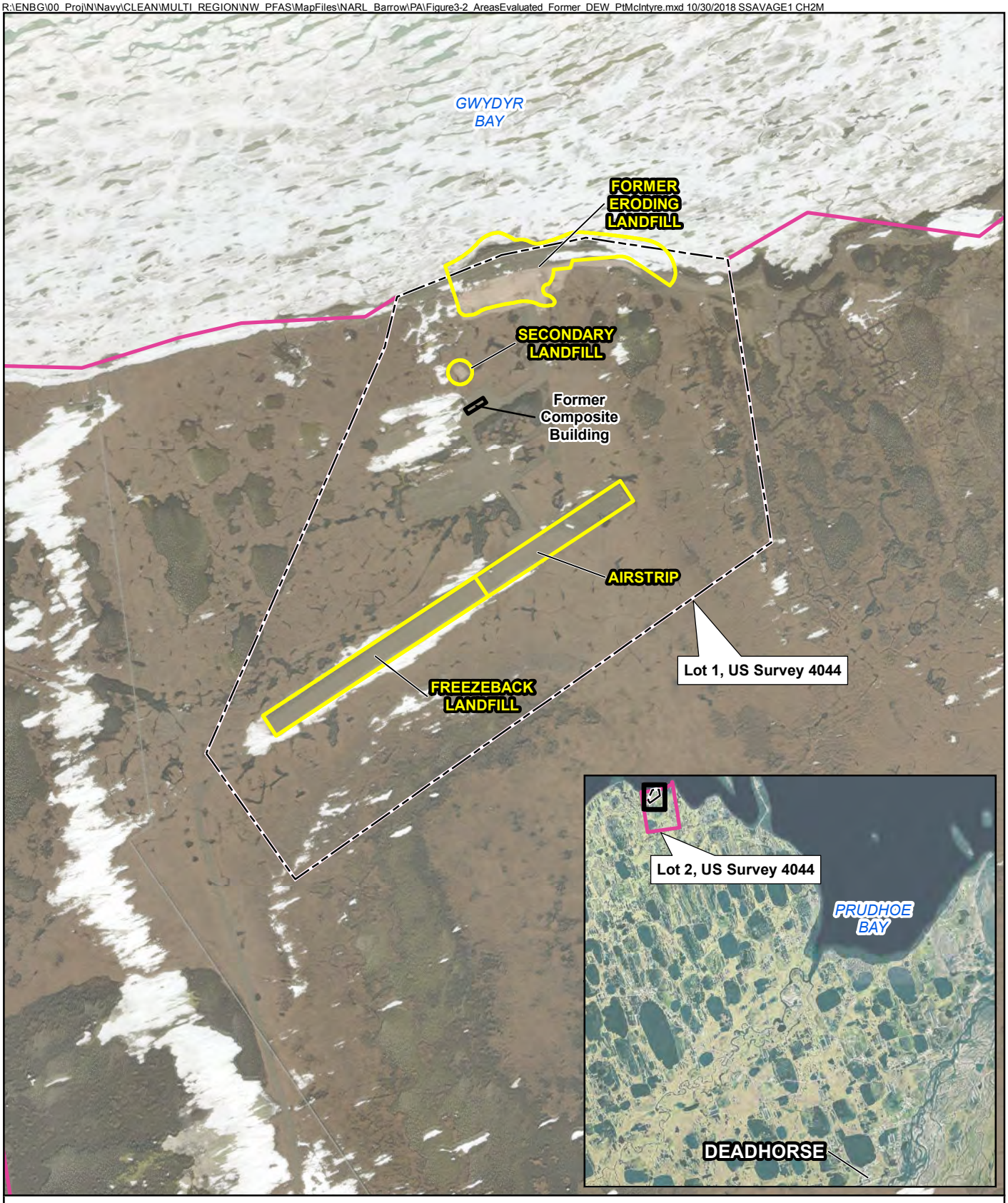
NOTE:
Some features are labeled with only their building number; additional information is provided in the text of this report.

Figure 3-1
Areas Evaluated: Former NARL Barrow
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 0.25 0.5 Miles
1 inch = 0.5 mile

N

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LEGEND

- Site Feature
- No Further Action Recommended
- Historical Installation Boundary
- Current Navy Property Boundary

NOTE:
No areas at Former DEW Line Station Point McIntyre have been identified as potential PFAS source areas.

Figure 3-2
Areas Evaluated: Former DEW Line Station Point McIntyre
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 0.05 0.1 Miles

1 inch = 0.1 mile

N

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LEGEND

- No Further Action Recommended
- Historical Installation Boundary
- Current Navy Property Boundary

NOTE:
No areas at Former DEW Line Station Icy Cape have been identified as potential PFAS source areas.

Figure 3-3
Areas Evaluated: Former DEW Line Station Icy Cape
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 0.125 0.25
Miles
1 inch = 0.379 mile

N

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LEGEND

- Site Feature
- No Further Action Recommended
- Installation Boundary

NOTE:
No areas associated with the Southeast Alaska Acoustic Measurement Facility have been identified as potential PFAS source areas.

Figure 3-4
Areas Evaluated: SEAFAC
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Assoctiated Special Areas

0 0.05 0.1 Miles

1 inch = 0.1 mile

N

DRAFT 9/27/2018

SECTION 4

Preliminary Assessment Results and Findings

Based on the information presented in **Tables 3-1** and **3-2**, 3 of the 22 areas evaluated were identified as potential PFAS source areas. All three areas are located on current Navy property at Former NARL Barrow (within the Airstrip Site). This section presents potential exposure points and routes relevant to these areas and detailed descriptions of each potential PFAS source area.

4.1 Potential Exposure Points and Routes

Through the historical use of materials containing PFAS, those substances may have been released to the environment. Because of their chemical structure, PFAS are chemically and biologically stable and resistant to typical degradation processes. As a result, PFAS persist in the environment. Additionally, PFAS are water-soluble and migrate readily from soil to groundwater where they can be transported long distances. Human receptors, as well as terrestrial and aquatic ecological receptors, potentially could be exposed to PFAS in the following media: groundwater, soil, air, surface water, and sediment. Access to Navy property at Former NARL Barrow is unrestricted. Adjacent properties fall within the current-day boundaries of the City of Utqiaġvik. The Main Camp Area, southwest of the Airstrip site, is now owned by UIC and is known as UIC-NARL. It is currently zoned by the City for mixed use (NSB, 2015). Current-day facilities at UIC-NARL include the Barrow Arctic Research Center, Iḷisaġvik College, permanent and temporary housing, and various staging and storage areas. **Figure 3-1** shows 13 parcels located within 1 mile of potential PFAS source areas on Navy property at Former NARL Barrow. Based on NSB GIS records (NSB, 2018, pers. comm.) the parcels are designated as either “Military” or “Village.” Specific receptors that might be exposed to groundwater, soil, air, surface water, and sediment within 1 mile of each potential PFAS source area are presented in **Section 4.2**.

In addition to direct exposure to potentially contaminated groundwater, soil, air, surface water, and sediment, human receptors may be exposed to PFAS through the consumption of locally-caught meat and fish. Some PFAS may or are known to bioaccumulate in terrestrial and aquatic organisms (NGWA, 2018). Subsistence hunting, fishing, and whaling are important aspects of life for many residents near Former NARL Barrow. Many residents of Utqiaġvik hunt or fish for most of their food (NSB, 2015). The subsistence lifestyle holds cultural significance and is an attractive alternative to the high cost of shipping food to the city.

4.1.1 Groundwater

As discussed in **Section 2.1.2**, groundwater at and near Former NARL Barrow is limited to the active layer, which is frozen for most of the year with a brief thaw season in the summer (USGS, 1994b). Contaminant transport in groundwater occurs only during this thaw season and is limited vertically by the depth of the active layer, which varies based on surface conditions. The direction of groundwater flow in the active zone is highly variable during the thaw season and can change from year to year. Distinct groundwater flow regimes occur at scales ranging from centimeters to tens of meters rather than at a regional scale. Because of this, groundwater flow directions (past and current) are not well defined. Generally, shallow groundwater flow direction within the active zone typically follows topography at the Former NARL Barrow, because, in general, the permafrost surface mimics the land surface. Anticipated groundwater flow directions are described for each potential PFAS source area in Section 4.2. Based on the short window during which the active zone is thawed, transport of PFAS in groundwater is anticipated to be limited. Transport that does occur is anticipated to be highly variable and difficult to predict.

Groundwater at and near Former NARL Barrow is not used as a drinking water source; however, PFAS transport in groundwater could potentially impact surface water bodies used as seasonal drinking water sources. The depth to groundwater in summer is shallow (the depth to the bottom of the active zone is typically 5 to 6 feet at Former NARL Barrow (USGS, 1995; URS Geiner, 2000). Because of the shallow depth to potentially impacted groundwater, construction workers could be exposed to PFAS in groundwater through dermal contact with groundwater during

excavation activities. There are no regulatory screening levels or other criteria for dermal contact with PFAS in groundwater.

4.1.2 Soil and Air

Nearby residents, construction workers, maintenance/industrial workers, and visitors could be exposed to PFAS in soil through incidental ingestion of and dermal contact with surface and subsurface soil or respiration of surface soil dust in the air. Such exposure would likely be most relevant in summer thaw months when snow cover is not present. The State of Alaska has established soil cleanup levels for PFOS and PFOA as described in **Section 1.3.3**. There are also USEPA human health risk-based screening levels for some PFAS for the ingestion and dermal exposure pathways (USEPA, 2018). Terrestrial ecological receptors could be exposed to PFAS in soil through direct exposure with soil. Humans could be indirectly exposed to PFAS in soil through the consumption of terrestrial organisms.

4.1.3 Surface Water

Surface water is the primary drinking water source near Navy property at Former NARL Barrow. Nearby residents, workers, and visitors could be exposed to PFAS in surface water through ingestion or dermal contact with surface water. Surface water used as drinking water is expected to be screened against the USEPA's lifetime health advisory and Alaska-specific action levels. Terrestrial and aquatic ecological receptors could be exposed to PFAS in surface water primarily through direct exposure to surface water. Humans could be indirectly exposed to PFAS in surface water through the consumption of terrestrial and aquatic organisms.

Imikpuk Lake is a potential source of drinking water adjacent to Navy property at Former NARL Barrow. It was used in the past as a seasonal drinking water source for hunters and fishers, but the State of Alaska and the Navy have advised against drinking water from the lake due to the presence of PFAS over USEPA's lifetime health advisory (Alaska DHSS, 2017; Navy, 2017a). No other surface water bodies used as drinking water sources are located within 1 mile of Navy property at Former NARL Barrow. Other surface water bodies within 1 mile include North Salt Lagoon, Middle Salt Lagoon, and South Salt Lagoon (**Figure 2-2**), none of which contain fresh water.

Surface water runoff at Former NARL Barrow could influence PFAS migration. The occurrence of surface water runoff in the area is restricted to warmer months and is primarily observed during the snowmelt period, which lasts approximately 2 weeks and may constitute as much as 90 percent of the annual runoff (USGS, 1995). Drainage patterns during this season are impacted by topography, but temporary alterations to flow paths may occur due to ice- or snow-blocked culverts and other drainage pathways (USGS, 1995). Cracks in the soil (including ice-wedge polygon troughs) and other depressions can also retain water (USGS, 1994b).

4.1.4 Sediment

Nearby residents, workers, and visitors could be exposed to PFAS in sediment through incidental ingestion of and dermal contact with sediment. Terrestrial and aquatic ecological receptors could be exposed to PFAS in sediment through direct exposure with sediment. Humans could be indirectly exposed to PFAS in sediment through the consumption of terrestrial and aquatic organisms.

4.2 Potential PFAS Source Areas

Potential PFAS source areas identified based on information gathered during this PA are described in the following subsection. A detailed figure showing the set of areas is presented as **Figures 4-1**.

4.2.1 Airstrip Site

Description and Operational History

The Airstrip Site is located adjacent to the Arctic Ocean (**Figure 2-2, Figure 4-1**). The geographic coordinates are 71.33858, -156.63840. The Navy currently maintains ownership of the Airstrip Site. The airstrip itself is

approximately 1 mile long and is situated parallel to the coastline between the Arctic Ocean and North Salt Lagoon. It was constructed by the Navy in 1944 (NAVFAC, 2010) using pierced steel planking (also known as Marston Mat) (**Figure 4-1, inset photograph**). Several support facilities, including a Navy hangar, are present southwest of the airstrip within the Airstrip Site boundary. As detailed in **Table 3-1**, three specific areas within the Airstrip Site have been identified as potential PFAS source areas; these are described below.

- ***Building 136 (Navy Hangar).*** Building 136 (**Figure 4-1**) is a steel framed, approximately 35,000 square foot Navy hangar built in 1970 (NAVFAC, 2010). Based on the recollection of a Navy historical architect, Building 136 was built to replace a previous structure that burned down in the late 1960s or early 1970s (NAVFAC Northwest Historical Architect, 2018, pers. comm.). A map from 1966 shows "Building 135 – ARL Hangar" at the approximate location of the current-day Building 136 (or potentially just to the southwest) (NAVFAC, 2010). Building 136 itself does not contain an AFFF fire suppression system but was the site of a 1970 fuel spill where AFFF was applied (NEESA, 1983; Former NARL Fire Chief, 2018, pers. comm.). The spill is described as having occurred behind the hangar (Former NARL Fire Chief, 2018, pers. comm.) (southeast of Building 136).
- ***1970 Constellation Crash.*** On May 5, 1970, a Lockheed L-1049H Super Constellation undershot the runway on landing and collided with a snow bank (ASN, 2018a). Depending on the direction of landing, this crash may have occurred near either the southwest or northeast end of the runway. Possible locations of this crash (Potential Crash Sites A and B) are shown on **Figure 4-1**. The nature of the accident and any ensuing emergency response actions is unknown.
- ***1978 Twin Otter Crash.*** On October 13, 1978 a de Havilland DHC-6 Twin Otter stalled and crashed short of the runway (BAAA, 2018; ASN, 2018b). As with the 1970 Constellation crash, depending on the direction of landing, this crash may have occurred near either Potential Crash Site A or B (**Figure 4-1**). The nature of the accident and any ensuing emergency response actions is unknown.

Potential for PFAS Storage, Use, or Release

Based on Navy documentation (NEESA, 1983) and firefighter recollection (Former NARL Fire Chief, 2018, pers. comm.), AFFF is known to have been released near Building 136 in 1970 in response to a fuel spill. No documentation regarding potential emergency response actions at Building 135 (previous Navy hanger) was identified during this PA; the Former NARL Fire Chief stated in general terms that he only recalled structure fires (Class A fires) at Former NARL Barrow and that these were responded to with water only (2018, pers. comm.). Building 135 appears to have been a small hanger built in the 1940s or 1950s (NAVFAC, 2010); based on the construction date and former firefighter recollection, it is not anticipated to have contained an AFFF fire-suppression system (Former NARL Firefighter #1, 2018, pers. comm.).

It is unknown whether AFFF was or was not applied at either the 1970 or 1978 aircraft crash sites; however, based on the potential for fuel fires and the dates of the crashes, it is possible AFFF may have been used.

Migration Pathway and Exposure Assessment

Groundwater

Because of the known and potential use of AFFF at the Airstrip Site, PFAS may have migrated to active-zone groundwater during the summer thaw months. Groundwater flow regimes at the Airstrip Site are not well understood. In the Main Camp Area (UIC-NARL) southwest of the Airstrip Site, a permafrost ridge under Stevenson Road acts as a groundwater divide (USGS, 1995). This permafrost ridge under Stevenson Road may be present at the Airstrip Site. It is not clear what impact the airstrip itself and the airstrip apron (northwest of Building 136, **Figure 4-1**) have on permafrost depts. The depth to permafrost may be greater under these areas if heat is retained by the Marston Mat surface. Conversely, these areas are slightly elevated compared to the surrounding topography, which may elevate the depth to permafrost (USGS, 1994a). Several elevated roads in and near the Airstrip Site may also have corresponding permafrost ridges that could potentially impact or impede groundwater flow (USGS, 1994a). Based on assumptions made in a previous study, groundwater flux from the southwest portion of the Airstrip Site to Imikpuk Lake has been estimated to be approximately 173 m^3/year, less than 0.1 percent of the estimated annual inflow to Imikpuk Lake (USGS, 1994a).

Soil and Air

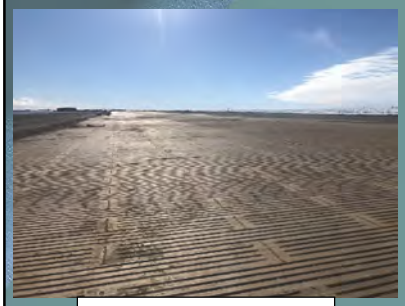
A portion of the Airstrip Site east of North Salt Lagoon falls within the boundaries of the City of Utqiaġvik and is zoned as a reserve district; the remaining portion is located within a conservation district (NSB, 2015). The Airstrip Site is located just northeast of the UIC-NARL area, which is zoned by the City of Utqiaġvik for mixed use (NSB, 2015) and includes scientific facilities, a 2-year college, and housing. Workers, visitors, and residents are present within 1 mile. If additional evaluation identifies PFAS-impacted soil at the site, an assessment will be conducted to determine if the exposure pathway is complete for identified receptors.Fugitive dust emissions may occur during summer months. Construction or other ground-disturbing activities could result in potential worker exposure to dust.

Sediment and Surface Water

Surface water drainage near the Airstrip Site is complex, variable, and typically limited to summer. Surface water may drain to any or all of the following: the Arctic Ocean (immediately northwest), Imikpuk Lake (immediately southwest), and North Salt Lagoon (immediately southeast). Sediment in these water bodies may be impacted by PFAS.

- ***Fuel Spill at Building 136 (Navy Hangar)***. Based on observations from the early 1990s, Building 136 is situated on a surface water drainage divide that bisects the building, with the area southwest of the building draining to Imikpuk Lake and the area northeast draining to North Salt Lagoon (**Figure 4-1**). Two depressions near Building 136 may also impact surface water drainage: the North Depression northeast of Building 136 and the South Depression southeast of Building 136.
- ***Potential Crash Site A.*** Surface water near Potential Crash Site A may drain towards either Imikpuk Lake (0.06 mile south) or the Arctic Ocean (0.09 mile northwest).
- ***Potential Crash Site B***. Surface water near Potential Crash Site B may drain towards either North Salt Lagoon (0.15 mile south) or the Arctic Ocean (0.05 mile northwest).

R:\ENBG\00_Proj\N\Navy\CLEAN\MULTI_REGION\NW_PFAS\MapFiles\NARL_Barrow\PA\Figure4-1_Potential_PFAS_Source_Areas.mxd 3/5/2019 SSAVAGE1 CH2M



Airstrip
View direction: southwest.
Photo date: 7/10/2018

POTENTIAL CRASH SITE B
(LOCATION APPROXIMATE)

ARCTIC OCEAN

AIRSTRIP SITE

Surface Water Drainage Divide

Stevenson Road

North Depression

South Depression

136

NORTH SALT LAGOON

POTENTIAL CRASH SITE A
(LOCATION APPROXIMATE)

IMIKPUK LAKE

Building 136 - Navy Hangar
View direction: south.
Photo date: 7/10/2018



LEGEND

- Anticipated Surface Water Drainage Direction
- Surface Drainage Feature
- Potential PFAS Source Areas
- Current Navy Property Boundary

NOTE:
Some features are labeled with only their building number; additional information is provided in the text of this report.

Figure 4-1
Potential PFAS Source Areas: Former NARL Barrow
Preliminary Assessment for PFAS
Former NARL Barrow, Utqiaġvik, Alaska
and Associated Special Areas

0 0.0625 0.125
Miles
1 inch = 0.166667 mile

N

SECTION 5

Conclusions and Recommendations

Twenty-two areas were considered during the PA for PFAS at Former NARL Barrow and associated special areas. Of those 22 areas, 10 were on Navy property at Former NARL Barrow and 12 were on Navy property or use areas at the special areas (4 at Former Dew Line Station Point McIntyre, 6 at Former Dew Line Station Icy Cape, and 2 at SEAFAC). Based on the findings of this PA, 7 areas at Former NARL Barrow (**Table 3-1**) and all 12 areas identified at the special areas (**Table 3-2**) are recommended for no further action, as there is no evidence that PFAS containing materials, primarily AFFF, were used or released at these locations. The remaining three areas, all located at Former NARL Barrow, are considered potential PFAS source areas. Each of these three potential PFAS source areas is located within 1 mile of Imikpuk Lake, a seasonal source of drinking water. Exposure to humans through ingestiion of Imikpuk Lake water has been addressed by the following actions performed by the Navy (in order of occurrence): 1) a public meeting to share the results with the community; 2) installation of signs around the lake warning the community not to drink or cook with the water; and 3) meetings with local leadership and health officials regarding the PFAS results in the lake. The Navy will continue to communicate the status of the PFAS investigation in and near Imikpuk Lake to the community via public meetings, such as the Restoration Advisory Board.

In accordance with DoD Instruction 4715.18, *Emerging Contaminants* (June 2009, certified through June 2016), DoD policy requires that "Risks to people, the environment, and DoD missions, programs, and resources shall be assessed and, when appropriate, actions shall be taken to reduce risks related to ECs [emerging contaminants] development, use, or release." Additionally, Navy *Interim Per- and Polyfluoroalkyl Substances (PFAS) Site Guidance for NAVFAC Remedial Project Managers (RPMs)/September 2017 Update* (Navy, 2017b) recommends:

> "RPMs should consider investigating ER sites for PFAS when the conceptual site model indicates:
>
> a. Historical release or use of aqueous film forming foam (AFFF), or
>
> b. Historical use of an area for other industrial activities (e.g., plating operations) that may have released PFAS.
>
> Based on recent Navy experience, sites at Naval and Marine Corps Air Stations (NAS and MCAS respectively), including outlying or auxiliary landing fields, or other applicable installations with potential repeated (e.g., former firefighting training areas) or significant (e.g., crashes) AFFF releases should be prioritized for investigation."

This PA has identified locations that meet the first criterion, triggering the need for further investigation to determine whether a release to the environment occurred that resulted in impacts to soil, sediment, surface water, or groundwater at levels that warrant remedial actions.

Three potential PFAS source areas are recommended for additional investigation based on the potential for AFFF to have been stored, used, or released during Navy operations. The recommended path forward and rationale for these three locations are provided in **Table 5-1**. For areas that are carried forward to the site inspection phase, samples of relevant environmental media (for example, soil, sediment, and groundwater) will be collected and analyzed to determine if PFOS, PFOA, PFBS and other state-specified PFAS are present.

Table 5-1. Preliminary Assessment Report Summary and Findings

Preliminary Assessment for PFAS at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Areas Investigated	Rationale	Recommendation
Airstrip Site: Building 136	• Building 136 is a Navy hangar. It does not contain an AFFF fire suppression system but was the site of a 1970 fuel spill where AFFF was applied. • A fire may have occurred at a previous Navy hangar (Building 135) at or just southwest of where Building 136 is currently located. It is not anticipated that this previous hangar contained an AFFF fire suppression system or that AFFF was used during any potential emergency response actions. However, it is recommended that the former location of Building 135 (just southwest of Building 136) be included in a site inspection at Building 136. • Surface water within 1 mile of these locations was used as a seasonal drinking water source.	Initiate site inspection
Airstrip Site: Potential Crash Site A	• Two crashes occurred at the Airstrip Site during the 1970s: a Constellation crash in 1970 and a Twin Otter crash in 1978. In both cases the crashes are believed to have occurred just short of the runway, however, the direction of landing is unknown. One or both of these crashes may have occurred at Potential Crash Site A. • The nature of the accidents and any ensuing emergency response actions is unknown. It is unknown whether AFFF was or was not applied; however, based on the date of the crash, it is possible AFFF may have been used. • Surface water within 1 mile of these locations was used as a seasonal drinking water source.	Initiate site inspection
Airstrip Site: Potential Crash Site B	• Two crashes occurred at the Airstrip Site during the 1970s: a Constellation crash in 1970 and a Twin Otter crash in 1978. In both cases the crashes are believed to have occurred just short of the runway, however, the direction of landing is unknown. One or both of these crashes may have occurred at Potential Crash Site B. • The nature of the accidents and any ensuing emergency response actions is unknown. It is unknown whether AFFF was or was not applied; however, based on the date of the crash, it is possible AFFF may have been used. • Surface water within 1 mile of these locations was used as a seasonal drinking water source.	Initiate site inspection

SECTION 6

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Appendix A
SEAFAC Fact Sheet

NORTHWEST
Training and Testing Environmental Impact Statement/ Overseas Environmental Impact Statement

Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Measurement Facility

The U.S. Navy passively measures sound generated by vessels to assess vulnerability and develop quieting measures at the Southeast Alaska Acoustic Measurement Facility, the Navy's primary acoustic measurement facility in the Pacific Ocean.





Since March 1992, the U.S. Navy has conducted research, development, test and evaluation activities ("testing activities") at the Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Measurement Facility (SEAFAC), located in the Western Behm Canal near Ketchikan, Alaska (see Figure 1).

SEAFAC is the Navy's only West Coast facility for measuring sound generated by vessels, called "acoustic signatures." All measurements are passive in nature with no active emissions. These measurements enable the Navy to identify the sources of sound on the vessel (typically a submarine or surface ship), assess its vulnerability and develop quieting measures. The testing activities conducted at SEAFAC assist in maintaining the United States' superiority in submarine stealth technology, preserving submarines' tactical advantage and protecting its survivability against threats. Stealth is reduced with the use of active acoustics, which reveals a submarine's position. Measuring the output of mid-frequency active sonar is therefore not conducted at SEAFAC. Activities conducted at SEAFAC are primarily for the U.S. Pacific Fleet.

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The Navy's Southeast Alaska Acoustic Measurement Facility provides an ideal acoustic measurement site for vessels because of low levels of ambient noise and minimal noise interference.

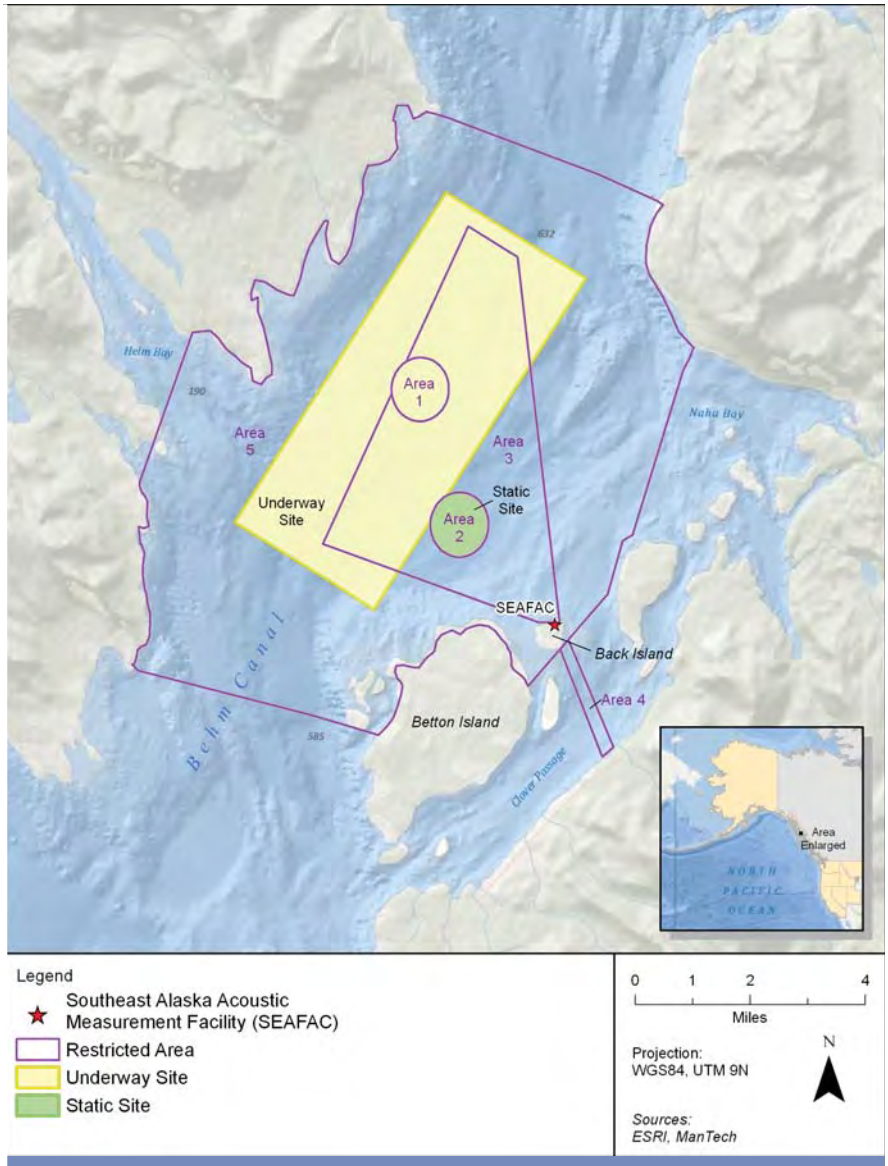


Figure 1. The Southeast Alaska Acoustic Measurement Facility consists of three major components in Western Behm Canal: the Underway Measurement Site, the Static Site, and the Back Island Operations Center and supporting facilities.

The Navy's Southeast Alaska Acoustic Measurement Facility is celebrating its 20th anniversary of the first acoustic measurement trial conducted at the facility.

To learn more about SEAFAC, visit: www.navsea.navy.mil/nswc/carderock/pub/who/sites/seafac.aspx

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SEAFAC provides an ideal acoustic measurement site for Navy and other military and civilian vessels because of low levels of surrounding (ambient) noise and minimal noise interference. SEAFAC consists of the following components:

- Underway Measurement Site
- Static Site
- Back Island Operations Center and supporting facilities

These components are within the restricted areas of Behm Canal. The areas are restricted to ensure vessel safety (submarine, surface ship and civilian craft), reduce sound from non-participating vessels and protect the Navy's sensitive in-water acoustic instruments and associated cables.









ACOUSTIC MEASUREMENTS AT SEAFAC

Submarines are critical assets used by the Navy to defend the United States and its interests, and the stealth of a submarine is of the utmost importance. SEAFAC ensures the highest level of stealth by measuring the precise level of sound emitted from a submarine.

The Navy uses in water sensors (hydrophones) to passively acquire acoustic signatures into an electronic format to allow for real-time analysis and evaluation of shipboard systems.

SEAFAC has two sites to acquire these acoustic signatures: the Underway Measurement Site and the Static Site. The data acquired at both sites are relayed to the Operations Center where Navy scientists and engineers process the signatures, analyze the results and determine the source of the sound, which occurs real-time.

Underway Measurement Site

The Underway Measurement Site acquires the signature of the ship while it is moving through the water. Measurements during movement ensure that propulsion and flow noises can be captured. The measurement process is slow and takes about 30 minutes to conduct 6 minutes of data acquisition for every single measurement. The remainder of the time is spent repositioning the ship for the next measurement. Typically, a submarine will spend two to five days conducting underway testing.

Static Site

At the Static Site, suspension barges lower the submarine on cables to hold it in a stable position. The Submarine can be suspended at various depths to evaluate how sea pressure affects the acoustic signature. The Static Site primarily measures the signature of rotating equipment onboard the vessel. The vessel does not have to maneuver so the testing can be conducted more rapidly. Also, better communication lines exist between the vessel and the Operations Center, therefore, the testing is more controlled and efficiently conducted. Typically, the submarine will spend one to seven days conducting Static Site testing.

Public Safety Measures

The location of the Southeast Alaska Acoustic Measurement Facility (SEAFAC) in Behm Canal, an isolated glacial fjord, provides ample room to maneuver in a low ambient noise environment, which is ideal for navigation safety and acoustic measurements.

For in-water testing activities conducted at SEAFAC, the Navy works with the U.S. Coast Guard to maintain law enforcement and safety. Prior to testing activities, the Navy informs Canadian authorities of submarines transiting Canadian waters en route to Ketchikan, Alaska. Other established notification procedures inform the Coast Guard, the Federal Aviation Administration, mariners, fisheries, the media and local agencies of upcoming testing activities.

MARCH 2012
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Appendix B
Records Reviewed

Appendix B
Table 1
Summary of Records Reviewed
Initial Screening of Potential PFAS Source Areas at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Author	Document Date	Document Type	Document Title	Referenced in Report (Y/N)	Availability of Referenced Document	NIRIS Record No
Alaska Department of Health and Social Services (Alaska DHHS)	8/31/2017	Fact sheet (PDF)	Perfluoroalkyl Substances - Imikpuk Lake in Utqiagvik, Alaska	Y	Attached	NA
Alaska Department of Environmental Conservation (ADEC)	6/18/1993	Correspondence	Letter to Jack W. Wynne/Navy regarding Naval Arctic Research Laboratory (NARL) and the Use of Radioactive Materials	N	NA	N65226_000117
Alaska Department of Environmental Conservation (ADEC)	07/08/1995	Correspondence	ADEC Notice of Violation to UIC based on Findings from 12 September 1994 Resource Conversation and Recovery Act Compliance Evaluation Inspection	N	NA	N65226_000351
Alaska Department of Environmental Conservation (ADEC)	Accessed 5/22/2018	Website	Alaska Department of Environmental Conservation Spill Prevention and Response Contaminated Site Search (http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/Search)	Y	Online Database	NA
Alaska Department of Environmental Conservation (ADEC)	Accessed 5/22/2018	Excel file	AlaskaDEC_ContaminatedSiteSearch	N	NA	NA
Alaska Department of Environmental Conservation (ADEC)	8/20/2018	Technical Memorandum	Action Levels for PFAS in Water and Guidance on Sampling Groundwater and Drinking Water	Y	Attached	NA
Alaska Department of Environmental Conservation (ADEC)	Mar-2019	State Regulations	18 AAC 75 Oil and Other Hazardous Substances Pollution Control. As amended through October 27.	Y	Attached	NA
Alaska Department of Environmental Conservation (ADEC)	Accessed 9/10/2018	Website	Alaska Department of Environmental Conservation Spill Prevention and Response PPR Spills Database Search Facility Details Back Island. http://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/FacilityDetails?FacilityID=73621	Y	Attached	NA
ADEC	10/1/2018	State Regulations	18 AAC 75 Oil and Other Hazardous Substances Pollution Control Public Comment Draft.	N	NA	NA
AGCIQ CH2M HILL	08/21/2014	Report	Point McIntyre: Final After-Action Report - 2013 Landfill Removal and Freezeback Landfill Construction	N	NA	N65226_000849
AGVIC CH2M HILL	08/22/2012	Report	Point McIntyre: Final Pre-construction Survey and Accident Prevention Plan - Former Dew Line Station	N	NA	N65226_000841
Alaska Department of Environmental Conservation	02/07/1995	Correspondence	Letter regarding Development of Memorandum of Agreement for NARL between the U.S. And the Department of Environmental Conservation	N	NA	N65226_000370
America North Inc/ DOWL Engineers	4/26/1988	Report	DERP Sampling Plan	Y	NIRIS	NA
Arctic GeoScience, Inc.	10/31/1996	Report	Results of Geophysical Site Investigation at the Airstrip Fuel Site	N	NA	N65226_000286
ASRC SKW Eskimos	Accessed 10/2/2018	Website	Barrow Landfill Cap (Accessed at http://skweskimos.com/demonstrated-performance/portfolio/barrow-landfill-cap/)	N	NA	NA
Aviation Safety Network	Accessed 5/31/2018	Website/Database	Aviation Safety Network WikiBase (https://aviation-safety.net/wikibase/)	Y	Attached	NA
Aviation Safety Network	Accessed 5/31/2018	Website/Database	https://aviation-safety.net/wikibase/dblist2.php?at=&re=&pc=&op=&lo=Barrow%2C+AK&co=&ph=&na=&submit=Submit	N	NA	NA
Aviation Safety Network	Accessed 5/31/2018	Website/Database	https://aviation-safety.net/wikibase/dblist2.php?at=&re=&pc=&op=&lo=Barrow%2C+Alaska&co=&ph=&na=&submit=Submit	N	NA	NA
Aviation Safety Network	Accessed 5/31/2018	Website/Database	https://aviation-safety.net/wikibase/dblist2.php?at=&re=&pc=&op=&lo=Barrow&co=&ph=&na=&submit=Submit	N	NA	NA
Aviation Safety Network	Accessed 7/2/2018	Website/Database	https://aviation-safety.net/database/record.php?id=19781013-0	Y	Attached	NA
Aviation Safety Network	Accessed 7/2/2018	Website/Database	https://aviation-safety.net/database/airport/airport.php?id=PBA	N	NA	NA
Barrow RAB	9/14/2006	Meeting Minutes	Barrow RAB Meeting Minutes September 14, 2006	N	NA	NA
Blackhawk GeoServices, Inc.	08/26/2003	Report	55-Gallon Drum Investigation at the Naval Artic Research Lab, Barrow, AK	N	NA	N65226_000575

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Author	Document Date	Document Type	Document Title	Referenced in Report (Y/N)	Availability of Referenced Document	NIRIS Record No
Bureau of Aircraft Accident Archives	Accessed 5/31/2018	Website/Database	https://www.baaa-acro.com/	Y	Attached	NA
Bureau of Aircraft Accident Archives	Accessed 5/31/2018	Website/Database	https://www.baaa-acro.com/crash-archives?field_crash_city_target_id=Barrow (17380)	N	NA	NA
Carson, Charles E.	1968	Article	Radiocarbon Dating of Lacustine Strands in Arctic Alaska	N	NA	N65226_000235
Charlotte E. Brower, Mayor	2010	Census	North Slope Borough, 2010 Economic Profile and Census Report Volume X	N	NA	NA
Charlotte E. Brower, Mayor	2010	Cover page for Census	North Slope Borough, 2010 Economic Profile and Census Report Volume X	N	NA	NA
Charlotte E. Brower, Mayor	2010	Map	North Slope Borough, 2010 Economic Profile and Census Report Volume X	N	NA	NA
CH2M Hill	2018	Report	Results of Investigation of Per- and Polyfluoroalkyl Substances in Drinking Water Former Naval Arctic Research Laboratory Utqiaġvik (Barrow), Alaska (draft)	Y	Draft document, not attached	NA
City of Utquigvik	Accessed 5/23/2018	Website	About Utquigvik (http://www.utqiagvik.us/index.php/about-barrow)	N	NA	NA
Clearwater Environmental, Inc.	08/31/1995	Report	Barrow Drum and Transformer Removal Final Deliverables Submittal	N	NA	N65226_000303
Clearwater Environmental, Inc.	08/31/1995	Photolog	Photo Log for Barrow Drum and Transformer Removal	N	NA	N65226_000304
Department of the Navy	06/29/1989	Correspondence	Letter regarding impact of DERA Funding Shortfall on Real Estate Exchange Agreement for NARL	N	NA	N65226_000362
Department of the Navy	04/06/1990	Correspondence	Letter in Response to Agreement Amendment for Removal of Debris from Elson Lagoon	N	NA	N65226_000363
Environmental Data Resources, Inc. (EDR)	8/17/2018	Report	The EDR Aerial Photo Decade Package. Barrow AK Aerials. Inquiry Number: 5381269.1.	Y	Attached	NA
Environmental Data Resources, Inc. (EDR)	9/5/2018	Email with aerial photograph attachments	Point Barrow Camp. Inquiry Number: 5407030.1.	Y	Attached	NA
Federal Emergency Management Agency (FEMA)	Accessed 10/5/2018	Website	FEMA Flood Map Service Center: Search By Address "BARROW, CITY OF" (https://msc.fema.gov/portal/search?AddressQuery=barrow%2C%20alaska#searchresultsanchor)	Y	Online GIS database	NA
Federal Register	2/4/43	Scanned Document	Federal Register, FR-1943-02-04	N	NA	NA
Federal Register	1/3/58	Scanned Document	Federal Register, FR-1958-01-03	N	NA	NA
Federal Register	12/20/58	Scanned Document	Federal Register, FR-1958-12-20	N	NA	NA
Federal Register	5/20/59	Scanned Document	Federal Register, FR-1959-05-20	N	NA	NA
Federal Register	8/17/65	Scanned Document	Federal Register, FR-1965-08-17	N	NA	NA
Federal Register	12/27/71	Scanned Document	Title 43 - Public Lands: Interior	N	NA	NA
Foster Wheeler Environmental Corporation	02/19/1999	Report	Final Barrow Landfill Investigation Report	N	NA	N65226_000539
GIS System Programmer, Planning & Community Services/North Slope Borough	9/27/2018	Email to CH2M with GIS file attachments	RE: North Slope Environmental GIS Data	N	NA	NA

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Google Earth	9/28/2018	Aerial Images	“Imikpuk Lake.” 71°19'39.01"N and 156°39'31.69"W.	Y	Attached	
Google Earth	9/28/2018	Aerial Images	“Point McIntyre.” 70°24'5.81"N and 148°40'56.42"W.	Y	Attached	
Google Earth	9/28/2018	Aerial Images	“Icy Cape AFS.” 70°17'32.70"N and 161°54'11.57"W.	Y	Attached	
Google Earth	9/28/2018	Aerial Images	“Back Island.” 55°32'27.56"N and 131°45'35.61"W.	Y	Attached	
Hart Crowser and EVS Environment Consultants	06/05/1998	Report	Report Draft Human Health and Ecological Risk Conceptual Site Models Airstrip Site 5	N	NA	N65226_000325
Hart Crowser and EVS Environment Consultants	06/05/1998	Report	Report Draft Human Health and Ecological Risk Conceptual Site Models Powerhouse Site 12	N	NA	N65226_000328
HartCrowser	Jul-98	Report	Final Sampling and Analysis Plan, Airstrip Site, Former Naval Arctic Research Laboratory, Point Barrow, Alaska	Y	NIRIS	N65226_000184
HartCrowser	Sep-1998	Map	Containment Berm/Recovery Trench Location Map Airstrip Site	N	NA	NA
HartCrowser	09/09/1998	Report	Site 5: Field Activities Data Report for Airstrip Fuel Spill Site	N	NA	N65226_000290
HartCrowser	03/25/1999	Report	Final Data Report: Dew Line Station, Point McIntyre, Alaska	Y	NIRIS	N65226_000648
HartCrowser	10/29/1999	Report	Final Baseline Human Health and Ecological Risk Assessments - Dew Line	N	NA	N65226_000649
HartCrowser	11/26/2001	Report	Final Groundwater, Surface Water, and Sediment Management and Evaluation Plan Powerhouse, Airstrip, Dry Cleaning Facility, and Bulk Tank Farm Sites Former NARL Point Barrow, Alaska	N	NA	NA
Historical Architect/NAVFAC NW	Jun-2018	Email to CH2M	NARL Antenna Field Evaluation	N	NA	NA
Holmes & Narver, Inc.	09/13/1970	Report	Maintenance and Operation of Facilities and Equipment in the Arctic	N	NA	N65226_000239
ICF Technology Incorporated	02/19/1996	Report	Final Risk Assessment Point Barrow Radar Installation	N	NA	N65226_000587
ICRC	09/30/2001	Report	Former Powerhouse Building Demolition at the NARL Facility	N	NA	N65226_000564
ICRC	09/30/2003	Report	Final Environmental Site Status Report	N	NA	N65226_000556
ICRC	09/30/2003	Report	NARL: Final Environmental Baseline Survey on Site 5 (Airstrip)	N	NA	N65226_000557
ICRC	05/14/2004	Report	Final 2003 Annual Water Monitoring Report for Airstrip Fuel Spill Area	N	NA	N65226_000553
ICRC/Clarus Environmental Services	03/17/2006	Report	Final 2005 Annual Monitoring Report for NARL Airstrip, Powerhouse, and Bulk Fuel Tank Farm Sites - (CD #599)	N	NA	N65226_000599
Isman, Warren E.	2/01/1979	Magazine Article	"Fire Fighting Based on Cold Facts in Barrow, Alaska" in Fire Engineering	N	NA	NA
Keith Torrance	9/23/16	PowerPoint presentation	Migration of Contaminants in Permafrost Active Layer; New Insights from On-going Studies at the Former Naval Arctic Research Laboratory, Barrow, Alaska	N	NA	NA
Kelley, John J; Schinler, John; Alber, Thomas F.	Unknown	Report	Background Report regarding the NARL Transition to the Local Community	N	NA	N65226_000212

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Land Surveyor/NAVFAC NW Asset Management	8/16/18	Email to CH2M with PDF, Word, and GIS attachments	Pt McIntyre Spatial Data and POC	Y	GIS files	NA
Land Surveyor/NAVFAC NW Asset Management	8/16/18	Email to CH2M with PDF, Word, and GIS attachments	Icy Cape Spatial Data and POC	Y	GIS files	NA
Land Surveyor/NAVFAC NW Asset Management	8/16/18	Email to CH2M with PDF, Word, and GIS attachments	Back Island Spacial Data and POC	Y	GIS files	NA
Land Surveyor/NAVFAC NW Asset Management	8/20/18	Email to CH2M with PDF, Word, and GIS attachments	NARL Barrow Spatial Data and POC	Y	GIS files	NA
LCMF INC	8/31/1999	Report appendix	AGRA Drill Logs NSB Barrow Landfill Closure Phase 1	N	NA	NA
LCMF Incorporated	Unknown	Map	Barrow Landfill Closure Planning Test Well Locations	N	NA	NA
Liebman, Kendra/NAVFAC NW	7/11/2018	Email to CH2M	Barrow Maps	N	NA	NA
Liebman, Kendra/NAVFAC NW	10/17/2018	Email to CH2M with Excel and PDF attachments	NW Back Island DW Results (Attachements: December 2016 PFAS drinking water testing results for Navy Region Northwest; "Overview of Drinking Water Expanded Testing Results for Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) (PFOS/PFOA) in Drinking Water and Follow-On Actions for Navy Region Northwest"	Y	Attached	NA
M.C. Shelesnyak	Unknown	Report	The History of the Artic Research Laboratory	N	NA	NA
Martin Marietta Energy Systems, Inc.	04/30/1990	Report	Investigation of Environmental Concerns at the NARL	N	NA	N65226_000283
McCarthy, Kathleen; Walker, Langston; Vigoren, Leah	2004	Journal Article	Subsurface fate of spilled petroleum hydrocarbons in continuous permafrost. Cold Regions Science and Technology (38) 43 - 54.	N	NA	N65226_000549
Miriam Aitken	9/17/15	PowerPoint presentation	UIC 2015 NARL clean-up activities	N	NA	NA
Multiple (school newspaper)	1960 - 1968	Scanned Document	Northern Hi-Lites Archive, 1 of 2 (National Archives Identifier 72033288)	N	NA	NA
Multiple (school newspaper)	1960 - 1968	Scanned Document	Northern Hi-Lites Archive, 2 of 2 (National Archives Identifier 72033492)	N	NA	NA
Nancy Glazier	2/22/1998	Attorney-Client Communication	Information Paper	N	NA	NA
National Archives	Accessed 8/9/2018	Website	National Archives Catalog	Y	Online Database	NA
Naval Energy and Environmental Support Activity	05/30/1983	Report	Navy Assessment and Control of Installation Pollutants: Initial Assessment Study of NARL	Y	NIRIS	N65226_000015
NAVFAC	04/14/1988	Correspondence	Partial Copy of the Exchange Agreement between the U.S. and UIC sent to John Gordon	Y	NIRIS	N65226_000361
NAVFAC	August 2010	Report	Historic Property Inventory and Evaluation NARL Point Barrow and NARL Point Barrow Airstrip, Point Barrow, Alaska	Y	Attached	NA
NAVFAC NW	05/31/1969	Report	Report Preliminary Master Plan	N	NA	N65226_000271
NAVFAC NW	9/30/1997	Report	Report & Letter Re: Radiological Investigations - Sampling & Investigations	N	NA	N65226_000099

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NAVFAC NW	9/30/2009	Report	Environmental Condition of Property Naval Arctic Research Laboratory Antenna Field Barrow, Alaska	N	NA	NA
NAVFAC NW	01/28/2012	Report	ICY CAPE: Biological Assessment for the Landfill Repairs, Icy Cape, Alaska	Y	NIRIS	N65226_000749
NAVFAC NW	01/28/2012	Correspondence	ICY CAPE: Biological Assessment Informal conultation Email to USFWS	N	NA	N65226_000747
NAVFAC NW	05/30/2012	Report	Point McIntyre: Final Record of Decision	N	NA	N65226_000838
NAVFAC NW	07/08/2013	Report	Icy Cape: 2013 Landfill Work Plan, APP/SSHP, Tier II SAP (CONTAINS PII, DO NOT RELEASE)	N	NA	N65226_000857
NAVSEA	October 2015	Report	Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement Vol. 1	N	NA	NA
NAVSEA	October 2015	Report	Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement Vol. 2	N	NA	NA
NAVSEA	October 2015	Report	Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement Vol. 3	N	NA	NA
NAVSEA	October 2015	Report	Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement Vol. 4	N	NA	NA
NAVSEA	Accessed 5/23/2018	Website	http://www.navsea.navy.mil/Home/Warfare-Centers/NSWC-Carderock/Who-We-Are/Ketchikan-Alaska/	Y	Attached	NA
Navy	8/30/79	Map	Land Status Map, Original Navy Withdrawal-PLO 2344 Tracts 1-3	N	NA	NA
Navy	03/07/1986	Correspondence	Letter and Land Exchange Agreement between U.S. and UIC and List of Actions to be Taken by WESTNAVFACENGCOM	Y	NIRIS	N65226_000355
Navy	01/30/1987	Correspondence	Letter of Response RE: Agreement between U.S. and UIC for Exchange of Properties in Alaska	N	NA	N65226_000359
Navy	07/01/1987	Report	Guidance Document MIL-HDBK-200G Quality Surveillance Handbook for Fuels, Lubricants, and Related Products	N	NA	N65226_000395
Navy	5/14/1993	Correspondence	(Letter to ADEC addressing the possibility of radioactive contamination at NARL)	N	NA	N65226_000001
Navy	09/30/1994	Correspondence	Letter Submitting the Land Exchange Agreement between the U.S. and UIC	N	NA	N65226_000119
Navy	7/19/1995	Correspondence	(Letter regarding 23 June 1995 notice of violation issued to UIC by the State of Alaska's Department of Environmental Conservation)	N	NA	NA
Navy	March 2006	Report	Final Land Use Control Plan, Former Distant Early Warning (DEW) Line Station, Point McIntyre, Alaska	N	NA	NA
Navy	12/18/2006	Report	Final Decision Document for the Radiation Laboratory Site 09	N	NA	N65226_000689
Navy	March 2012	Fact sheet (PDF)	Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement; Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Measurement Facility	Y	Attached	NA
Navy	2016	Memorandum	Overview of Drinking Water Expanded Testing Results for Perfluorooctane Sulfonate (PFOS) and Perluorooctanoic Acid (PFOA) (PFOS/PFOA) in Drinking Water and Follow-On Actions for Navy Region Northwest.	Y	Internal Navy	NA
Navy	September 2017	Fact sheet (PDF)	Naval Arctic Research Laboratory Utqiaġvik (Barrow), Alaska Airstrip Site (Site 5) Imikpuk Lake Drinking Water Investigation	Y	Attached	NA
Navy	9/14/17	Public Meeting	Public Meeting Agenda	N	NA	NA

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Navy's iNFADS	Accessed June 2018	Database	NA	Y	Database	NA
North Slope Borough (NSB)	December 2007	Report	Comprehensive Annual Financial Report of the North Slope Borough, Alaska (Accessed at http://www.north-slope.org/assets/images/uploads/FS07NSB.pdf)	N	NA	NA
North Slope Borough (NSB)	5/9/2013	Report	Total Project Snapshot Report: North Slope Borough - Critical Infrastructure Protection	N	NA	NA
North Slope Borough (NSB)	Accessed 5/23/2018	Website	Official Website of the North Slope Borough (http://www.north-slope.org/)	N	NA	NA
North Slope Borough (NSB)	6/20/2018	Email to CH2M	North Slope Parcels	Y	GIS files	NA
North Slope Borough Anchorage Liaison Office	6/12/2000	Correspondence	Regarding: Letter of February 8, 2000, Barrow Landfill Closure Plan Review #0031-PR001	N	NA	NA
North Slope Borough Department of Planning & Community Services (NSB DPCS)	3/3/2015	Document	Soaring to the Future - Barrow Comprehensive Plan 2015-2035 http://www.north-slope.org/assets/images/uploads/Barrow_Comp_Plan_March_2015_FINAL.pdf	Y	Attached	NA
OEL Database	Accessed June 2018	Database	NA	Y	NIRIS	NA
Office of Naval Research	1968	Scanned documents	NARL 1755	N	NA	NA
Pacific Northwest Laboratory	March 1988	Website/scanned document	Final environmental impact statement of the Southeast Alaska Acoustic Measurement Facility (SEAFAC), Behm Canal, Ketchikan Gateway Borough. Available at https://books.google.com/books?id=r-43AQAAMAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false	Y	Document available online only	NA
Paul Shepson and Peter Lourie	Accessed 6/21/2018	Website	Arctic Stories (https://www.arcticstories.net/people.html)	N	NA	NA
Rolf Bjornert	Accessed 8/25/2018	Website	http://www.qsl.net/kg0yh/ice.htm	N	NA	NA
Science Applications International Corporation	11/30/1987	Report	Final Evaluation of Hazardous Materials and Potential Environmental Contamination	N	NA	N65226_000012
Southeast Alaska Acoustic Measurement Facility (SEAFAC) Site Director	10/17/2018	Email to CH2M with PDF attachment	APP H Spill History w cover.pdf (Attachment: "Appendix H SEAFAC Chronological Spill and Leak History")	N	NA	NA
SEALASKA Environmental Services, LLC	03/20/2012	Report	Final 2011 Annual Monitoring Report - Airstrip, Former BFTF and Powerhouse	N	NA	N65226_000751
SES-TECH	6/18/2009	Report	Final 2008 Long-term Monitoring Report for Site 5, 12, 23 - N44255-05-D-5101 TO#: 47 (CD# 737 W/CAD)	N	NA	N65226_000737
SES-TECH	06/23/2009	Report	NARL Former Bulk Fuel Tank Farm Confirmation Sampling Report (2008)	N	NA	N65226_000738
Tetra Tech EC, Inc.	July 2015	Report	After Action Report Landfill Removal and Freezeback Landfill Construction (2014 Field Season) Former Distant Early Warning (DEW) Line Station Point McIntyre, Alaska	Y	NIRIS	NA
Tetra Tech EC, Inc.	March 2016	Report	Land Use Control Plan Former Distant Early Warning (DEW) Line Station, Point McIntyre, Alaska	Y	Attached	NA
The DEWLine	Accessed 5/23/2018	Website	The DEWLine (http://lswilson.dewlineadventures.com/)	Y	Multiple webpages	NA
The NARL Cleanup Team	6/24/2002	Report	Decision Document for the Navy Arctic Research Laboratory Airstrip Site Barrow, Alaska	Y	NIRIS	N65226_000518
The NARL Cleanup Team	12/31/2002	Report	Decision Document for the Navy Arctic Research Laboratory Powerhouse Site Barrow, Alaska	N	NA	N65226_000534
The NARL Cleanup Team	1/1/2003	Report	Decision Document for the Navy Arctic Research Laboratory Bulk Fuel Tank Farm Barrow, Alaska	N	NA	N65226_000532

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U.S. Army Corps of Engineers, Alaska District	11/30/1994	Report	Draft Preliminary Assessment, Point McIntyre Dew Line Site	Y	NIRIS	N65226_000652
U.S. Bureau of Land Management	1/19/65	Map/Scanned documents	U.S. Survey No. 4044 Alaska	N	NA	NA
U.S. Bureau of Land Management	11/13/74	Map/Scanned documents	U.S. Survey No. 5261 Alaska	N	NA	NA
U.S. Bureau of Land Management	8/17/78	Map	U.S. Survey No. 5253 Alaska	N	NA	NA
U.S. Bureau of Land Management	8/17/78	Map	U.S. Survey No. 5253 Alaska	N	NA	NA
U.S. Bureau of Land Management	11/20/78	Map	U.S. Survey No. 5253 Alaska	N	NA	NA
U.S. Bureau of Land Management	7/1/99	Map	U.S. Survey No. 11874 Alaska	N	NA	NA
U.S. Bureau of Land Management	5/13/10	Map	U.S. Survey No. 5253 Alaska	N	NA	NA
U.S. Bureau of Land Management	10/31/13	Map	Surveyed Township 23 North Range 18 West of the Umiat Meridian, Alaska	N	NA	NA
U.S. Department of Agriculture (USDA)	May 1989	Permit	Term Special Use Permit	Y	Attached	NA
U.S. Fish and Wildlife Service (USFWS)	Accessed 5/23/2018	Species by County Report	ECOS Environmental Conservation Online System; Species By County Report; County: North Slope, Alaska (https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=02185)	Y	Attached	NA
U.S. Fish and Wildlife Service (USFWS)	Accessed 5/23/2018	Species by County Report	ECOS Environmental Conservation Online System; Species By County Report; County: Ketchikan Gateway, Alaska (https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=02130)	Y	Attached	NA
U.S. Fish and Wildlife Service (USFWS)	Accessed 10/8/2018	Website	Critical Habitat for Threatened and Endangered Species (https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77)	Y	GIS Database; available online	NA
U.S. Geological Survey	1994	Report	Overview of Environmental and Hydrogeologic Conditions at Barrow, Alaska (Accessed at https://pubs.usgs.gov/of/1994/0322/report.pdf)	Y	Attached	NA
U.S. Geological Survey	07/24/1995	Report	Background Report Preliminary Draft Assessment of the Subsurface Hydrology of the UIC-NARL Main Camp near Barrow, Alaska 1993-1994	Y	NIRIS	N65226_000206
U.S. Geological Survey	01/31/1994	Report	Report Assessment of the Hydrologic Interaction between Imikpuk Lake and the Adjacent Airstrip Site 1993	Y	NIRIS	N65226_000322
UIC Staff (Bernice Oyagak and Don Gray)	7/17/18	Email	Subject: U.S. Navy Fire Fighting tanks	N	NA	NA
Ukpeagvik Inupiat Corporation	10/09/1986	Correspondence	Letter and Land Exchange Agreement between U.S. and UIC due to Lack of Progress in Environmental Cleanup Activities in the Year 1986.	Y	NIRIS	N65226_000356
Ukpeagvik Inupiat Corporation	Accessed 9/24/2018	Website	http://www.barrowbulletin.com/barrow-facilities/	N	NA	NA
Unknown	1955	Scanned maps	NARL 1406 - Photo Mosaic Sheets 1955	N	NA	NA
Unknown	9/12/66	Scanned Letter and Handwritten Notes	NARL 773	N	NA	NA
Unknown	7/31/1981	Correspondence	Background Collection of Information Pertaining to Closure, EPA Legislation, POL, Wastewater, Radioactive Waste, Sewage Treatment and a Research Index	N	NA	N65226_000255
Unknown	12/05/1986	Correspondence	Briefing Sheet regarding the Agreement between the U.S. and UIC Concerning Exchange Properties	N	NA	N65226_000357

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Unknown	12/08/1988	Correspondence	Amendment to Agreement between the U.S. and UIC	Y	NIRIS	N65226_000372
Unknown	06/14/1989	Report	Record of Decision and Signature of Acceptance from UIC for Abandonment of Government-owned Personal Property at NARL	N	NA	N65226_000350
Unknown	Sep-1993	Correspondence	Establish Ownership and Chain of Events of Land at the Arctic Research Laboratory, Point Barrow, Alaska	N	NA	NA
Unknown	08/09/1994	Correspondence	Correspondence Concerning the Agreement between the Navy and the UIC regarding Transformers at NARL Site 10	N	NA	N65226_000314
Unknown	09/24/1998	Report	Field Activities Data Report Dew Line Station	N	NA	N65226_000687
Unknown	12/29/1998	Report	Draft Former NARL Cleanup Plan	N	NA	N65226_000538
Unknown	03/30/1999	Report	Final Data Report, Dew Line Station, Cape Sabine - C#: N44255-96-D-0001, TO#: 33	N	NA	N65226_000615
Unknown	06/29/1999	Report	Site 5: Field Activities Data Report	N	NA	N65226_000590
Unknown	April 2003	Map	Bulk Fuel Tank Farm Excavation Detail	N	NA	NA
Unknown	03/03/2014	Report	Icy Cape: Project Report for Landfill Repairs at Landfills A, B, &C	N	NA	N65226_000848
Unknown	Unknown	Scanned Documents	NARL 1478	N	NA	NA
Unknown	Unknown	Report	NARL Barrow Exchange Agreement Point Paper	N	NA	NA
Unknown	Unknown	Executive Summary	NARL Fuel Spill Investigation	N	NA	NA
Unknown	Unknown	Report	Background Science Inventory of Chemicals Showing None Applicable	N	NA	N65226_000221
Unknown	Unknown	Report	Background Equipment List Containing V.C. #, Nomenclature, Manufacturer, Model No., Serial No, etc.	N	NA	N65226_000215
Unknown	Unknown	Report	Background Report Historical Summary of Activities NARL 1947-1979	N	NA	N65226_000209
URS Consultants, Inc.	08/31/1990	Report	Project Plans: Focused Remedial Investigation	N	NA	N65226_000284
URS Consultants, Inc.	Apr-1991	Report	Draft Feasibility Study NARL, Point Barrow, Alaska	N	NA	NA
URS Consultants, Inc.	10/23/1995	Report	Final Site Inspection Report: Airstrip Fuel Spill Area, Hangars 100 and 136, Building 27, and Old Waste Disposal Area	N	NA	N65226_000007
URS Consultants, Inc.	09/02/1997	Report	Bulk Fuel Tank Farm: Sampling and Analysis Plan for Duck Camp Site	N	NA	N65226_000023
URS Consultants, Inc.	4/30/2001	Report	Final Barrow Landfill Closure Plan	N	NA	N65226_000565
URS Consultants, Inc./Shannon & Wilson, Inc.	12/06/1993	Report	Report Draft Supplemental Site Charactcerization Airstrip Fuel Spill, Imikpuk Lake, North Salt Lagoon and Selected Meltwater Ponds	N	NA	N65226_000321
URS Geiner, Inc.	07/20/2000	Report	Final NARL Environmental Site Status Report	Y	NIRIS	N65226_000173

Appendix B
Table 1
Summary of Records Reviewed
Initial Screening of Potential PFAS Source Areas at Former NARL Barrow, Utqiaġvik, Alaska and Associated Special Areas

Author	Document Date	Document Type	Document Title	Referenced in Report (Y/N)	Availability of Referenced Document	NIRIS Record No
URS Group, Inc.	08/04/2011	Report	NARL: 2011 Project-specific Inspection and Sampling Work Plans including SAP, WMP, EPP	Y	NIRIS	N65226_000760
Various	1968	Letters	NARL 786	N	NA	NA
Various	1972, 1988, 1993, unknown	Scanned maps	NA	N	NA	NA
Vinnell Corporation	1967	Scanned documents and letters	NARL 1480	N	NA	NA
Western Regional Climate Center (WRCC)	Accessed 10/15/2018	Website	Barrow Post Rogers AP, Alaska (500546) (https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak0546)	Y	Attached	NA

Notes:
DERP = Defense Environmental Restoration Program
GIS = geographic information system
iNFADS = internet Navy Facilities Asset Data Store
NA = not applicable or not available
NARL = Naval Arctic Research Laboratory
NAVFAC NW = Naval Facilities Engineering Command Northwest
Navy = Department of the Navy
NAVSEA = Naval Sea Systems Command
OEL = Other Environmental Liabilities
RAB = Restoration Advisory Board
UIC = Ukpeagvik Inupiat Corporation

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM
and
DIVISION OF ENVIRONMENTAL HEALTH
DRINKING WATER PROGRAM
Date: August 20, 2018

Technical Memorandum

Action Levels for PFAS in Water and
Guidance on Sampling Groundwater and Drinking Water

Purpose

This document was prepared by the Alaska Department of Environmental Conservation (DEC or "department") to provide clear, consistent guidance on responding to Per- and Polyfluoroalkyl Substances (PFAS) in groundwater and surface water, and to establish health-based action levels for drinking water.

Regulatory Authority

18 AAC 75.325(d): "A responsible person shall investigate, contain, and perform a cleanup of a discharge or release of a hazardous substance…"

18 AAC 75.325(f)(1)(D): "A responsible person shall to the maximum extent practicable, …prevent, eliminate, or minimize potential adverse impacts to human health, safety, and welfare, and to the environment, onsite and offsite, from any hazardous substance remaining at the site."

18 AAC 75.990(17): Cleanup is defined to include "efforts to mitigate environmental damage or a threat to human health, safety, or welfare resulting from a hazardous substance, and includes . . . measures that are necessary to mitigate or avoid further threat to human health, safety, or welfare."

18 AAC 75.345(d): "Where the department determines that toxicity information is insufficient to establish a cleanup level for a hazardous substance or a pollutant that ensures protection of human health, safety, and welfare, and of the environment, the department may require a responsible person to provide an alternative source of drinking water for the affected parties or implement other institutional controls under 18 AAC 75.375 until a cleanup level is established under (b)(2), (3), or (4) of this section."

18 AAC 75.345(c): "The department will set a more stringent cleanup level than the applicable level under (b) of this section, if the department determines that a more stringent cleanup level is necessary to ensure protection of human health, safety, or welfare, or of the environment, and based on actual onsite and actual or likely offsite uses of the groundwater that are likely to be affected by the hazardous substance. In making a determination under this subsection, the department may consider:

(2) the presence of sensitive subpopulations who respond biologically to lower levels of exposure to a hazardous substance…

(5) a health advisory value developed by EPA's Office of Water…"

18 AAC 80.005(a): "The purpose of this chapter is to protect public health and safety by establishing…

(2) contaminant monitoring requirements for drinking water provided by a public water system."

18 AAC 80.015(a): "A person may not

(1) cause pollution or contamination to enter a public water system; or

(2) create or maintain a condition that has a significant potential to cause or allow the pollution or contamination of a public water system."

Background and Basis for Guidance

To ensure public drinking water is safe for consumption, Alaska relies on and adopts the U.S. Environmental Protection Agency's (EPA's) drinking water maximum contaminant levels (MCLs), rather than establishing state specific MCLs.

The EPA has not yet established MCLs for PFAS. However, in 2009 the EPA published Provisional Health Advisory Levels of 0.4 μg/L perfluorooctanoic acid (PFOA) and 0.2 μg/L perfluorooctane sulfonate (PFOS), and recommended people not drink water containing higher levels of these compounds.

In 2012, EPA published the third Unregulated Contaminant Monitoring Rule (UCMR3) under the Safe Drinking Water Act (SDWA). The rule required a subset of public drinking water systems to monitor for thirty unregulated contaminants including six PFAS compounds [PFOS, PFOA, perfluorohexane sulfonate (PFHxS), perfluorononanoic acid (PFNA), perfluorohepatanoic acid (PFHpA) and perfluorobutane sulfonate (PFBS)] between 2013 and 2015. PFAS have since been found in many public and private water supplies across the country.

In 2016, EPA published lifetime health advisories (LHAs) under the SDWA for two PFAS, specifically PFOS and PFOA. These LHAs were created to assist state and local officials and drinking water system operators, in evaluating risks from these contaminants in drinking water, so they can take appropriate action to protect residents. The EPA recommends people not drink water containing a total concentration of PFOS+PFOA above 0.07 μg/L (70 parts per trillion).

The EPA LHA levels assume an adult body weight of 80 kilograms and a daily drinking water intake rate of 4.32 liters for a nursing mother. In addition, each LHA level incorporates a relative source contribution (RSC) that assumes 20% of the exposure to PFOS and PFOA is from drinking contaminated water and the remaining 80% is from exposure from other sources (e.g. consuming contaminated food, contact with household products, and occupational exposure).

In 2016, the department incorporated the published EPA LHA reference dose (RfD) into its determination of risk-based groundwater cleanup levels at contaminated sites for two of the UCMR3 compounds -- PFOS and PFOA. Groundwater cleanup levels for contaminants regulated by the department are calculated using a risk-based approach that does not include an RSC factor.

In June 2018, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a draft Toxicological Profile for Perfluoroalkyls for public review and comment. The document provides a compilation of information from available studies on the toxicologic properties and adverse health effects associated with PFAS compounds and identifies numerous on-going studies.

Based on review of available information, DEC considers the six PFAS compounds addressed in this memorandum to be hazardous substances under state law.[1] Several of these compounds have been found in groundwater and surface water used as drinking water. The department finds that action levels are necessary to consistently determine where drinking water treatment or alternative drinking water sources are necessary to ensure adequate protection of human health.

Action Levels

Action levels for PFAS compounds in groundwater and surface water used as drinking water are as follows:

- **Where one or more of the PFAS compounds, PFOS, PFOA, PFNA, PFHxS, or PFHpA are detected in a water sample analytical result, the sum of the concentrations for all detected compounds will be compared to an action level of 0.07 µg/L.**

- **Where PFBS is present in a water sample analytical result, the detected concentration will be compared to an action level of 2.0 µg/L.**

Contaminant	CAS Registry Number
perfluorooctanesulfonic acid (PFOS)	1763-23-1
perfluorooctanoic acid (PFOA)	335-67-1
perfluorononanoic acid (PFNA)	375-95-1
perfluorohexanesulfonic acid (PFHxS)	355-46-4
perfluoroheptanoic acid (PFHpA)	375-85-9
perfluorobutanesulfonic acid (PFBS)	375-73-5

Summed Action Level **0.07 µg/L**

Action Level **2.0 µg/L**

- **Where the above PFAS are not detected, refer to the April 2017 Technical Memorandum *Guidelines For Treatment Of Non-Detect Values, Data Reduction For Multiple-Detections And Comparison Of Quantitation Limits To Cleanup Values***

[1] AS 46.03.826(5) "hazardous substance" means (A) an element or compound which, when it enters into the atmosphere, or in or upon the water or surface or subsurface land of the state, presents an imminent and substantial danger to the public health or welfare, including but not limited to fish, animals, vegetation, or any part of the natural habitat in which they are found.

Scientific Basis

In taking this action, DEC concurs with the state of Massachusetts and other states that several factors together warrant applying the PFOA/PFOS LHA of 0.07 μg/L as a total threshold level for five of the six UCMR3 compounds.[2] [3] These factors include:

1) the molecular structure of the compounds PFNA, PFHxS, and PFHpA is substantially similar (between six and eight fluorinated carbons) to that of PFOS and PFOA, thus similar biological activities are predicted;
2) evidence indicates the compounds have similar biological half-lives, which is indicative of toxicity;
3) toxicity information, though limited, indicates these compounds cause adverse health effects at similar doses;
4) the presence of multiple contaminants may cause additive or synergistic health effects; and
5) the additive approach is consistent with EPA's LHA approach where PFOS and PFOA are summed together. Including the additional three PFAS with PFOS and PFOA when assessing exposure is a reasonable and protective approach given the similarities of the compounds.

The department is setting an individual action level for PFBS due to the shorter chain structure (four fluorinated carbons versus 6-8 in the other five compounds) which implies less persistence in the body and the available data, although limited, indicates that it exhibits lower toxicity than PFOS and PFOA. This value is based on a chronic reference dose (RfD) established by the state of Minnesota Department of Health.[4]

Guidance

At a contaminated site where a release of PFAS have been documented, a responsible party shall develop a work plan to:

- characterize the nature and extent of contamination in groundwater including, if appropriate, surface water and pore water if contaminated groundwater is discharging to surface water, using EPA Method 537 and report results for the six PFAS listed in UCMR3 at a minimum, following the ITRC sampling guidance for PFAS[5];
- conduct a water well survey to identify wells that may be impacted; and
- sample potentially impacted drinking water supplies, both public and private, using EPA Method 537 to determine the extent of impacts.

[2] Massachusetts Department of Environmental Protection Office of Research and Standards. June 2018. Final Recommendations for Interim Toxicity and Drinking Water Guidance Values for Perfluorinated Alkyl Substances included in the Unregulated Chemical Monitoring Rule 3.

[3] Arizona, Colorado, Connecticut, Minnesota, New Jersey, Vermont

[4] Minnesota Department of Health. December 2017. Toxicological Summary for Perfluorobutane sulfonate.

[5] ITRC 2018. Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS).

Where drinking water contamination is likely, water well surveys and drinking water sampling should be conducted as soon as feasible. The water well survey and sampling efforts shall be expanded until all potentially impacted drinking water systems have been tested. Where drinking water sources or water supply wells are affected, the RP shall:

- Provide an alternative drinking water source to all properties where drinking water has been impacted above the action levels listed above;
- Work with owners of all water supply wells containing PFAS concentrations above the action levels as soon as feasible to either:
    - ensure all water pumped and discharged is treated to concentrations below the action levels;[6]
    - disconnect the wells (disconnect power, cap water line, and label) and take them out of use; or
    - permanently decommission the wells.
- On a quarterly basis, sample all water supply wells currently in use that contain PFAS concentrations at or above one-half the action levels, subject to approval for reduced monitoring frequency if concentrations are determined to be stable or decreasing; and
- On an annual basis, sample any water supply wells currently in use that contain PFAS concentrations between 25% - 50% of the action levels, subject to approval for reduced monitoring if the concentrations are determined to be stable or decreasing.

The department is contemplating future revisions to the cleanup levels for PFOS and PFOA and adopting regulatory cleanup levels for the remaining UCMR3 PFAS compounds based on the Agency for Toxic Substances and Disease Registry draft Toxicological Profile for Perfluoroalkyls (2018)[7] and other information that may be developed by other states or at the national level.

The department may revise this technical memorandum as new information on the science and toxicity of PFAS becomes available.

For more information or additional questions, please contact: Sally Schlichting at (907) 465-5076.

[6] Excavation dewatering and other discharges may be permitted on a case-by-case basis under an excavation dewatering permit, DEC work plan, or other DEC authorized permit, and may involve limited or controlled discharge locations and/or heightened monitoring requirements.

[7] ATSDR. June 2018. Draft Toxicological Profile for Perfluoroalkyls – Draft for Public Comment

DEPARTMENT OF

ENVIRONMENTAL CONSERVATION

18 AAC 75

Oil and Other Hazardous Substances Pollution Control

As amended through October 27, 2018

Bill Walker
Governor

Larry Hartig
Commissioner

IMPORTANT NOTE TO READER

THE REGULATIONS REPRODUCED HERE HAVE BEEN PROVIDED BY THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AS A PUBLIC COURTESY. WHILE EVERY EFFORT HAS BEEN MADE TO ASSURE THE ACCURACY OF THE REPRODUCED VERSION, THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION CANNOT GUARANTEE ITS ABSOLUTE ACCURACY. PAPER COPIES OF THE REGULATIONS AS ORIGINALLY FILED BY THE LIEUTENANT GOVERNOR ARE AVAILABLE FROM THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION.

THE REGULATIONS HAVE AN EFFECTIVE DATE OF OCTOBER 27, 2018, ARE IN REGISTER 228, AND WILL APPEAR IN OFFICIAL PUBLISHED FORM IN THE JANUARY 2019 SUPPLEMENT TO THE ALASKA ADMINISTRATIVE CODE.

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Chapter 75. Oil and Other Hazardous Substances Pollution Control.

Article

1. Oil Pollution Prevention Requirements (18 AAC 75.005 - 18 AAC 75.090)
2. Financial Responsibility for Oil Discharges (18 AAC 75.205 - 18 AAC 75.290)
3. Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances (18 AAC 75.300 - 18 AAC 75.396)
4. Oil Discharge Prevention and Contingency Plans and Nontank Vessel Plans (18 AAC 75.400 - 18 AAC 75.496)
5. Oil Spill Primary Response Action Contractors and Nontank Vessel Cleanup Contractors, Incident Management Teams, and Response Planning Facilitators (18 AAC 75.500 - 18 AAC 75.580)
6. Civil Penalties for Discharge of Petroleum and Petroleum Products and Byproducts (18 AAC 75.605 - 18 AAC 75.670)
7. Surface Oiling (18 AAC 75.700 - 18 AAC 75.730)
8. Oil Discharge for Scientific Purposes (18 AAC 75.800 - 18 AAC 75.830)
9. Aboveground Storage Tanks; Class 2 Facilities (18 AAC 75.835 – 18 AAC 75.849)
10. General Provisions (18 AAC 75.905 - 18 AAC 75.990)

Editor's notes: Effective 5/14/92, Register 122, the regulations in 18 AAC 75 were comprehensively reorganized and revised. They replace all previous regulations in this chapter and in 18 AAC 20 (Financial Responsibility), which were repealed simultaneously with the adoption of these regulations. The history line at the end of each section does not reflect the history of that provision before the 5/14/92 effective date of this chapter, nor is the section numbering related to the numbering before that date.

Previous amendments to 18 AAC 20 and to this chapter are on file in the Office of the Lieutenant Governor as follows:

Previous amendments to regulations dealing with financial responsibility, which now appear at 18 AAC 75.205 - 18 AAC 75.275, are found at Register 79, 9/9/81; and at Register 103, 8/6/87. Previous amendments to regulations dealing with oil and hazardous substances pollution control are found at Register 45, 4/15/73; Register 62, 4/23/77; Register 63, 9/16/77; Register 66, 4/19/78; Register 79, 9/9/81; Register 94, 5/2/85; Register 103, 8/6/87; Register 110, 7/89; and at Register 115, 8/17/90.

The regulations in 18 AAC 75.300 - 18 AAC 75.396, grouped under Article 3, effective January 22, 1999 and distributed in Register 149, constitute a comprehensive reorganization and revision of material formerly set out at 18 AAC 75.300 - 18 AAC 75.370, which also had been grouped at Article 3. The regulations at 18 AAC 75.300 - 18 AAC 75.396 replace former 18 AAC 75.300 - 18 AAC 75.370, which were repealed simultaneously with the adoption of these regulations. The history line at the end of each section does not reflect the history of the replaced provisions before January 22, 1999. Some section numbers in this revision were used for previous regulations, but current sections are not necessarily related to previous sections with the same section number. The earlier version of 18 AAC 75.300 - 18 AAC 75.370 may be reviewed at the Office of the Lieutenant Governor, and may be found at Register 122, effective May 14, 1992.

Article 1. Oil Pollution Prevention Requirements.

Section

005. Responsibility
007. General oil pollution prevention requirements
015. Waiver
020. Oil Discharge Prevention Training & Recordkeeping
025. Transfer requirements
027. Requirements for laden tank vessels
037. Requirements for laden oil barges
045. Operating requirements for exploration and production facilities
047. Requirements for flow lines at production facilities
055. Leak detection, monitoring, and operating requirements for crude oil transmission pipelines
065. Field-constructed aboveground oil storage tank requirements
066. Shop-fabricated aboveground oil storage tanks
075. Secondary containment requirements for aboveground oil storage tanks
080. Requirements for facility oil piping
085. Requirements for railroad tank cars and operations by rail
090. (Repealed)

18 AAC 75.005. Responsibility. The owner or operator of a tank vessel, oil barge, pipeline, oil terminal, railroad tank car, exploration facility, or production facility subject to the requirements of AS 46.04.030 or AS 46.04.055(j) is responsible for meeting the applicable requirements of this chapter and for preventing the discharge of oil into waters or onto land of the state. (Eff. 5/14/92, Register 122; am 12/14/2002, Register 164; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070
AS 46.03.740 AS 46.04.050

18 AAC 75.007. General oil pollution prevention requirements. (a) Except where application of the requirements of 18 AAC 75.005 - 18 AAC 75.085 would be preempted by federal law, those requirements apply to each facility or operation for which an approved oil discharge prevention and contingency plan is required under AS 46.04.030 or AS 46.04.055(j).

(b) A vessel, barge, pipeline, railroad tank car, or other facility subject to the applicable requirements of this chapter must be equipped and operated in accordance with this chapter and other state and federal law applicable to the prevention of an oil discharge. A railroad must be operated in compliance with applicable federal railroad safety regulations.

(c) If a requirement of 18 AAC 75.005 – 18 AAC 75.085 and a corresponding requirement of federal law differ and application of the requirement of 18 AAC 75.005 – 18 AAC 75.085 would not be preempted by federal law, the more stringent requirement applies.

(d) Repealed 12/30/06.

(e) The owner or operator shall have in place programs designed to ensure that each drill operator, each person who has navigational, towline, security, or maintenance duties, and any other person directly responsible for an activity that might result in a violation of this chapter is free of substance-abuse or medical condition that would impair that person's ability to do that person's job. The requirements of this section may be met

(1) for a railroad, by a program in accordance with 49 C.F.R. Part 219, as revised as of October 1, 2005 and adopted by reference;

(2) for a pipeline, by a program in accordance with 49 C.F.R. Part 199, as revised as of October 1, 2005 and adopted by reference; or

(3) for a vessel, by a program in accordance with 49 C.F.R. Part 16, as revised as of October 1, 2005 and adopted by reference.

(f) The owner or operator shall provide security measures and surveillance appropriate to each component of the operation to minimize the risk of vandalism, sabotage, and unauthorized entry.

(g) Repealed 12/30/2006.

(h) Repealed 12/30/2006. (Eff. 5/14/92, Register 122; am 4/4/97, Register 142; am 12/14/2002, Register 164; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070
AS 46.04.055

18 AAC 75.015. Waiver. (a) The department may waive a requirement of 18 AAC 75.005 – 18 AAC 75.085 if the owner or operator demonstrates to the department's satisfaction that an equivalent level of protection will be achieved by using a technology or procedure other than the technology or procedure required by 18 AAC 75.005 – 18 AAC 75.085. (Eff. 5/14/92, Register 122; am 5/26/2004, Register 170; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.050 AS 46.04.070
AS 46.04.030

18 AAC 75.020. Oil discharge prevention training & recordkeeping. (a) The owner or operator shall have in place personnel training programs designed to ensure that all personnel with job duties directly involving inspection, maintenance, or operation of oil storage and transfer equipment regulated under 18 AAC 75.005 - 18 AAC 75.085 are appropriately and regularly trained regarding company and state oil pollution prevention measures that are applicable to each position's duties.

(b) Personnel training programs must include:

(1) a listing of each position with job duties listed under (a) of this section and the training and level of knowledge appropriate to that position;

(2) a listing of any licenses, certifications, or other prerequisites needed to hold each position listed in (1) of this subsection; and

(3) a listing of training objectives and the means of achieving them, including training subjects, training schedules, frequency, and type.

(c) Completion of training required by this subsection shall be verified by

(1) a statement, signed and dated by each participant, listing the course or program content;

(2) shipboard records verified by the vessel master; or

(3) computerized records verified by the owner or operator.

(d) The owner or operator shall maintain for the life of the facility or operation, a history of all known oil discharges over 55 gallons within the state, including the source, cause, amount, and corrective action taken. Copies of records shall be provided to the department upon request.

(e) The owner or operator shall prepare and maintain records in retrievable form to document training, inspections, tests, maintenance, and repairs required by 18 AAC 75.005 - 18 AAC 75.085. Unless specified otherwise, records must be kept for at least five years and copies shall be provided to the department upon request. (Eff. 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.025. Transfer requirements. (a) The owner or operator of an oil terminal facility, exploration facility, production facility, railroad, tank vessel, or oil barge shall take all appropriate measures to prevent spills or overfilling during a transfer of oil, including reduced loading rates at the beginning and end of a transfer.

(b) Unless it is technically unfeasible to do so, an oil containment boom appropriate for local conditions must be deployed in an effective manner around a tank vessel or oil barge during the transfer of

(1) crude oil;

(2) other persistent products; and

(3) oily ballast water.

(c) Except for crude oil washing, tank cleaning operations may not be conducted during cargo offloading.

(d) The owner or operator shall ensure that each person involved in a transfer is capable of clearly communicating orders to stop a transfer at any time during the transfer.

(e) A positive means must be provided to stop a transfer in the shortest possible time consistent with the best commercially available technology.

(f) Before beginning a transfer to or from an area not protected by secondary containment, the owner or operator shall ensure that all valves in the transfer system have been checked to ensure that they are in the correct position, and that all manifolds not in use are blank flanged or capped. Where feasible, the owner or operator shall also inspect for damage or defects all piping and hoses used in the transfer before and at least once during each transfer.

(g) The lowermost drain and all outlets of any tank car or tank truck must be visually examined for leakage before filling and before departure. All tank car or tank truck manifolds must be blank flanged or capped, and valves must be secured before leaving the transfer area.

(h) All aboveground transfer piping that is used to transfer oil to or from docks or vessels must be visually checked before and during each transfer or monthly, whichever is less frequent.

(i) For purposes of (b) of this section, deployment of an oil containment boom is technically unfeasible if

(1) expected tidal currents and other local environmental conditions preclude the effective configuration and operation of the oil containment boom due to entrainment or splash over; or

(2) the physical facility layout precludes the effective configuration of the oil containment boom around the tank vessel or oil barge.

(j) In this section, “transfer” means any movement of oil by means of pumping, gravity, or displacement.

(1) within an oil terminal facility; or

(2) between an oil terminal, exploration, or production facility and a railroad tank car, tank truck, tank vessel, or oil barge. (Eff. 5/14/92, Register 122; am 10/28/2000, Register 156; am 12/14/2002, Register 164; am 12/30/2006, Register 180; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.027. Requirements for laden tank vessels. (a) In addition to meeting the applicable requirements of 18 AAC 75.007 - 18 AAC 75.025, a laden tank vessel must carry or have ready access to sufficient oil transfer equipment to facilitate lightering to and from other vessels. The oil transfer equipment must be sufficient to lighter the volume of the largest cargo tank within 24 hours.

(b) The owner or operator shall ensure that each laden tank vessel has on board a person who is designated as an oil spill prevention and response officer and is responsible for training and drilling the crew on state and federal oil pollution prevention and response requirements.

(c) If the master is not fluent in English, a person fluent in English and in the master's language must be immediately available to the bridge of any laden tank vessel when underway in state waters.

(d) The owner or operator shall ensure that measures are in place that allow the prompt detection of an oil discharge, including

(1) visual lookouts;

(2) the sounding of all cargo tanks to check cargo and water levels in the tanks after an intentional or unintentional grounding, collision, or allision, and,

(3) where technically feasible, electronic leak detection systems.

(e) A tank vessel under escort by another vessel must, at all times, be operated in a manner that permits the escort vessel to be available immediately to provide the intended assistance to the tank vessel.

(f) While in state waters, towing line must be made up and prepared for rapid deployment to a towing vessel. The tow line must be fitted to allow tow vessels commonly available in the area of operation to take the vessel in tow rapidly. For a vessel operating at the oil loading terminal at Valdez, the Prince William Sound towing package may be used instead of having lines made up, if the package permits rapid deployment to a towing vessel. (Eff. 5/14/92, Register 122; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.037. Requirements for laden oil barges. (a) In addition to meeting the applicable requirements of 18 AAC 75.007 - 18 AAC 75.025, a laden oil barge must carry or have ready access to sufficient oil transfer equipment to facilitate lightering to and from other vessels. The oil transfer equipment must be sufficient to lighter the volume of the largest cargo tank within 24 hours.

(b) The owner or operator of a laden oil barge shall ensure that each barge or vessel towing a barge has on board a person who is designated as an oil spill prevention and response officer and is responsible for training and drilling the crew on state and federal oil pollution prevention and response requirements.

(c) If the master is not fluent in English, a person fluent in English and in the master's language must be immediately available to any vessel towing an oil laden barge.

(d) The owner or operator shall ensure that measures are in place that allow the prompt detection of an oil discharge, including visual inspections of the barge and the area around the barge, and the sounding of all cargo tanks to check cargo and water levels in the tanks after an intentional or unintentional grounding collision, or allision.

(e) The owner or operator shall inspect towing equipment every two months and shall record the results of each inspection and any actions taken to resolve problems discovered during an inspection.

(f) The owner or operator shall provide an adequate means of recovering a barge that breaks free of its towing vessel. The recovery means must be capable of being used by other vessels if the towing vessel is lost or incapacitated. (Eff. 5/14/92, Register 122; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.045. Operating requirements for exploration and production facilities. (a) In addition to the applicable requirements of 18 AAC 75.007 - 18 AAC 75.025, the owner or operator of an exploration or production facility shall collect and store oil produced during a formation flow test or other drilling operation in a manner that prevents the oil from entering the land or waters of the state.

(b) In state waters, a marine structure used for drilling must be inspected for fatigue and structural integrity as required by 30 C.F.R. Part 250, Subpart I, revised as of July 1, 2001 and adopted by reference. The inspection must be conducted after installation of the structure and before drilling or production operations begin. The owner or operator shall submit to the department a report of the inspection results and any corrective actions taken.

(c) Closure valves for pipelines leaving marine structures must be located at a protected location that isolates the pipeline from the structure if a discharge or other emergency occurs and must function both manually and remotely as part of an emergency shutdown system.

(d) The owner or operator of an exploration or production facility shall provide, at a minimum,

(1) containment and collection devices such as drip pans and curbs for offshore exploration and production wells; and

(2) wellhead sumps for exploration and production wells located onshore or on artificial islands or ice islands; for exploration and production wells drilled and completed after December 30, 2008 and located onshore or on artificial islands or ice islands, wellhead sumps shall be designed and installed to be sufficiently impermeable.

(e) A marine structure used for oil production other than an artificial island must have a sufficiently impermeable deck with catch tanks or other devices adequate to contain, collect, and divert spilled oil. The catch tank must have adequate storage capacity to contain anticipated and accidental discharges of oil and high-liquid-level alarms that will immediately notify the operator if a high liquid level develops.

(f) Aboveground oil storage tanks, including bulk fuel tanks, must meet the applicable requirements of 18 AAC 75.065, 18 AAC 75.066, and 18 AAC 75.075.

(g) Piping associated with an exploration or production facility must meet the applicable requirements of 18 AAC 75.047 and 18 AAC 75.080. (Eff. 5/14/92, Register 122; am 12/30/2006, Register 189)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.047. Requirements for flow lines at production facilities. (a) The requirements of this section apply to each flow line associated with a production facility.

(b) Unless the owner or operator must comply with a more stringent requirement set out in this section, the owner or operator shall ensure that the design and construction of each flow line placed in service after December 30, 2008 is consistent with one of the following standards,

(1) American Society of Mechanical Engineers, *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*, 2002 Edition (ASME B31.4-2002); adopted by reference;

(2) ASME *Gas Transmission and Distribution Piping Systems*, 2003 Edition (ASME B31.8-2003), adopted by reference;

(3) another equivalent and nationally recognized standard approved by the department.

(c) No later than December 30, 2007, the owner or operator shall ensure that measures for controlling corrosion in flow lines are undertaken, including, at a minimum,

(1) a corrosion monitoring and control program consistent with Chapter VIII of *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids* (ASME B31.4-2002) adopted by reference in (b)(1) of this section;

(2) unless a more stringent requirement is set out in this section, external corrosion control of buried or submerged flow lines consistent with NACE International's *Standard Recommended Practice-Control of External Corrosion on Underground or Submerged Metallic Piping Systems*, 2002 edition (NACE, RP0169-2002), adopted by reference;

(3) external corrosion control of aboveground flow lines by the application of a protective coating, by the use of corrosion-resistant alloys or by another method approved by the department, unless the operator demonstrates by test, investigation, or experience appropriate to the environment of the flow line segment, that the anticipated extent of corrosion will not affect the flow line's fitness for service; and

(4) a program designed to minimize internal corrosion, including, as appropriate, one or more of the following:

(A) removal of foreign material by scraping or pigging;

(B) treatment of residual water or dehydration;

(C) injection of inhibitors, biocides, or other chemical agents;

(D) removal of dissolved gases by chemical or mechanical means;

(E) gas blanketing;

(F) continuous internal coating or lining; or

(G) another method approved by the department; and

(d) No later than December 30, 2007, the operator shall

(1) completely contain the entire circumference of the flow line and provide the interstitial space with a leak detection system approved by the department; or

(2) have in place a preventative maintenance program that ensures the continued operational reliability of any flow line system component affecting quality, safety, and pollution prevention; the owner or operator shall ensure that the program,

(A) for submerged flow lines, is consistent with Chapters VII through IX of *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*, (ASME B31.4-2002), adopted by reference in (b)(1) of this section;

(B) for buried flow lines, is consistent with Chapters VII and VIII of *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids* (ASME B31.4-2002), adopted by reference in (b)(1) of this section;

(C) for aboveground flow lines, as appropriate, a program consistent with

(i) the requirements of American Petroleum Institute's (API) *Piping Inspection Code, Inspection, Repair, Alteration, and Rerating of In-service Piping Systems*, Second Edition, October 1998, Addendum 1, February 2000, Addendum 2, December 2001, and Addendum 3 (API 570), August 2003, adopted by reference excluding Section 8; and

(ii) Chapters VII and VIII of *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids* (ASME B31.4-2002), (API 570) adopted by reference in (b)(1) of this section; and

(D) for all flow lines, procedures to review proposed changes in operations to evaluate potential impacts on pipe integrity.

(e) Line markers shall be installed no later than December 30, 2007 and maintained over each onshore flow line at each road crossing and at one-mile intervals along the remainder of the pipe to identify and, for buried pipe, properly locate each flow line.

(f) On or after December 30, 2006, flow lines removed from service for more than one year must be free of accumulated oil and isolated from the system. The owner or operator shall notify the department when flow lines are removed from service and when the actions required by this subsection are completed. For purposes of this subsection, a flow line removed from service is free of accumulated oil if

(1) in the case of a piggable pipe, a cleaning pig is run through the pipe;

(2) in the case of a pipe that is not piggable but that can be drained entirely of its contents by gravity, the pipe is completely drained of oil; or

(3) in all other cases, air is blown through the pipe or another method is used to flush or evacuate standing oil accumulated in low spots; and

(g) Aboveground flow lines must be supported consistent with the requirements of Paragraph 421 of *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids* (ASME B31.4-2002), adopted by reference in (b)(1) of this section.

(h) The owner or operator shall verify compliance with the requirements of (c) and (d)(2) of this section by documentation, including

(1) for corrosion control measures under (c) of this section, documentation to validate the effectiveness of those measures, including

(A) dates and locations of inspections and tests;

(B) inspections and test data evaluation including analysis of

(i) weight loss coupons and electrical resistance probes; and

(ii) corrosion inspections;

(C) data and analysis of chemical optimization activities;

(D) analysis of corrosion trends that affect the fitness for service of the flow line; and

(E) a list and description of repair activities undertaken; and

(2) for a preventative maintenance program under (d)(2) of this section, documentation to validate the effectiveness of that program, including

(A) the procedures for program implementation under (d)(2) of this section;

(B) dates and locations of inspections and tests;

(C) inspections and test data evaluation including analysis, pipewall thickness measurements and remaining life calculations; and

(D) internal audit procedures of the program, including descriptions of controls and corrections for identified defects.

(i) In this section,

(1) "buried" means covered or in contact with soil;

(2) "defects"

(A) means an imperfection listed in Paragraph 451.6.2 of *Pipeline. Transportation Systems for Liquid Hydrocarbons and Other Liquids,* ASME B.31.4-2002, adopted by reference in (b)(1) of this section; and

(B) has the meaning given in Section 3.10 of *Piping Inspection Code, Inspection, Repair, Alteration, and Rerating of In-service Piping Systems,* Second Edition (API 570), adopted by reference in (d)(2) of this section;

(3) "removed from service" means not in regular use for the service intended and not included in a regular maintenance and inspection program in accordance with (c) and (d) of this section.

(4) "submerged" means located below the surface of waters of the state. (Eff.12/30/2006, Register 180; am 3/23/2017, Register 221)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

Editor's Note: The publications adopted by reference in 18 AAC 75.047 may be reviewed at the department's offices in Anchorage, Fairbanks or Juneau, or may be obtained directly from the appropriate publisher. The mailing address, telephone number, facsimile number, and website, if available, for each publisher are as follows: American Society of Mechanical Engineers (ASME), 22 Law Drive, P.O. Box 2300, Fairfield, New Jersey 07007-2300; phone (800) 843-2763; fax (201) 882-1717; website: http://www.asme.org/; (NACE) International, 1440 South Creek Drive, Houston, Texas 77084-4906; phone (800) 797-6223; fax (281) 228-6300; website: http://www.nace.org; American Petroleum Institute (API), 1220 L Street NW, Washington, DC 20005-4070; phone (202) 682-8000; fax (303) 397-2740; website: http://www.api-ec.api.org.

18 AAC 75.055. Leak detection, monitoring, and operating requirements for crude oil transmission pipelines. (a) A crude oil transmission pipeline must be equipped with a leak detection system capable of promptly detecting a leak, including

(1) if technically feasible, the continuous capability to detect a daily discharge equal to not more than one percent of daily throughput;

(2) flow verification through an accounting method, at least once every 24 hours; and

(3) for a remote pipeline not otherwise directly accessible, weekly aerial surveillance, unless precluded by safety or weather conditions.

(b) The owner or operator of a crude oil transmission pipeline shall ensure that the incoming flow of oil can be completely stopped within one hour after detection of a discharge.

(c) If aboveground oil storage tanks are present at the crude oil transmission pipeline facility, the owner or operator shall meet the applicable requirements of 18 AAC 75.065, 18 AAC 75.066 and 18 AAC 75.075.

(d) For facility oil piping connected to or associated with the main crude oil transmission pipeline, the owner or operator shall meet the requirements of 18 AAC 75.080. (Eff. 5/14/92, Register 122; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.065. Field-constructed aboveground oil storage tank requirements. (a) Unless the owner or operator must comply with a more stringent requirement set out in this section, the owner or operator of an oil terminal, crude oil pipeline, exploration, or production facility shall maintain and inspect each field-constructed aboveground oil storage tank consistent with the requirements, as appropriate of American Petroleum Institute's (API)

(1) *Tank Inspection, Repair, Alteration, and Reconstruction,* Third Edition, December 2001, and Addendum 1, September 2003 (API 653), adopted by reference; or

(2) *Recommended Practice for Setting, Maintenance, Inspection, Operation and Repair of Tanks in Production Service,* Fifth Edition, August 1997 (API RP 12R1) adopted by reference.

(b) Inspection intervals for a field constructed aboveground oil storage tank

(1) may be reduced by the department

(A) for a field-constructed aboveground oil storage tanks older than 30 years;

(B) for a field-constructed aboveground oil storage tank that is riveted or bolted;

(C) for a field-constructed aboveground oil storage tanks with a demonstrated structural, corrosion, or foundation problems; or

(D) after a significant seismic event;

(2) may not be based upon similar service as specified in Section 6.4.2 of *Tank Inspection, Repair, Alteration, and Reconstruction,* (API 653), adopted by reference in (a) of this section; and

(3) may be based upon risk-based inspection as specified in Section 6.4.3 of *Tank Inspection, Repair, Alteration, and Reconstruction,* (API 653), adopted by reference in (a) of this section, if the risk based inspection assessment is submitted to the department for approval; the assessment must include

(A) a quantitative risk assessment, signed by a registered engineer and conducted in accordance with the American Petroleum Institute's *Risk Based Inspection,* First Edition, May 2002 (API RP 580), adopted by reference; and

(B) an inspection schedule with inspection intervals not to exceed 30 years.

(c) An onshore elevated field-constructed aboveground oil storage tank whose configuration allows external inspection of more than 50 percent of the tank bottom is not required to undergo an internal inspection if

(1) an external integrity inspection is substituted, and performed in accordance with *Tank Inspection, Repair, Alteration, and Reconstruction,* (API 653), adopted by reference in (a) of this section, or *Recommended Practice for Setting, Maintenance, Inspection, Operation and Repair of Tanks in Production Service*, (API RP 12R1), adopted by reference in (a) of this section; and

(2) the external integrity inspection includes an inspection and a nondestructive integrity test of the tank, including the tank bottom.

(d) Records and documentation

(1) required by this section shall be maintained by the owner or operator, except as provide in (2) of this subsection, for the service life of the tank and shall be provided to the department for inspection and copying upon request.

(2) of inspections required as specified in Section 6.3.1 of *Tank Inspection, Repair, Alteration, and Reconstruction* (API 653), adopted by reference in (a) of this section, shall be maintained by the owner or operator for five years and shall be provided to the department for inspection and copying upon request.

(e) The owner or operator shall notify the department

(1) as soon as practical before a field-constructed aboveground oil storage tank undergoes major repair or major alteration, as defined in Section 12.3.1.2 of *Tank Inspection, Repair, Alternation, and Reconstruction,* (API 653), adopted by reference in (a) of this section; and

(2) before a field-constructed aboveground oil storage tank resumes service following major repair or alteration as defined in Section 12.3.1.2 of *Tank Inspection, Repair, Alteration, and Reconstruction*, (API 653), adopted by reference in (a) of this section.

(f) A field-constructed aboveground oil storage tanks served by an internal steam heating systems must be designed to control leakage through defective heating coils. Condensate lines must be monitored, passed through an oil separating device, or passed through a retention system.

(g) An internal lining system installed and used to control corrosion or to meet the requirements of (h) of this section, must be installed in accordance with American Petroleum Institute's (API).

(1) *Lining of Aboveground Petroleum Tank Bottoms,* First Edition, 1991, (API RP 652) adopted by reference, for internal lining systems installed before December 30, 2008; or

(2) *Lining of Aboveground Petroleum Storage Tank Bottoms,* Third Edition, October 2005 (API RP 652), adopted by reference, for internal lining systems installed after December 30, 2008.

(h) An owner or operator of an installation placed in service before May 14, 1992 shall

(1) equip each field-constructed aboveground oil storage tank with one or more of the following:

(A) a leak detection system that an observer from outside the tank can use to detect leaks in the bottom of the tank, such as secondary catchment under the tank bottom with a leak detection sump, a sensitive gauging system, or other leak detection system approved by the department;

(B) cathodic protection in accordance with the American Petroleum Institute's (API) *Cathodic Protection of Aboveground Petroleum Storage Tanks*, First Edition, 1991 (API RP 651), adopted by reference;

(C) a thick film liner in accordance with *Lining of Aboveground Petroleum Storage Tank Bottoms*; First Edition, 1991 (API R 652), adopted by reference in (g)(1) of this section;

(D) another leak detection or spill prevention system approved by the department; and

(2) operate and maintain, after December 30, 2007, the cathodic protection system on each field-constructed aboveground oil storage tank consistent with Section 11 of *Standard Recommended Practice: External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms*, (NACE RP0193-2001), adopted by reference in (j) of this section; a corrosion expert or qualified cathodic protection tester shall perform a cathodic protection survey specified under that standard.

(i) The owner or operator of an installation placed in service on or after May 14, 1992 and before December 30, 2008 shall meet each of the following requirements:

(1) each field-constructed aboveground oil storage tank must be constructed and installed in compliance with

(A) the American Petroleum Institute's (API)

(i) *Welded Steel Tanks for Oil Storage*, Eighth Edition, 1988 (API 650), adopted by reference;

(ii) *Specifications for Field Welded Tanks for Storage of Production Liquids*, Ninth Edition, 1989 (API Spec 12D), adopted by reference;

(iii) *Specifications for Shop Welded Tanks for Storage of Production Liquids*, 10th Edition, 1989 (API Spec 12F), adopted by reference: and

(iv) Specifications for Fiberglass Reinforced Tanks, First Edition, 1986 (API Spec 12P), adopted by reference; or

(B) another equivalent standard approved by the department;

(2) a field-constructed aboveground oil storage tank may not be of riveted or

bolted construction;

(3) cathodic protection or another approved corrosion control system must be installed, to protect the bottom of each field-constructed aboveground oil storage tank from external corrosion where local soil conditions warrant; after December 30, 2007, operation and maintenance of the cathodic protection system must be consistent with Section 11 of *External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms* (NACE RP0193-2001), adopted by reference in (j) of this section; a corrosion expert or qualified cathodic protection tester shall perform a cathodic protection survey specified under that standard;

(4) each field-constructed aboveground oil storage tank must be equipped with one or more of the following leak detection systems that an observer from outside the tank can use to detect leaks in the bottom of the tank:

(A) secondary catchment under the tank bottom with a leak detection sump;

(B) a sensitive gauging system;

(C) another leak detection system approved by the department.

(j) An owner or operator of an installation placed in service after December 30, 2008 shall meet each of the following requirements:

(1) each field-constructed aboveground oil storage tank must be constructed and installed in compliance with

(A) the American Petroleum Institute's (API) *Welded Steel Tanks for Oil Storage*, 10th Edition, November 1998, Addendum 1, January 2000, Addendum 2, November 2001, and Addendum 3, September 2003 (API 650), adopted by reference;

(B) the American Petroleum Institute's (API) *Specifications for Field Welded Tanks for Storage of Production Liquids*, 10th Edition, November 1994 (API Spec 12D), adopted by reference; or

(C) another equivalent standard approved by the department;

(2) a field-constructed aboveground oil storage tank may not be riveted or bolted construction;

(3) a cathodic protection system or another approved corrosion control system shall be installed to protect the bottom of each field-constructed aboveground oil storage tank from external corrosion unless deemed not necessary by an evaluation conducted by a corrosion expert in accordance with Chapter 5 of the American Petroleum Institute's (API) *Cathodic Protection of Aboveground Petroleum Storage Tanks,* Second Edition, December 1997 (API RP 651), adopted by reference; a cathodic protection system must be

(A) designed by a corrosion expert;

(B) installed under the supervision of a corrosion expert;

(C) installed, operated, and maintained in accordance with NACE International's *Standard Recommended Practice: External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms*, 2001 edition (NACE RP0193-2001), adopted by reference: a corrosion expert or qualified cathodic protection tester shall perform a cathodic protection survey specified under that standard; and

(4) each field-constructed aboveground oil storage tank must be equipped with

(A) a leak detection system that

(i) an observer from outside the tank can use to detect leaks in the bottom of the tank; and

(ii) is designed and installed, in accordance with Appendix I of *Welded Steel Tanks for Oil Storage* (API 650), adopted by reference in (1) of this subsection; or

(B) another leak detection system approved by the department.

(k) In addition to the applicable requirements of 18 AAC 75.025, and except as required in (1) of this subsection, the owner or operator of a field constructed aboveground oil storage tank shall ensure that one or more of the following means of preventing overfilling is provided:

(1) high liquid level alarms with signals that sound and display in a manner immediately recognizable by personnel conducting a transfer; an installation placed in service after December 30, 2008 must be in compliance with this paragraph, regardless of whether another means of preventing overfilling is provided;

(2) high liquid level automatic pump shutoff devices set to stop flow at a predetermined tank content level;

(3) a means of immediately determining the liquid level of each bulk storage tank, if the liquid level is closely monitored during a transfer;

(4) a system approved by the department which will immediately notify the operator of high liquid levels.

(*l*) Overfill protection devices must be tested before each transfer operation or monthly, whichever is less frequent. If monthly testing would necessitate interrupting the operation of a system subject to continuous flow, the owner or operator may substitute monthly inspection and annual testing for the monthly testing of overfill protection devices.

(m) An owner or operator who installs a cathodic protection system after December 30, 2008 on a field-constructed aboveground oil storage tank shall meet the applicable requirements of (j)(3) of this section.

(n) An owner or operator shall maintain the cathodic protection test lead wires on a field-constructed aboveground oil storage tank in a condition that enables electrical measurements to determine the effectiveness of a cathodic protection system.

(o) A field-constructed aboveground oil storage tank removed from service for more than one year must be free of accumulated oil, marked with the words "Out of Service" and the date taken out of service, secured in a manner to prevent unauthorized use, and either blank flanged or otherwise disconnected from facility piping. The owner or operator shall notify the department when a tank is removed from service and when the actions required by this subsection are completed. In this subsection, "removed from service" means not in regular use for the service intended and not included in a regular maintenance and inspection program in accordance with this section. (Eff. 5/14/92, Register 122; am 5/26/2004, Register 170; am 12/30/2006, Register 180; am 3/23/2017, Register 221)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

Editor's Note: The publications adopted by reference in 18 AAC 75.065 may be reviewed at the department's offices in Anchorage, Fairbanks, or Juneau, or may be obtained directly from the appropriate publisher. The mailing address, telephone number, facsimile number, and website, if available, for each publisher are as follows: American Petroleum Institute (API), 1220 L Street NW, Washington, DC 20005-4070; phone (202) 682-8000; fax (303) 397-2740; website: http://www.api.org ; NACE International, 1440 South Creek Drive, Houston, Texas 77084-4906; phone (800) 797-6223; fax (281) 228-6300; website: http://www.nace.org.

18 AAC 75.066. Shop-fabricated aboveground oil storage tanks. (a) The owner or operator of a shop-fabricated aboveground oil storage tank placed in service:

(1) on or before December 30, 2008 shall meet the requirements of (f) - (h) of this section;

(2) after December 30, 2008 shall meet the requirements of this section.

(3) after October 27, 2018 with a storage capacity greater than 50,000 gallons shall meet the requirements of 18 AAC 75.065.

(b) Unless the owner or operator must comply with a more stringent requirement set out in this section, the owner or operator shall ensure that

(1) one of the following standards is used for the design and construction of each shop-fabricated aboveground oil storage tank:

(A) Underwriters Laboratories (UL) *Steel Aboveground Tanks for Flammable and Combustible Liquids*, Eighth Edition, dated July 11, 2002 (UL 142), adopted by reference;

(B) Appendix J of American Petroleum Institute's (API) *Welded Steel Tanks for Oil Storage*, 10th Edition, November 1998, Addendum 1, January 2000, Addendum 2, November 2001, Addendum 3, September 2003, (API 650) adopted by reference;

(C) American Petroleum Institute's (API) *Specification for Shop Welded Tanks for Storage of Production Liquids*, Eleventh Edition, November 1994 (API Spec 12F), adopted by reference;

(D) Steel Tank Institute's (STI) *Standard for Aboveground Tanks with Integral Secondary Containment*, revised as of October 21, 2004, (STI F921-03), adopted by reference;

(E) Underwriters Laboratories (UL) *Protected Aboveground Tanks for Flammable and Combustible Liquids*, Second Edition, revised as of December 1, 1999, (UL 2085) adopted by reference; or

(2) the design of a shop-fabricated above ground oil storage tank is certified by a registered engineer, and approved by the department as equivalent to a design for which a standard listed in (1) of this subsection is used.

(c) The owner or operator of a vaulted shop-fabricated aboveground oil storage tank shall ensure that the tank has

(1) a discrete secondary containment vault systems

(A) constructed of

(i) seamless, poured concrete that is sealed or lined;

(ii) welded carbon or stainless metal; or

(iii) other impermeable material; and

(B) able to contain 100 percent of the volume of the tank plus any necessary allowance for precipitation; and

(2) sufficient personnel access to allow full physical inspection of all sides of the tank.

(d) The owner or operator of a self-diked shop-fabricated aboveground oil storage tanks shall ensure that the tank

(1) has access that allows visual inspection for corrosion or damage to the

(A) outer shell of the storage tank; and

(B) interior surfaces of the integral secondary containment dike; and

(2) has, at each tank fill connection, a fixed spill containment system designed to prevent a discharge when a transfer hose or pipe is detached from the tank fill pipe or to divert that discharge into the secondary containment dike;

(3) is equipped with a system for freeing water or spilled fuel from the integral dike and for regular maintenance in accordance with 18 AAC 75.075(c) and (d); and

(4) is equipped with an operating interstitial monitoring system that enables an observer from outside the tank to detect oil leaks from the tank bottom and water accumulation within the secondary containment area

(e) The owner or operator of a double-walled shop-fabricated aboveground oil storage tank shall ensure that the tanks is equipped

(1) with an operating interstitial monitoring system that enables an observer from outside the tank to detect oil leaks and water accumulation;

(2) at each tank fill connection with a fixed spill containment system designed to prevent a discharge when a transfer hose or pipe is detached from the tank fill pipe;

(3) with a system for freeing water or spilled fuel from the interstitial space and for regular maintenance in accordance with 18 AAC 75.075(c) and (d).

(f) Unless the owner or operator must comply with a more stringent requirement set out in this section, the owner or operator of an oil terminal facility, crude oil pipeline, exploration facility, or production facility shall ensure that one of the following standards is used for the maintenance and inspection of shop-fabricated aboveground oil storage tank:

(1) the Steel Tank Institute's (STI) Standard *for the Inspection of Aboveground Storage Tanks*, 3rd Edition, July 2005, (STI SP001), adopted by reference;

(2) the American Petroleum Institute's (API) *Tank Inspection, Repair, Alteration, and Reconstruction*, Third Edition, December 2001, and Addendum 1, September 2003 (API 653), adopted by reference;

(3) another equivalent standard approved by the department.

(g) In addition to the applicable requirements of 18 AAC 75.025, the owner or operator of a shop-fabricated aboveground oil storage tank

(1) shall ensure that the tank is equipped with one or more of the following means of preventing discharges:

(A) high liquid level alarms with signals that sound and display in a manner immediately recognizable by personnel conducting a transfer;

(B) high liquid level automatic pump shutoff devices set to stop flow at a predetermined tank content level;

(C) a means of immediately determining the liquid level of each bulk storage tank, if the liquid level is closely monitored during a transfer;

(D) a system approved by the department which will immediately notify the operator of high liquid levels; and

(2) placed in service after December 30, 2008 shall equip each tank fill connection with a fixed spill containment system designed to prevent a discharge when a transfer hose or pipe is detached from the tank fill pipe.

(h) The owner or operator of a shop-fabricated aboveground storage tank shall ensure that each discharge prevention device for the tank is tested before each transfer operation or monthly, whichever is less frequent. If monthly testing would necessitate interrupting the operation of a system subject to continuous flow, the owner or operator may substitute monthly inspection and annual testing for the monthly testing of overfill protection devices. (Eff. 12/30/2006, Register 180; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

Editor's Note: The publications adopted by reference in 18 AAC 75.066 may be reviewed at the department's offices in Anchorage, Fairbanks, or Juneau, or may be obtained directly from the appropriate publisher. The mailing address, telephone number, facsimile number, and website, if available, for each publisher are as follows: Underwriters Laboratories, Inc. (UL), Standards Department, 333 Pfingsten Road, Northbrook, Illinois 60062; telephone (708) 272-8800; fax (708) 272-8129; website: http://www.ul.com; Steel Tank Institute (STI), 570 Oakwood Road, Lake Zurich, Illinois 60062; telephone (708) 438-8265, extension 4331; fax (708) 438-8766; website: http://www.steeltank.com; American Petroleum Institute (API), 1220 L Street NW, Washington, DC 20005-4070; telephone (202) 682-8000; fax (303) 397-2740; website: http://www.api.org.

18 AAC 75.075. Secondary containment requirements for aboveground oil storage tanks. (a) Onshore aboveground oil storage tanks must be located within a secondary containment area that has the capacity to hold the volume of the largest tank within the containment area, plus enough additional capacity to allow for local precipitation. Minimum secondary containment system requirements include

(1) berms, dikes, or retaining walls that are constructed to prevent the release of spilled oil from within the containment area; and

(2) with the exception of the area under a tank, components constructed of, or lined with, materials that are

(A) adequately resistant to damage by the products stored to maintain sufficient impermeability;

(B) resistant to damage from prevailing weather conditions; and

(C) sufficiently impermeable; and

(D) resistant to operational damage.

(3) Repealed 12/30/2006.

(b) In locations where physically feasible, aboveground oil storage tank areas at an offshore exploration or production facility must incorporate a secondary containment method to prevent oil spills from entering the water.

(c) A secondary containment system must be maintained free of debris, vegetation, excessive accumulated water, or other materials or conditions that might interfere with the effectiveness of the system. Facility personnel shall visually check for the presence of oil leaks or spills within secondary containment areas during routine operations, and, unless precluded by safety concerns or weather conditions, shall conduct documented weekly inspections of secondary containment areas, including checking for

(1) debris and vegetation,

(2) proper alignment and operation of drain valves,

(3) visible signs of oil leaks or spills; and

(4) defects or failures of the secondary containment system.

(d) Drainage of water accumulations from secondary containment areas that discharge directly to the land or waters of the state must be controlled by locally operated, positive close failsafe valves or other positive means to prevent a discharge. Valves must be kept closed and locked when not in use. The owner or operator shall inspect accumulated water before discharging

it from a secondary containment area to ensure that no oil will be discharged and shall keep for five years a written record of each drainage operation and whether a sheen was present or not. A discharge of water to land is subject to a cleanup plan approved under 18 AAC 75.360, a corrective action plan approval under 18 AAC 78.260, or a wastewater discharge permit issued under 18 AAC 72. If the discharge of water from a secondary containment area is to surface waters or wetlands, either a permit under 18 AAC 72, a permit under 18 AAC 83, or a certified NPDES permit under 18 AAC 15.120 may be required.

(e) An installation placed in service on or after May 14, 1992 is subject to the following:

(1) impermeable liners or double bottoms that are chemically resistant to damage by the product being stored in the tank must be installed under all tanks, except for tanks containing viscous products exceeding 400 SUS (Saybolt Universal System) at storage temperatures; and

(2) drains and other penetrations through secondary containment areas must be minimized consistent with facility operational requirements.

(f) At an installation placed in service before May 14, 1992, in the event of a known or suspected discharge, the department may require installation of monitoring wells to detect oil or other hazardous substances in the groundwater if the local geology and groundwater conditions allow installation of monitoring wells and if monitoring wells will not substantially increase the risk of contaminating groundwater.

(g) The owner or operator of rail tank car and tank truck loading areas and permanent unloading areas must ensure that those loading and unloading areas

(1) have a secondary containment system designed to contain the maximum capacity of any single compartment of the tank car or tank truck, including containment curbing and a trenching system or drains with drainage to a collection tank or device designed to handle a discharge;

(2) are paved, surfaced, or lined with sufficiently impermeable materials;

(3) are maintained free of debris, vegetation, excessive accumulated water or other materials or conditions that might interfere with the effectiveness of the system;

(4) have warning lights, warning signs, or a physical barrier system to prevent premature vehicular movement; and

(5) are visually inspected before any transfer operation or at least monthly.

(h) Shop-fabricated aboveground oil storage tanks of a vaulted, self-diked, or double-walled design meeting the requirements of 18 AAC 75.066(c), (d), or (e) are not required to be placed within bermed, lined, secondary containment areas if those tanks are equipped with catchments that positively hold any fuel overflow due to tank overfill or divert it into an integral secondary containment area.

(i) In this section, "failsafe" means designed such that the equipment defaults to a closed condition in the event of an equipment failure. (Eff. 5/14/92, Register 122; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.080. Requirements for facility oil piping (a) The owner or operator of an oil terminal, crude oil transmission pipeline, exploration facility, or production facility shall ensure that all facility oil piping associated with that facility meets the requirements of this section.

(b) The owner or operator shall maintain metallic facility oil piping containing oil in accordance with a written corrosion control program.

(c) Unless the owner or operator must comply with a more stringent requirement set out in this section, the owner or operator shall ensure that facility oil piping placed in service after December 30, 2008 is designed and constructed in accordance with one of the following standards, as appropriate:

(1) American Society of Mechanical Engineers' *Process Piping* (ASME B31.3-2004), adopted by reference;

(2) American Society of Mechanical Engineers' *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*, 2002 Edition (ASME B31.4-2002), adopted by reference;

(3) American Society of Mechanical Engineers' *Gas Transmission and Distribution Piping Systems*, 2003 Edition (ASME B31.8-2003), adopted by reference;

(4) another equivalent standard approved by the department.

(d) The owner or operator shall ensure that buried metallic facility oil piping placed in service between May 14, 1992 and December 30, 2008, is protected from corrosion by installing protective coating and cathodic protection appropriate for local soil conditions and is of all welded construction with no clamped, threaded, or similar connections for lines larger than a one inch nominal pipe size.

(e) The owner or operator shall ensure that buried facility oil piping placed in service after December 30, 2008

(1) is of all welded construction with no clamped, threaded, or similar connections for lines larger than one inch nominal pipe size; and

(2) unless constructed of a corrosion-resistant material approved by the department, is

(A) protected from corrosion by installing protective coating; and

(B) cathodically protected in accordance with (f) of this section.

(f) The owner or operator shall ensure that, after December 30, 2008, cathodic protection systems installed on facility oil piping are

(1) consistent with NACE International's, *Standard Recommended Practice-Control of External Corrosion on Underground or Submerged Metallic Piping Systems*, 2002 edition (NACE RP0169-2002), adopted by reference;

(2) designed by a corrosion expert; and

(3) installed under the supervision of a corrosion expert;

(g) The owner or operator shall ensure that, if a piping segment of a buried facility oil piping installation is exposed for any reason, the segment is carefully examined, for damaged coating or corroded piping in accordance with Section 9.2.6 of *Piping Inspection Code, Inspection, Repair, Alteration, and Rerating of In-service Piping Systems* (API 570), adopted by reference in (j) of this section, if active corrosion is found during that examination,

(1) the owner or operator shall implement actions for control of future corrosion; and

(2) significant repairs or replacements must meet the requirements of (c) and (e) of this section.

(h) An owner or operator or a buried facility oil piping installation of metallic construction without cathodic protection shall ensure that the piping

(1) is electrically inspected by a corrosion expert for active corrosion at least once every three years, but with intervals between inspections not exceeding 39 months; and

(2) in areas in which active corrosion is found, cathodically protected in accordance with (d) or (f) of this section, as appropriate;

(i) The owner or operator shall ensure that aboveground facility oil piping is supported consistent with the requirements of Paragraph 321 of *Process Piping*, (ASME B31.3-2004), adopted by reference in (c) of this section.

(j) After December 30, 2007, unless the owner or operator must comply with a more stringent requirement set out in this section, the owner or operator shall ensure that all facility oil piping is maintained and inspected under

(1) a program developed in accordance with the requirements of the American Petroleum Institute's (API) *Piping Inspection Code, Inspection, Repair, Alteration, and Rerating of In-service Piping Systems*, Second Edition, October 1998, Addendum 1, February 2000, Addendum 2, December 2001, and Addendum 3, August 2003, (API 570) adopted by reference; or

(2) another equivalent program approved by the department.

(k) Unless the owner or operator must comply with a more stringent requirement set out in this section, the operation and maintenance of a cathodic protection system on facility oil piping must

(1) be consistent with Section 10 of *Standard Recommended Practice: Control of External Corrosion on Underground or Submerged Metallic Piping Systems*, (NACE RP0169-2002), adopted by reference in (f) of this section;

(2) include a cathodic protection survey by a corrosion expert or qualified cathodic protection tester; and

(3) include maintenance of test lead wires in a condition that enables electrical measurements to be taken to determine the effectiveness of a cathodic protection system;

(*l*) The owner or operator of aboveground facility oil piping, other than piping specified in (m) of this section, shall ensure that the piping is protected from atmospheric corrosion by the application of a protective coating or by the use of corrosion-resistant material unless the owner or operator demonstrates by test, investigation, or experience appropriate to the environment of the piping segment that the anticipated extent of corrosion will

(1) only be a light surface oxide; or

(2) not affect the safe operation of the piping before the next scheduled inspection under a program developed under (j) of this section;

(m) The owner or operator shall ensure that aboveground facility oil piping is protected against external corrosion through the application of a protective coating or by the use of corrosion-resistant materials for piping

(1) located outside a sufficiently impermeable deck onboard a marine structure; or

(2) at a soil-to-air interface.

(n) The owner or operator of aboveground facility oil piping and valves must ensure that the piping and valves are

(1) visually checked for leaks or damage during routine operations or at least monthly, and

(2) appropriately protected from damage by vehicles.

(o) The owner or operator of facility oil piping that is removed from service for more than one year shall ensure that the facility oil piping is free of accumulated oil, identified as to origin, marked on the exterior with the words "Out of Service" and the date taken out of service, secured in a manner to prevent unauthorized use, and either blank flanged or otherwise isolated from the system. For piping removed from service after December 30, 2006, the owner or operator shall notify the department when facility oil piping is removed from service and when the actions required by this subsection are completed.

(p) In this section,

(1) “active corrosion” means continuing corrosion that, unless controlled, could result in a spill;

(2) “buried” means covered or in contact with soil;

(3) “protective coating” means a durable external coating that is applied to piping and that

(A) isolates the external surface of the piping from the environment;

(B) has sufficient adhesion to effectively resist underfilm migration of moisture;

(C) is sufficiently ductile to resist cracking in the range of temperatures encountered during bending, handling, installation, and operation;

(D) has sufficient strength and adhesion, or is otherwise protected, to resist mechanical damage;

(E) resists degradation throughout the range of temperatures encountered during storage, shipping, construction, and operation; and

(F) is compatible with the cathodic protection system in use on the piping;

(4) “removed from service” means not in regular use for the service intended and not included in a regular maintenance and inspection program in accordance with (j) of this section.

(5) “submerged” means located below the surface of waters of the state. (Eff. 5/14/92, Register 122; am 12/30/2006, Register 180; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

Editor’s Note: The publications adopted by reference in 18 AAC 75.080 may be reviewed at the department’s offices in Anchorage, Fairbanks, or Juneau, or may be obtained directly from the appropriate publisher. The mailing address, telephone number, facsimile

number, and website, if available, for each publisher are as follows: American Society of Mechanical Engineers (ASME), 22 Law Drive, P.O. Box 2300, Fairfield, New Jersey 07007-2300; telephone (800) 843-2763; fax (201) 882-1717; website: http://www.asme.org/; National Association of Corrosion Engineers (NACE) International, 1440 South Creek Drive, Houston, Texas 77084-4906; telephone (800) 797-6223; fax (281) 228-6300; website http://www.nace.org; American Petroleum Institute (API), 1220 L Street NW, Washington, DC 20005-4070; telephone (202) 682-8000; fax (303) 397-2740; website: http://www.api.org.

As of Register 210 (July 2014), and acting under AS 44.62.125(b)(6), the regulations attorney made a technical revision to 18 AAC 75.080(c).

18 AAC 75.085. Requirements for railroad tank cars and operations by rail. In addition to the applicable requirements of 18 AAC 75.007 – 18 AAC 75.025, the owner or operator of a railroad tank car shall ensure that

(1) the tank car meets all applicable federal specifications;

(2) the operation and transport of railroad tank cars by railroad, at a minimum, meet all applicable federal operating and transport criteria and practices;

(3) if the tank car is subject to the federal inspection and maintenance reporting requirements of 49 C.F.R. 180.501 – 180.519, the required reports are available for review by the department upon request;

(4) the transporting railroad maintains avalanche detection and mitigation systems designed to address local avalanche hazards to the safe transportation of railroad tank cars; and

(5) the transporting railroad maintains an appropriate system of track-mounted detectors designed to detect defects on railroad tank cars during transit. (Eff. 12/14/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.030 AS 46.03.070
AS 46.04.055

18 AAC 75.090. Recommended practices. Repealed. (Eff. 5/14/92, Register 122; repealed 12/30/2006, Register 180)

Article 2. Financial Responsibility For Oil Discharges.

Section

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18 AAC 75.205. Application for approval. (a) Subject to the exemptions provided under AS 46.04.050 and (d) of this section, an application for approval of proof of financial responsibility under AS 46.04.040 or 46.04.055, including an application for renewal of approval under 18 AAC 75.225, must be submitted to the department by the following responsible party:

(1) for an oil terminal facility that has a storage capacity of 5,000 barrels or more of crude oil or 10,000 barrels or more of noncrude oil as provided in AS 46.04.050(a), by the owner or operator of the facility;

(2) for a railroad tank car, by the owner or operator of the railroad tank car;

(3) for a vessel, by

(A) the charterer, if the vessel is chartered by demise;

(B) the operator of the vessel;

(C) the owner of the vessel, if the agents or employees of the owner retain control and responsibility for the operation of the vessel; or

(D) in any other case, the person with primary operational control;

(4) for an exploration or production facility, whether mobile or fixed, by the operator or one or more lease holders;

(5) for a pipeline facility, by the operator or one or more lease holders;

(6) for a group of vessel or facility owners or operators who have agreed to pool their resources to provide proof of financial responsibility for each other, by a designated person in the group.

(b) Applications under this section and renewal applications under 18 AAC 75.225 must be made on a form supplied by the department. The following conditions apply, as appropriate, to an application:

(1) an applicant must furnish the department with the appropriate documents listed in the "financial responsibility application and checklist" supplied by the department;

(2) except a nontank vessel, the completed and signed application must be submitted to the department at least 30 days, but no earlier than 90 days before operations are proposed to begin; the department will, in its discretion, expedite its review of an application if circumstances warrant;

(3) for a nontank vessel, the completed and signed application must be received by the department at least 15 days, but no earlier than 90 days, before operations are proposed to begin; the department will accept an application received less than 15 days before operations are proposed to begin and expedite the review of the application, if the

(A) application is received at least five days before operations are proposed to begin; and

(B) applicant demonstrates that unanticipated circumstances prevent the applicant from meeting the 15-day deadline under this paragraph;

(4) if the applicant is an agency of the United States or this state whose debts and liabilities are the debts and liabilities of the United States or this state, proof of financial responsibility is not required, but the "financial responsibility application and checklist" must be submitted to the department in accordance with the time frames established under this section;

(5) an applicant may submit a combined application for more than one vessel or facility;

(6) an approval may not be assigned to another person, and may not be transferred from one vessel or facility to another; an attempted assignment or transfer of an approval voids the approval;

(7) all forms of proof of financial responsibility must be in effect before operations begin; an approval will not be given on pending coverage.

(c) Applications submitted under this section and renewal applications submitted under 18 AAC 75.225 must be signed upon oath or affirmation as follows:

(1) in the case of a corporation, by a principal executive officer of at least the level of vice president or that officer's authorized representative, if the representative is responsible for the overall management of the facility or operation;

(2) in the case of a partnership, by a general partner;

(3) in the case of a sole proprietorship, by the proprietor;

(4) in the case of a municipal, state, federal, or other public facility, by a principal executive officer, ranking elected official, or other authorized employee;

(5) in the case of a combined application, by an appropriate representative of each party to the application;

(6) in the case of a joint venture, by the operator;

(7) by an agent who has been delegated that authority by the responsible party under (a) of this section on a form supplied by the department; and

(8) for a limited liability company, by a member.

(d) The department will, in its discretion, approve an application for an exemption from the proof of financial responsibility requirements of AS 46.04.040(c) and 46.04.055(a) if the owner or operator of a vessel that is conducting, or is available only for conducting, an oil discharge response operation submits to the department

(1) a written explanation, to the department's satisfaction, requesting the exemption, giving details of the time period during which the exemption is requested for each vessel for the oil discharge response operation; and

(2) a completed "application for exemption from financial responsibility" form.
(Eff. 5/14/92, Register 122; am 10/28/2000, Register 156; am 11/27/2002, Register 164; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.215. Applications submitted by facsimile or electronic mail. The department will accept an application by facsimile transmission or electronic mail. The completed original of the application must be submitted to the department by registered or certified mail or by courier and must be postmarked or dated by courier within two working days after it was sent by facsimile or electronic mail. (Eff. 5/14/92, Register 122; am 10/28/2000, Register 156; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.220. Application for amendment. The owner or operator must file an application with the department for a change in operation that would change the dollar amount of financial responsibility required under 18 AAC 75.235(a). The application must include appropriate proof of financial responsibility under 18 AAC 75.235 – 18 AAC 75.271, include a letter describing the change in operation, and be submitted to the department at least 30 days before placing the changed operations into service, except that the owner or operator of a nontank vessel must submit changes at least 15 days before placing the changed operations into service within state waters. The department will review the application in accordance with 18 AAC 75.205 - 18 AAC 75.271. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.225. Renewals. (a) An application for renewal of department approval of proof of financial responsibility must be submitted to the department at least 30 days, but no earlier than 90 days, before the current approval of proof of financial responsibility expires, except for a nontank vessel. For a nontank vessel, an application for renewal must be submitted at least 15 days before expiration.

(b) An application for renewal must include the information required by 18 AAC 75.205(b)(1). (Eff. 5/14/92, Register 122; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.235. Amount and evidence of financial responsibility: general provisions. (a) Each vessel or facility must be specifically covered by an approved form of financial responsibility. The dollar amounts of required financial responsibility set out in AS 46.04.040 or 46.04.055 are adjusted, based upon the percentage change between the reference base index and the semi-annual average Consumer Price Index for all urban consumers in the Anchorage metropolitan area for the second half of 2016, as reported by the United States

Department of Labor, bureau of labor statistics. An applicant under 18 AAC 75.205 or 18 AAC 75.225 must demonstrate financial responsibility to respond in damages for claims covered by AS 46.04.040(i) in the following applicable minimum amount:

(1) for a crude oil terminal facility, $93,550,000 per incident;

(2) for a noncrude oil terminal facility, $46.78, per incident, for each barrel of total noncrude oil storage capacity at the terminal, or $1,871,000, whichever is greater, subject to a maximum of $93,550,000; if the facility stores more noncrude oil than crude oil, the $46.78 per incident, per barrel requirement of this paragraph applies to each barrel of oil storage capacity at the facility;

(3) for a tank vessel or barge carrying crude oil, $561.30, per incident, for each barrel of storage capacity or $187,100,000 whichever is greater;

(4) for a tank vessel or barge carrying noncrude oil, $187.10, per incident, for each barrel of storage capacity or $1,871,000, whichever is greater, subject to a maximum of $65,485,000;

(5) for a nontank vessel carrying predominantly nonpersistent product, $187.10 per incident, for each barrel of total oil storage capacity, persistent and nonpersistent product, on the vessel or $1,871,000, whichever is greater;

(6) for a nontank vessel carrying predominantly persistent product, $561.30 per incident, for each barrel of total oil storage capacity, persistent product and nonpersistent product, on the vessel or $9,355,000, whichever is greater;

(7) for a railroad tank car,

(A) $561.30 per incident for each barrel of persistent product based on the maximum amount of persistent product storage capacity of any train on the railroad; and

(B) $187.10 per incident for each barrel of nonpersistent product based on the maximum amount of nonpersistent product storage capacity of any train on the railroad or $1,830,000, whichever is greater;

(8) for a pipeline, $93,550,000 per incident;

(9) for an offshore exploration or production facility, $93,550,000 per incident;

(10) for an onshore production facility that produces more than 10,000 barrels per day of oil, $37,420,000 per incident;

(11) for an onshore production facility that produces more than 5,000, but not more than 10,000 barrels per day of oil, $18,710,000 per incident;

(12) for an onshore production facility that produces more than 2,500, but not more than 5,000 barrels per day of oil, $93,550,000 per incident;

(13) for an onshore production facility that produces 2,500 or fewer barrels per day of oil, $1,871,000 per incident;

(14) for an onshore exploration facility, $1,871,000 per incident.

(b) The required amount of financial responsibility does not increase with increasing numbers of vessels or facilities operated by the same applicant. An application for multiple vessels or facilities must show proof of financial responsibility in an amount equal to the highest applicable amount prescribed by (a) of this section. The department will, in its discretion, consider the proof of financial responsibility as being applicable to all operations if each separate operation is named as being specifically covered by the proof submitted.

(c) The applicant may add an owned, operated, leased, or chartered vessel or facility to its proof of financial responsibility by submitting a letter to the department requesting an amendment to the application and including documents that verify to the department's satisfaction that the additional operation is covered by the current approved proof of financial responsibility.

(d) The applicant may delete an owned, operated, leased, or chartered vessel or facility from its proof of financial responsibility by submitting a letter to the department requesting an amendment to the application and including documents that verify to the department's satisfaction that the vessel or facility is no longer covered by the current approved proof of financial responsibility.

(e) In satisfying proof of financial responsibility requirements for a combined application, a guarantor or insurer is responsible only for the amount applicable to the vessel or facility that discharges oil and not the amount applicable to another vessel or facility listed on the application.

(f) If a vessel or facility subject to AS 46.04.040 or 46.04.055 discharges oil and the department determines that a claim has been or is likely to be presented as a result of the discharge and that payment of the claim will reduce the owner's or operator's demonstrated financial responsibility below that required by (a) of this section, the department will, in its discretion, require the owner or operator to demonstrate an additional amount of financial responsibility equal to the amount the department determines might be paid as a result of the claim.

(g) If the applicant fails to comply with the requirement imposed under (f) of this section to demonstrate an additional amount of financial responsibility, the department will, in its discretion, provide the owner or operator with 10 days' notice of the department's intent to revoke its approval of the proof of financial responsibility.

(h) If the department provides a notice under (g) of this section, the applicant may request an informal review under 18 AAC 15.185 or an adjudicatory hearing under 18 AAC 15.195 – 18 AAC 15.340. The requirement of (f) of this section is not stayed during the pendency of an adjudicatory hearing.

(i) Proof of financial responsibility may be demonstrated by one or any combination of the mechanisms listed in AS 46.04.040(e), as approved by the department.

(j) An insurer or surety shall respond to damages covered by AS 46.04.040(i), but only with respect to the stated limit of liability contained in an insurance policy or surety submitted as proof of financial responsibility and approved under this chapter.

(k) For purposes of this section, the reference base index is the semi-annual average Consumer Price Index for all urban consumers in the Anchorage metropolitan area for the first half of 1990 as reported by the United States Department of Labor, Bureau of Labor Statistics.

(*l*) A person required to demonstrate proof of financial responsibility under AS 46.04.040 or AS 46.05.055 shall maintain coverage for at least 60 days after operation of the vessel or facility ceases.

(m) Short-term testing, evaluation, or experimental pilot production activities are subject to the financial responsibility requirements of AS 46.04.040 and 18 AAC 75.205 - 18 AAC 75.290 for exploration facilities.

(n) For purposes of AS 46.04.040, 46.04.055 and this section, "operation" means

(1) for an oil terminal facility, until

(A) the department finds that storage tanks are empty and out of use and that all connecting pipe lines are rendered unusable and posted with a placard prohibiting refilling of the tank without department approval; or

(B) the facility is closed and dismantled;

(2) for a pipeline, while the pipeline

(A) is connected to a production facility; or

(B) contains oil;

(3) an exploration or production facility, until the department has been notified in writing by the Alaska Oil and Gas Conservation Commission that all wells were properly plugged as required by 20 AAC 25.112 and abandoned as required by 20 AAC 25.105; and

(4) for a vessel, while the vessel is in the waters of the state, unless the owner or operator submits a notarized statement to the department certifying that all oil on the vessel has been removed. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132; am 12/8/95, Register 136; am 10/1/99, Register 151; am 10/28/2000, Register 156; am 10/27/2002, Register 164; am 11/27/2002, Register 164; am 10/6/2005, Register 176; am 8/31/2008, Register 187; am 10/1/2011, Register 199; am 9/4/2014, Register 211; add'l am 10/1/2014, Register 211; am 10/1/2017, Register 223; am 11/7/2017)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.04.055 AS 46.04.890

Editor's note: On September 16, 2005, the Office of the Lieutenant Governor filed amendments to 18 AAC 75.235(a). Under AS 44.62.180, those amendments became effective on October 16, 2005. Due to a clerical error, the regulations did not appear in print in the Alaska Administrative Code. As of Register 186 (July 2008), the regulations attorney made a technical revision under AS 44.62.125 (b)(6), to incorporate the October 16, 2005 amendments into 18 AAC 75.235(a).

As of Register 195 (October 2010), the regulations attorney made a technical revision under AS 44.62.125(b)(6), to 18 AAC 75.235(n).

18 AAC 75.236. Amount and evidence of financial responsibility: onshore production facilities. (a) In addition to the other applicable requirements of this chapter, for an onshore production facility, the amount of financial responsibility required is based on maximum daily production of oil, measured in barrels per day. "Maximum daily production" means the highest amount of oil to be produced at a facility in one day during the period for which application is made.

(b) For an onshore production facility that is taken out of service, or suspended under 20 AAC 25, but that is not closed or abandoned, the amount of financial responsibility required is the most recent amount of financial responsibility required under this chapter, and that amount will continue to be required until production resumes at which time the owner or operator shall determine maximum daily production under (a) of this section.

(c) The owner or operator shall, when submitting an application under 18 AAC 75.205 or 18 AAC 75.225, submit a notarized statement certifying that the maximum daily production of oil at a facility during the period for which application is made will be

(1) more than 10,000 barrels a day;

(2) more than 5,000 barrels a day, but not more than 10,000 barrels a day;

(3) more than 2,500 barrels a day, but not more than 5,000 barrels a day; or

(4) 2,500 or fewer barrels a day.

(d) With the certification submitted under (c) of this section, the owner or operator shall submit to the department a description of how the owner or operator determined the maximum daily production.

(e) The owner or operator shall notify the department in writing at its Juneau office of a change in production that would alter the certification submitted under (c) of this section within 30 days after the operator has knowledge of change or knowledge of the impending change, whichever occurs first.

(f) If the department finds that the maximum daily production is or may be higher than that certified under (c) or reported under (e) of this section, the department will require the owner or operator to provide proof within 20 days that the amount certified or reported is correct. If the owner or operator fails to provide proof under this subsection that is satisfactory to the department, or fails to report a change under (e) of this section, the department will, in its discretion, deny or revoke its approval of the proof of financial responsibility.

(g) For purposes of this section, "production" has the meaning given "regular production" in AS 31.05.170; however, the term "production facility" retains the meaning given in 18 AAC 75.990. (Eff. 12/8/95, Register 136; am 11/27/2002, Register 164; am 3/23/2017, Register 221)

Authority: AS 46.03.020 AS 46.04.040 AS 46.04.070

18 AAC 75.237. Public access to records. Records received by the department under 18 AAC 75.205 - 18 AAC 75.290, including financial responsibility applications, operations files, and proof of financial ability to respond to a spill incident, are subject to AS 40.25.110 - 40.25.220. (Eff. 12/8/95, Register 136)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.240. Certificate of proof of financial responsibility. (a) If the department approves a proof of financial responsibility, it will issue a certificate to the applicant stating that the proof of financial responsibility requirements have been met for each vessel or facility identified in the application.

(b) The original certificate, or a copy of the original certificate, including a printed copy of a certificate sent by electronic mail or a facsimile copy, that is certified by the applicant to be a true copy of the original certificate, must be readily available for inspection

(1) at each covered facility or pipeline;

(2) on each covered vessel while it is in state waters; the certificate must be shown to the owner or operator of an oil terminal facility before loading or unloading

(A) liquid bulk oil cargo; or

(B) oil to or from a nontank vessel; or

(3) with respect to a railroad tank car, at the headquarters office of the responsible party under 18 AAC 75.205(a) and at each facility at which oil is loaded or unloaded; if the financial responsibility requirements of the responsible party change, the responsible party shall immediately notify the department and the affected facilities and obtain an updated or amended certificate to reflect such changes, in accordance with 18 AAC 75.205 and 18 AAC 75.225.

(c) The effective date and the expiration date, as determined under AS 46.04.040(f), will be clearly marked on the certificate. For certificates that are effective for more than one year when issued, the continuing effectiveness of the form of financial responsibility that was approved by the department must be verified annually by submitting to the department, not more than 90 days and not less than 30 days before the anniversary of the certificate's effective date, the affidavit of a responsible party, as specified under 18 AAC 75.205(a), stating that the form of financial responsibility remains in effect and stating the date on which it will expire.

(d) If the owner or operator to whom the certificate was issued ceases to be the responsible party under 18 AAC 75.205(a), that person shall immediately return the original certificate to the department with written information regarding the new owner or operator's name and address and the date of the change in ownership or operational control so that a new certificate can be issued.

(e) A certificate is void and subject to immediate revocation by the department, without prior notice, if

(1) it contains erasures or is altered in any way, except for erasures, errors, or alterations made by the department in issuing the certificate;

(2) the person to whom the certificate was issued

(A) is no longer the responsible party under 18 AAC 75.205(a) for the facility or vessel identified on the certificate;

(B) fails to furnish acceptable proof of the continuing effectiveness of a form of financial responsibility as required under (c) of this section or in support of an application for renewal; or

(C) permits the cancellation or termination of the form of financial responsibility upon which issuance of the certificate was based.

(f) The department will give a certificate holder 10 days' written notice of the department's intent to revoke a certificate under AS 46.04.040(h). The notice will include an effective date for and an explanation of the revocation.

(g) If the department acts or provides a notice under (e) or (f) of this section, the applicant may request an informal review under 18 AAC 15.185, or an adjudicatory hearing under 18 AAC 15.195 – 18 AAC 15.340. (Eff. 5/14/92, Register 122; am 10/28/2000, Register 156; am 11/27/2002, Register 164; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.245. Self-insurance. (a) In order to demonstrate financial responsibility through self-insurance, an applicant shall maintain in the United States, working capital and net worth, each in an amount at least equal to the applicable amount required under 18 AAC 75.235(a), or a lesser amount necessary to supplement other forms of proof which, when combined, are at least equal to the applicable amount required under 18 AAC 75.235(a). In determining working capital or net worth, the department will consider all current contractual requirements to which the applicant is bound. For the purposes of this subsection,

(1) "working capital" means the amount of current assets located in the United States,

(A) other than those assets that are petroleum inventory that may be affected by an oil discharge from a facility covered by the self-insurance; and

(B) less all worldwide current liabilities; and

(2) "net worth" means the amount of all assets located in the United States, less all worldwide liabilities.

(b) The proof of financial responsibility required under (a) of this section must be supported by the following, which must be submitted with the application for approval, and which must be later supplemented as described:

(1) annual audited financial statements for consolidated holdings in the United States for the fiscal year ending immediately before each initial or renewal application, certified by an independent certified public accountant; if the financial statements do not specify what portion of the applicant’s working capital and net worth are located in the United States, the statements must be supplemented by an affidavit from the applicant’s chief financial officer or treasurer, or a sworn statement by the certified public accountant who prepared the audit, certifying that the working capital and net worth located in the United States are each in an amount equal to the applicable amount required under 18 AAC 75.235(a);

(2) subsequent quarterly affidavits attesting that the amounts of working capital and net worth are each equal to the applicable amount required under 18 AAC 75.235(a); and

(3) any additional information the department considers necessary.

(c) Instead of the information required under (b) of this section, a self-insuring applicant may provide the department with a copy of the applicant's Form 10K as filed with the United States Securities and Exchange Commission for the fiscal year preceding application or renewal, and each Form 10Q subsequently filed with that commission, subject to the following conditions:

(1) if the applicant's fiscal year ended six months or more before initial application, the applicant's Form 10Q for the first quarter of the current fiscal year must also be submitted with the initial application; and

(2) if the applicant's United States Securities and Exchange Commission forms do not specify what portion of its working capital and net worth are located in the United States, those forms must be supplemented by an affidavit from the applicant’s chief financial officer or treasurer, or a sworn statement by the certified public accountant who prepared the form, certifying that the working capital and net worth located in the United States are each in an amount equal to the applicable amount required under 18 AAC 75.235(a).

(d) Repealed 4/6/2016.

(e) Instead of the information required under (b)(1) and (c) of this section, the applicant may submit annually to the department a copy of its Form No. 6 as filed with the Federal Energy Regulatory Commission for each fiscal year, starting with the fiscal year that ended immediately preceding application and subsequent quarterly affidavits under (b)(2) or (c)(2) of this section.

(f) The affidavits or sworn statement required under (b)(2) of this section must be signed as follows:

(1) in the case of a corporation, by the treasurer or chief financial officer;

(2) in the case of a partnership, by a general partner;

(3) in the case of a sole proprietorship, by the proprietor;

(4) in the case of a municipal, state, federal, or other public facility, by an authorized public official or employee; and

(5) in the case of a combined application, by a representative of each party to the application;

(6) in the case of a joint venture, by the operator; and

(7) in the case of a limited liability company, by a member.

(g) A self-insurer shall notify the department within 10 days after the self-insurer knows, or has reason to believe, that the amount of the self-insurer's working capital or net worth has fallen below the applicable amount required under 18 AAC 75.235(a) or the lesser amount necessary to supplement other forms of proof.

(h) Unless it is earlier replaced by another form of financial responsibility approved by the department, termination or cancellation of self-insurance that serves as proof of financial responsibility under AS 46.04.040 may not take effect until 60 days after the self-insurer sends written notice to the department's Juneau office by certified mail.

(i) The department will, in its discretion, revoke a certificate issued under 18 AAC 75.240 if any document required under this section is not submitted to the department on or before the following due date:

(1) a Form 10K is due within four calendar months after the end of the applicant's fiscal year;

(2) a Form 10Q is due two calendar months after the quarter ends;

(3) a Form No. 6 is due no later than four calendar months after the end of the applicant's fiscal year;

(4) an annual audited financial statement is due within four calendar months after the end of the applicant's fiscal year; and

(5) a quarterly affidavit is due within two calendar months after the quarter ends.

(j) Upon written request, the department will, in its discretion, grant a reasonable extension of a time limit set in (i) of this section if the request is received at least 15 days before the document is due.

(k) A self-insurer must submit a renewal application no later than four calendar months after the end of the applicant's fiscal year. The initial application to demonstrate self-insurance may be submitted at any time. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132; am 12/8/95, Register 136; am 11/27/2002, Register 164; am 4/6/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.04.055

18 AAC 75.250. Insurance. (a) An applicant may demonstrate financial responsibility with insurance for the applicable amount required under 18 AAC 75.235(a), in full or in part. The applicant shall provide proof of insurance issued by an insurer either who is authorized to sell insurance in Alaska under a certificate of authority issued by the director of the division of insurance of the Department of Commerce, Community, and Economic Development or who is an unauthorized insurer listed by the division of insurance as meeting the minimum trust or capital and surplus requirements of AS 21.34.040(c). Proof of insurance may be provided by a binder, by a certificate of insurance acceptable in form to the department, or by a copy of the policy. If a binder or certificate of insurance is submitted to meet the requirements of this subsection, a copy of the underlying insurance policy must also be provided to the department within 90 days.

(b) Except for nontank vessels submitting proof of financial responsibility under 18 AAC 75.271(a)(2) or (3), if a policy of insurance, certificate, or binder is submitted, it must include an endorsement with the following, or substantially similar language:

> "Any other provision of this policy notwithstanding: (1) this policy insures against any liability the insured may incur under Alaska Statute 46.04.040(i) or any provision cited in it as a result of an unlawful discharge of oil within or affecting land or waters within the territorial jurisdiction of the State of Alaska; however, **the insurer's liability does not exceed the limits of coverage set out in Section (Article or Clause) _____ of this policy,** subject to any deductible as specifically set out in Section (Article or Clause) _____ of this policy (binder, certificate); (2) the insurer agrees that any final judgment against the insured for damages under AS 46.04.040(i) or any provision cited in it resulting from an unlawful discharge of oil from or by any vessel or facility named in this policy may be enforced or executed in Alaska state courts, directly against the insurer, **subject to the limits of coverage in this policy**; the insurer will be bound by such a judgment as if the judgment were against the insurer; any person obtaining such a judgment against the insured is expressly made a third-party beneficiary of this provision; and (3) termination or cancellation of this policy, insofar as it serves as proof of the insured's financial responsibility under AS 46.04.040, shall not become effective until 60 days after notice with the exception for nonpayment of premium which will require 30 days notice, in writing has been mailed, prepaid and certified, by the insurer to the insured and to the Alaska Department of Environmental Conservation at its office in Juneau, Alaska; however, this policy shall apply to all claims arising from a discharge occurring during the period covered by the policy and before the effective date of the termination or cancellation."

(c) An applicant may submit a claims-made policy if it contains

(1) an extended reporting period of at least six months; and

(2) the endorsement language required by (b) of this section, with the following added to the end of the endorsement: "and made to the insurer during the policy period or the extended reporting period."

(d) A deductible provision in any policy of insurance, binder, or certificate is acceptable if

(1) the applicant demonstrates supplemental coverage for the amount of the deductible by means of other acceptable insurance, surety, guaranty, self-insurance, letter of credit, or other proof of financial responsibility approved by the department; or

(2) the deductible provision provides for a loss reimbursement plan that contains language guaranteeing that the insurer will be responsible for the payment of all claims on a first dollar basis, without waiting for the insured to pay the deductible.

(e) For purposes of this section, "claims made policy" means a policy of liability insurance that covers claims arising out of a discharge occurring after a specified retroactive date but before the end of the policy period and first made to the insurer. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132; am 10/28/2000, Register 156)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.05.055

Editor's note: As of Register 171 (October 2004), the regulations attorney made technical revisions under AS 44.62.125(b)(6) to reflect the name change of the Department of Community and Economic Development to the Department of Commerce, Community, and Economic Development made by ch. 47, SLA 2004 and the corresponding title change of the commissioner of community and economic development.

18 AAC 75.255. Surety. (a) An applicant may demonstrate financial responsibility with a contract of surety, in full or in part, for the applicable amount required under 18 AAC 75.235(a). The applicant shall submit the contract of surety to the department on forms supplied by the department.

(b) The issuer of the contract of surety must

(1) be registered to do business in Alaska;

(2) possess a current certificate of authority to do business in the United States under 31 C.F.R. 223; and

(3) possess an underwriting limitation of risk at least equal to the amount of the bond, or in a lesser amount necessary to supplement other forms of proof of financial responsibility.

(c) An applicant may demonstrate financial responsibility by a contract of surety for an amount equal to the deductible of an insurance policy submitted under 18 AAC 75.250 or in combination with another means of proof.

(d) Termination or cancellation of a contract of surety that serves as proof of financial responsibility under AS 46.04.040 may not become effective until 60 days after the surety notifies the department in writing, by certified mail, at its office in Juneau, Alaska. The surety remains liable for any discharge occurring before the effective date of termination or cancellation. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.05.055

18 AAC 75.260. Guaranty. (a) An applicant may demonstrate financial responsibility with a contract of guaranty, in full or in part, for the applicable amount required under 18 AAC 75.235(a). The applicant shall submit the contract of guaranty to the department, using a form supplied by the department.

(b) The issuer of the guaranty contract must meet the financial, application, and reporting requirements of 18 AAC 75.245.

(c) Termination or cancellation of a guaranty that serves as proof of financial responsibility under AS 46.04.040 may not become effective until 60 days after the guarantor notifies the department in writing, by certified mail, at its office in Juneau, Alaska. The guarantor remains liable for any discharge occurring before the effective date of termination or cancellation. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132; am 4/6/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.04.055

18 AAC 75.265. Letters of credit. (a) An applicant may demonstrate financial responsibility with a letter of credit, in favor of the State of Alaska, for the applicable amount required under 18 AAC 75.235(a), in full or in part. The letter of credit

(1) must be irrevocable for a period of not less than one year on the part of the issuer; in addition, the letter must provide that it will be automatically extended for one year unless the department and the applicant are notified in writing at least 90 days before expiration of its stated term that the letter will not be renewed; however, if a vessel is to be used in state waters for less than one year, the letter of credit must cover the period that the vessel is to be used in state waters plus 30 days;

(2) must be irrevocable until satisfaction of a judgment or of a claim against the applicant under AS 46.04.040(i) or the provisions cited in it which results from a discharge occurring during its term, subject to the limit of credit;

(3) must be a standby letter of credit, to respond specifically to a claim under AS 46.04.040(i) or the provisions cited in it, subject to the limit of credit;

(4) may not be used as collateral and may not be drawn upon by the applicant except to respond to a claim under AS 46.04.040(i) or the provisions cited in that subsection for as long as the letter of credit is used by the applicant as proof of financial responsibility under AS 46.04.040 or 46.04.055;

(5) must be issued by a financial institution that has authority to issue letters of credit, and that is regulated and examined by state and federal banking agencies; and

(6) must state an effective date and an expiration date, and must be effective on or before the approval date of proof of financial responsibility.

(b) The issuing bank shall pay upon presentation by the State of Alaska of a draft or other document as specified in the letter of credit and may not make determinations of fact or law that might be at issue between the responsible party and the department. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132; am 10/28/2000, Register 156)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.04.055

18 AAC 75.270. Other proof of financial responsibility for tank vessels, oil barges, oil terminal facilities, oil exploration or production facilities, pipelines, and railroad tank cars. (a) This section applies to other proof of financial responsibility for tank vessels, oil barges, oil terminal facilities, oil exploration or production facilities, pipelines, and railroad tank cars. An applicant may demonstrate financial responsibility for the applicable amount required under 18 AAC 75.235(a)(1) - (4) or (7) - (14), in full or in part, with a contract of indemnity or with insurance issued by a group of insureds who have agreed to cover the pollution risks of the group's members, if approved by the department.

(b) Subject to AS 46.04.040(e), the department will, in its discretion, approve a protection and indemnity (P&I) club or an insurance syndicate contract of indemnification as demonstrating financial responsibility under this section if

(1) a statement of indemnification issued by the P&I club or insurance syndicate contains an endorsement that meets the requirements of 18 AAC 75.250(b);

(2) the P&I club or insurance syndicate has the financial solvency and a favorable history of claim handling to meet the obligations contained in the contract of indemnity; and

(3) the P&I club or insurance syndicate appoints an agent for service of process in the state as required under AS 46.04.040(e).

(c) The department may approve a P&I club or insurance syndicate that does not agree to be subject to direct court action in this state or that does not agree to appoint an agent for service of process in this state if the requirements of AS 46.04.040(*l*) are met with respect to the amount of $93,550,000 or the amount required by 18 AAC 75.235(a), whichever is less. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132; am 10/1/99, Register 151; am 10/28/2000, Register 156; am 10/27/2002, Register 164; am 10/16/2005, Register 176; am 8/31/2008, Register 187; am 10/1/2011, Register 199; am 10/1/2014, Register 211; am 10/1/2017, Register 223)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040

Editor's note: On September 16, 2005, the Office of the Lieutenant Governor filed amendments to 18 AAC 75.270. Under AS 44.62.180, those amendments became effective on October 16, 2005. Due to a clerical error, the regulations did not appear in print in the Alaska Administrative Code. As of Register 186 (July 2008), the regulations attorney made a technical

revision under AS 44.62.125 (b)(6), to incorporate the October 16, 2005 amendments into 18 AAC 75.270.

18 AAC 75.271. Proof of financial responsibility for nontank vessels. (a) This section applies to proof of financial responsibility for nontank vessels. An applicant may demonstrate financial responsibility for the applicable amount required under 18 AAC 75.235(a)(5) or (6), in full or in part, with

(1) evidence of financial responsibility meeting the requirements of 18 AAC 75.245, 18 AAC 75.250, 18 AAC 75.255, 18 AAC 75.260, or 18 AAC 75.265;

(2) proof of entry of the nontank vessel in a P&I club or proof of coverage with another insurer, including a group of insureds who have agreed to cover the pollution risks of the members of the group, if approved by the department; or

(3) insurance, a surety bond, self-insurance, a financial guaranty, or other evidence of financial responsibility used to satisfy the federal financial responsibility requirements contained in 33 C.F.R. Part 138, if the coverage includes the oil pollution risks specified in AS 46.04.040(i).

(b) The department will, in its discretion approve an insurance policy, or a P&I club or insurance syndicate contract of indemnification, as demonstrating financial responsibility under this section if

(1) the insurance policy, contract of indemnification, or P&I club rules and related documentation

(A) reflects that each entered nontank vessel is covered for the oil pollution risks specified in AS 46.04.040(i) in at least the applicable amount specified in 18 AAC 75.235(a)(5) or (6); coverage for the oil pollution risks specified in AS 46.04.040(i) may be demonstrated by using the following endorsement or substantially similar language: "Any other provision of this policy notwithstanding, this policy insures against any liability the insured may incur under AS 46.04.040(i) or any provision cited in it as a result of an unlawful discharge of oil from or by a covered vessel within or affecting land or waters within the territorial jurisdiction of the State of Alaska; however, the insurer's liability does not exceed the limits of coverage set out in Section (Article or Clause) of this policy, subject to any deductible as specifically set out in Section (Article or Clause) of this policy (binder, certificate)"; and

(B) names the applicant as an assured or member; and

(2) for a contract of indemnification from a P&I club or insurance syndicate, the P&I club or insurance syndicate has the financial solvency and a favorable history of claim handling to meet the obligations contained in the contract of indemnification.

(c) The insurance policy or contract of indemnification submitted as evidence of financial responsibility for a nontank vessel under this section

(1) need not include the endorsement required by 18 AAC 75.250(b); and

(2) must include

(A) all addenda that pertain to pollution coverage and deductibles; and

(B) for a contract of indemnification by a P&I club, a copy of the applicable P&I club rules and the vessel's certificate of entry into the P&I club.

(d) If an applicant submits a policy of insurance, binder, certificate, or evidence of P&I club coverage containing a deductible or similar provision exceeding $50,000,

(1) the applicant must demonstrate supplemental coverage for the amount of the deductible by means of other acceptable insurance, a surety, a guaranty, self-insurance, a letter of credit, or other proof of financial responsibility approved by the department; or

(2) the deductible provision must provide for a loss reimbursement plan that contains language guaranteeing that the insurer will be responsible for the payment of all claims on a first dollar basis, without waiting for the insured to pay the deductible.

(e) In addition to meeting the renewal requirements of 18 AAC 75.225, and no later than 60 days after the renewal of the P&I club coverage, a holder of a certificate of proof of financial responsibility who uses P&I club membership as the method of financial responsibility shall submit to the department a renewal confirmation letter from the P&I club showing that the certificate holder's membership in the P&I club has been renewed. The certificate holder shall also submit additional documentation acceptable to the department showing renewal of the certificant's membership in the P&I club, no later than 90 days after renewal of the P&I club coverage. Acceptable documentation includes a copy of the addendum or renewal certificate of entry, both of which contain the information required by this subsection, and any additional terms or conditions that may affect coverage, including renewal and new expiration dates.

(f) If requested by the department, a holder of a certificate of proof of financial responsibility who uses P&I club membership as the method of financial responsibility shall submit documentation executed by the certificate holder's P&I club confirming that the certificate holder's coverage used to demonstrate financial responsibility remains current. (Eff. 10/28/2000, Register 156; am 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.045 AS 46.04.070
AS 46.04.040 AS 46.04.055

18 AAC 75.272. Termination or cancellation of proof of financial responsibility. Termination or cancellation of proof of financial responsibility does not relieve a person subject to AS 46.04.040 or 46.04.055 from

(1) the requirement to provide proof of financial responsibility if that person's vessel or facility remains in operation as defined in 18 AAC 75.235(n); and

(2) liability for a discharge from that person's vessel or facility before, at the time of, or after termination or cancellation of proof of financial responsibility. (Eff. 12/8/95, Register 136; am 10/28/2000, Register 156)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.275. Service of process. An agent designated for service of process under AS 46.04.040(e) must be a resident of the state or a corporation authorized to do business in the state. If no designation is made and filed, or if process cannot be served in Alaska upon the designated agent, process may be served upon the commissioner. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.280. Classification as an oil terminal facility. (a) If a vessel is to operate as an oil terminal facility as defined at AS 46.04.900, the owner or operator shall submit a written request for classification of the vessel as an oil terminal facility to the department. The request for classification must include the

(1) name of the owner or operator;

(2) vessel name and official number;

(3) oil storage capacity of the vessel;

(4) type of product carried as cargo; and

(5) period of time during which the classification will apply.

(b) Upon receipt of a request under (a) of this section, the department will issue a certificate to the vessel, classifying the vessel as an oil terminal facility for the prescribed period.

(c) If the capacity of the vessel for which classification is requested is more than 10,000 barrels of noncrude oil, the owner or operator must meet the financial responsibility requirements of 18 AAC 75.235(a)(2) and the oil discharge prevention and contingency plan requirements of AS 46.04.030. (Eff. 5/14/92, Register 122; am 11/26/94, Register 132)

Authority: AS 46.03.020 AS 46.04.050 AS 46.04.070
AS 46.04.040 AS 46.04.055 AS 46.04.900
AS 46.04.045

18 AAC 75.285. Oil terminal facilities. (a) An oil terminal facility may not transfer a liquid bulk oil product to or from a tank vessel or oil barge if the oil product is declared as liquid bulk cargo, unless the tank vessel or oil barge provides proof to the terminal operator that the tank vessel or oil barge has a current, valid certificate of proof of financial responsibility issued under 18 AAC 75.205 – 18 AAC 75.290, an exemption under 18 AAC 75.205(d), or a certificate of classification as an oil terminal facility issued under 18 AAC 75.280.

(b) Unless a nontank vessel is subject to an exemption in AS 46.04.055(e)(2) or (3), an oil terminal facility may not transfer oil to or from a nontank vessel unless the nontank vessel provides proof to the terminal operator that the nontank vessel has a current, valid certificate of proof of financial responsibility issued under 18 AAC 75.205 – 18 AAC 75.290.

(c) If a vessel has frequent transactions at an oil terminal facility and is known by the facility operator, the owner or operator of that oil terminal facility may accept verbal confirmation from the vessel's master that the vessel has on board a current, valid certificate of proof of financial responsibility issued under 18 AAC 75.205 – 18 AAC 75.290.

(d) An oil terminal facility may not transfer a liquid bulk oil product to or from a railroad tank car, unless the owner or operator of the railroad tank car has previously provided the terminal owner or operator with a certified copy of the current, valid certificate of proof of financial responsibility as required by 18 AAC 75.240(b)(3).

(e) If a tank vessel, oil barge, or railroad tank car operator fails or refuses to provide proof of a current, valid certificate of proof of financial responsibility issued under 18 AAC 75.205 – 18 AAC 75.290, an exemption under 18 AAC 75.205(d), or a certificate of classification as an oil terminal facility issued under 18 AAC 75.280(b), or if a railroad tank car owner or operator has not provided a current certificate to the oil terminal facility as required by 18 AAC 75.240(b)(3) before loading or unloading a railroad tank car, the owner or operator of an oil terminal facility shall notify the department's Anchorage, Fairbanks, or Juneau office of that failure or refusal by telephone or facsimile on the next working day.

(f) If a nontank vessel owner or operator fails or refuses to provide proof of a current, valid certificate of proof of financial responsibility issued under 18 AAC 75.205 – 18 AAC 75.290, or to demonstrate that the nontank vessel owner or operator is subject to an exemption under AS 46.04.055(e)(2) or (3), the owner or operator of an oil terminal facility shall notify the department’s Anchorage, Fairbanks, or Juneau office of that failure or refusal by telephone or facsimile on the next working day.

(g) The requirements of this section with respect to nontank vessels and railroad tank cars apply after January 30, 2001. (Eff. 5/14/92, Register 122; am 10/28/2000, Register 156)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.040

18 AAC 75.290. Enforcement. If person required to provide proof of financial responsibility under AS 46.04.040, AS 46.04.055, or 18 AAC 75.205 - 18 AAC 75.290 fails or refuses to do so, the department will, in its discretion,

(1) seek civil assessments and costs under AS 46.03.760 or other appropriate statutes for each separate violation of AS 46.04.040, 46.04.055, or of 18 AAC 75.205 - 18 AAC 75.290;

(2) take action to halt the operation of a vessel or facility that is not in compliance with AS 46.04.040, AS 46.04.055, or 18 AAC 75.205 - 18 AAC 75.290;

(3) take action to deny entry to a vessel to the navigable waters of the state;

(4) take action to detain a vessel that does not produce, upon the department's request, a current, valid certificate of proof of financial responsibility issued under 18 AAC 75.205 - 18 AAC 75.290; or

(5) take such other and further action as may be warranted by the circumstances. (Eff. 5/14/92, Register 122; am 10/28/2000, Register 156)

Authority: AS 46.03.020 AS 46.04.040 AS 46.04.070
AS 46.03.760 AS 46.04.050 AS 46.04.900
AS 46.03.850 AS 46.04.055

Article 3. Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances

Section

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Editor's note: The regulations in 18 AAC 75.300 – 18 AAC 75.396, grouped under Article 3, effective January 22, 1999 and distributed in Register 149, constitute a comprehensive reorganization and revision of material formerly set out at 18 AAC 75.300 - 18 AAC 75.370, which also had been grouped at Article 3. The regulations at 18 AAC 75.300 - 18 AAC 75.396 replace former 18 AAC 75.300 - 18 AAC 75.370, which were repealed simultaneously with the adoption of these regulations. The history line at the end of each section does not reflect the history of the replaced provisions before January 22, 1999. Some section numbers in this revision were used for previous regulations, but current sections are not necessarily related to previous sections with the same section number. The earlier version of 18 AAC 75.300 - 18 AAC 75.370 may be reviewed at the Office of the Lieutenant Governor, and may be found at Register 122, effective May 14, 1992.

18 AAC 75.300. Discharge or release notification; reporting requirements. (a) Subject to (b), (c), and (g) of this section, a person in charge of a facility or operation shall notify the department by telephone, and immediately afterwards send the department a written notice by facsimile, electronic mail, hand delivery, or first class mail, informing the department about a discharge or release of a hazardous substance at or from the facility or operation as follows:

(1) as soon as the person has knowledge of a

(A) discharge or release of a hazardous substance other than oil;

(B) discharge or release of oil to water; or

(C) discharge or release, including a cumulative discharge or release, of oil in excess of 55 gallons solely to land outside an impermeable secondary containment area or structure; and

(2) within 48 hours after the person has knowledge of a discharge or release, including a cumulative discharge, of oil solely to land

(A) in excess of 10 gallons, but 55 gallons or less; or

(B) in excess of 55 gallons, if the discharge or release is the result of the escape or release of oil from its original storage tank, pipeline, or other immediate container into an impermeable secondary containment area or structure.

(b) A person in charge of a facility or operation shall maintain, and provide to the department monthly, a written record of each discharge or release, including a cumulative discharge or release, of one gallon to 10 gallons of oil solely to land.

(c) If a person in charge of a facility or operation has entered into an agreement with the department, as provided under AS 46.03.755(b) or AS 46.09.010(b), for the periodic reporting of a discharge or release of a hazardous substance, the terms of the agreement replace the applicable requirements of this section for the hazardous substance.

(d) After receiving notice of a discharge or release under (a) of this section, and until containment and cleanup are completed, the department will require interim reports as the department considers necessary to ascertain any threat to human health, safety, or welfare, or to the environment.

(e) Unless the department determines that a written report is not needed for the department to ascertain any threat to human health, safety, or welfare, or to the environment, a written report must be submitted to the department within 15 days after containment and cleanup are completed or, if no cleanup occurs, within 15 days after the discharge or release. The report must be submitted to the department's Anchorage, Fairbanks, or Juneau office, whichever is nearest to the location of the discharge, unless the department specifies otherwise. The report must contain the information specified in (f) of this section.

(f) A report, record, or notification required by this section must contain, as applicable,

(1) the date and time of the discharge or release;

(2) the location of the discharge or release;

(3) the name of the facility or operation;

(4) the name, mailing address, and telephone number of

(A) each responsible person; and

(B) the owner and the operator of the facility or operation;

(5) the type and amount of each hazardous substance discharged or released;

(6) factors that caused or contributed to the discharge or release;

(7) a description of any environmental effects of the discharge or release, or the containment and cleanup, to the extent those effects can be identified;

(8) a description of the containment or cleanup action taken;

(9) the estimated amount of

(A) hazardous substance cleaned up; and

(B) hazardous waste generated;

(10) the date and method of disposal or treatment of the hazardous substance, contaminated equipment, contaminated materials, contaminated soil, and contaminated water;

(11) a description of actions being taken to prevent another discharge or release; and

(12) other information that the department requires to fully assess the cause and impact of the discharge or release, including any sampling reports and a description and estimate of any remaining contamination.

(g) Reporting under this section is not required for a discharge or release

(1) that is authorized by a valid permit issued by the department; or

(2) that is excluded from the definition of “release” under AS 46.03.826(9). (Eff. 1/22/99, Register 149; am 1/30/2003, Register 165; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.03.745 AS 46.04.070
AS 46.03.050 AS 46.03.755 AS 46.09.010
AS 46.03.710 AS 46.04.020 AS 46.09.020
AS 46.03.740

18 AAC 75.305. Posting of information required. (a) The owner or operator shall display a discharge or release notification placard, provided by the department, that includes telephone numbers of department offices in conspicuous locations on a

(1) tank truck containing more than 500 gallons of a hazardous substance, in addition to that required to operate the vehicle;

(2) tugboat, tank vessel, oil barge, tow boat, or other vessel transporting a hazardous substance as cargo in state waters;

(3) vehicle carrying or towing a hazardous substance other than oil, or more than 500 gallons of oil, as cargo off-road over frozen or unfrozen ground; and

(4) facility that has a total above-ground or underground storage capacity in excess of 1,000 gallons of a hazardous substance.

(b) A person who wants to post a substitute for a placard provided by the department shall submit the proposed placard to the department for approval. The department will approve the substitute if the department determines that the substitute meets the requirements of (a) of this section. A placard approved under this subsection must contain the words: "Form approved by the Alaska Department of Environmental Conservation." (Eff. 1/22/99, Register 149)

Authority: AS 46.03.020 AS 46.04.020 AS 46.09.020
AS 46.03.050 AS 46.09.010 AS 46.09.070
AS 46.03.755

18 AAC 75.310. Scope and duration of initial response actions. (a) Immediately after receiving notice from a person or after otherwise becoming aware of a discharge or release of a hazardous substance to land or waters of the state, a responsible person shall, as required by 18 AAC 75.315, immediately contain and control the discharge or release and seek approval of cleanup and disposal plans to be used for that release. After obtaining approval of cleanup and disposal plans, the responsible person shall perform a cleanup of the discharge or release and dispose of the contaminated material in accordance with those plans.

(b) The department under AS 46.04.020(a), or the commissioner under AS 46.09.020(a), will waive the requirements of (a) of this section if the department or commissioner as appropriate

(1) determines, in consultation with appropriate agencies as provided in AS 46.04.020(a)(1) or AS 46.09.020(a)(1), that containment or cleanup of the discharge or release is technically not feasible; or

(2) determines that the containment or cleanup effort would result in a greater threat to human health, safety, or welfare, or in greater damage to the environment than the discharge or release itself.

(c) Unless relieved under (b) of this section, a responsible person shall immediately begin the initial response actions required by 18 AAC 75.315 and continue until

(1) the department, using the factors set out in 18 AAC 75.315, determines that

(A) the lowest practicable level of contamination has been achieved;

(B) any imminent and substantial threat to human health, safety, or welfare, or to the environment is abated; and

(C) additional action, including site cleanup under 18 AAC 75.325 - 18 AAC 75.390, is not required; or

(2) the department determines, on its own or at the request of a responsible person, that the source of the contamination has abated and that cleanup of residual soil and groundwater contamination should proceed under 18 AAC 75.325 - 18 AAC 75.396.
(Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020
AS 46.03.710 AS 46.04.020

18 AAC 75.315. Initial response actions. (a) A responsible person shall investigate, contain, and perform a cleanup of a sudden or recent discharge or release of a hazardous substance

(1) in consultation with the department, or upon notification of a discharge or release under 18 AAC 75.300;

(2) in a manner that does not result in a significantly greater overall threat or damage to human health, safety, or welfare, or to the environment than another alternative, including taking no action; and

(3) until the lowest practicable level of contamination is achieved under (c) of this section.

(b) A person who is not a responsible person and who undertakes an initial response action at a site subject to this section shall comply with this section and 18 AAC 75.320.

(c) For containment and cleanup under this section, the department will determine the lowest practicable level of contamination based on

(1) protection of human health, safety, and welfare, and of the environment;

(2) the nature and toxicity of the hazardous substance, including amount and concentration;

(3) hydrogeological and climatological factors;

(4) the extent to which the hazardous substance has migrated, or is likely to migrate, from the area of original contamination if the hazardous substance remains onsite;

(5) the natural dispersion, attenuation, or degradation of the contamination;

(6) the extent to which residual soil contamination exceeds the cleanup levels in 18 AAC 75.340 and 18 AAC 75.341;

(7) the extent to which groundwater contamination exceeds the groundwater cleanup levels in 18 AAC 75.345;

(8) the current and future use of the groundwater under 18 AAC 75.350; and

(9) the need for an interim removal action under 18 AAC 75.330.

(d) If the department determines that the lowest practicable level of contamination has been achieved under this section, a responsible person is not required to perform additional containment or cleanup. The department will base a determination under this section on the most current and complete information available to the department. The department will require a responsible person to perform additional containment or cleanup if subsequent information indicates that

(1) the level of contamination that remains does not protect human health, safety, or welfare, or the environment; or

(2) the information the department relied upon was invalid, incomplete, or fraudulent. (Eff. 1/22/99, Register 149)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020
AS 46.03.710 AS 46.04.020

18 AAC 75.320. Department oversight of containment and cleanup. (a) The department will determine that a responsible person's containment and cleanup efforts are inadequate under 18 AAC 75.315 or 18 AAC 75.325 - 18 AAC 75.396 if the department determines that

(1) the responsible person has not used, or has not adequately used, containment equipment to intercept, concentrate, and collect the hazardous substance in its pattern of movement, unless environmental conditions exceed the operational limitations of the equipment;

(2) the responsible person has not used, or has not adequately used, exclusion equipment to protect a sensitive environmental zone, unless environmental conditions exceed the operational limitations of the equipment;

(3) the area affected by the hazardous substance is increasing at an avoidable rate despite containment and removal activities, unless environmental conditions exceed the operational limitations of the equipment, or unless immediate containment would pose a greater threat to human health, safety, or welfare, or to the environment, than to allow the discharge or release to temporarily spread;

(4) the containment and exclusion equipment is not functioning effectively because of weather or oceanographic conditions, and other equipment is reasonably available that can function effectively in those conditions;

(5) containment, exclusion, and lightering equipment is not deployed and operational as specified in an applicable oil discharge prevention and contingency plan approved under AS 46.04.030 or a nontank vessel plan approved under AS 46.04.055;

(6) major items of cleanup equipment and materials, including booms, skimmers, lightering pumps, sorbent, and storage containers, are not fully operational;

(7) available personnel, equipment, sorbent, or supplies are inappropriate, being mismanaged, or not being used, or additional personnel, equipment, sorbent, or supplies are required but not being provided; or

(8) containment and cleanup have not proceeded in a timely manner that is protective of human health, safety, and welfare, and of the environment.

(b) If the department determines that a responsible person's containment and cleanup efforts do not adequately protect human health, safety, or welfare, or the environment, the department will

(1) direct that responsible person or another responsible person to use additional measures or to cease cleanup activities;

(2) begin cleanup activities, or authorize an agent of the department to begin cleanup activities; or

(3) take a combination of these actions. (Eff. 1/22/99, Register 149; am 11/27/2002, Register 164)

Authority:	AS 46.03.020	AS 46.03.745	AS 46.04.070
	AS 46.03.050	AS 46.03.822	AS 46.08.140
	AS 46.03.710	AS 46.04.020	AS 46.09.020
	AS 46.03.740	AS 46.04.055	

18 AAC 75.325. Site cleanup rules: purpose, applicability, and general provisions. (a) The requirements of 18 AAC 75.325 - 18 AAC 75.390 are referred to in this chapter as the "site cleanup rules". The site cleanup rules establish administrative processes and standards to determine the necessity for and degree of cleanup required to protect human health, safety, and welfare, and the environment at a site where a hazardous substance is located.

(b) The site cleanup rules apply to

(1) a sudden or recent discharge or release of a hazardous substance, if the department determines under 18 AAC 75.310 that application of the site cleanup rules is necessary; or

(2) a release of a hazardous substance caused by past activities.

(c) The site cleanup rules do not apply to

(1) a release from an underground storage tank (UST) subject to AS 46.03.360 - 46.03.450 and 18 AAC 78, except as made applicable expressly by 18 AAC 78; or

(2) an oil and gas reserve pit closure and permitted solid waste storage or disposal facility regulated under 18 AAC 60, 18 AAC 62, or 42 U.S.C. 6901 - 6992k (Solid Waste Disposal Act, as amended by the Resource Conservation Recovery Act).

(d) A responsible person shall investigate, contain, and perform a cleanup of a discharge or release of a hazardous substance unless

(1) the department makes a written determination that a discharge or release does not pose a threat to human health, safety, or welfare, or to the environment and requires no cleanup action according to the information available at the time of the determination; or

(2) the department issues an order under AS 46.04.020(c), or the commissioner issues an order under AS 46.09.020(c) that the responsible person cease cleanup activities.

(e) A person who is not a responsible person and who undertakes a cleanup activity at a site that is subject to the site cleanup rules shall comply with those provisions of the site cleanup rules that are applicable to the particular cleanup activity undertaken.

(f) A responsible person shall

(1) to the maximum extent practicable,

(A) use permanent remedies;

(B) recover free product in a manner that

(i) minimizes the spread of contamination into an uncontaminated area by using containment, recovery, and disposal techniques appropriate to site conditions;

(ii) avoids additional discharge; and

(iii) disposes of the recovered free product in compliance with applicable local, state, and federal requirements;

(C) complete cleanup in a period of time that the department determines to be protective of human health, safety, and welfare, and of the environment;

(D) prevent, eliminate, or minimize potential adverse impacts to human health, safety, and welfare, and to the environment, onsite and offsite, from any hazardous substance remaining at the site; and

(E) evaluate and perform a cleanup of surface soil staining attributable to a hazardous substance;

(2) meet the applicable cleanup levels determined under 18 AAC 75.340 - 18 AAC 75.350; and

(3) provide for long-term care and management of a site as required under the site cleanup rules, including proper operation and maintenance of

(A) cleanup techniques and equipment;

(B) monitoring wells and equipment, if required; and

(C) institutional controls, if required under 18 AAC 75.375

(g) If using method two or method three for determining the applicable soil cleanup levels as described in 18 AAC 75.340 and 18 AAC 75.341, or if applying the groundwater cleanup levels at Table C in 18 AAC 75.345, a responsible person shall ensure that, after completing site cleanup, the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one, reported to one significant figure, across all exposure pathways. Instructions for determining cumulative risk are provided in the department's *Procedures for Calculating Cumulative Risk,* February 1, 2018 and adopted by reference.

(h) If proposing an alternative cleanup level for soil or groundwater, based on a site-specific risk assessment under method four in 18 AAC 75.340(f) or under the provisions of 18 AAC 75.345(b)(2), a responsible person shall ensure that the risk from hazardous substances does not exceed the cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed the cumulative noncarcinogenic risk standard at a hazard index of one, reported to one significant figure, across all exposure pathways. Instructions for determining cumulative risk are provided in the department's *Procedures for Calculating Cumulative Risk*, adopted by reference in (g) of this section.

(i) A responsible person, owner, or operator shall obtain approval before disposing of soil or groundwater from a site

(1) that is subject to the site cleanup rules; or

(2) for which a written determination from the department has been made under 18 AAC 75.380(d)(1) that allows contamination to remain at the site above method two soil cleanup levels under 18 AAC 75.340(a)(2) or groundwater cleanup levels listed in Table C in 18 AAC 75.345(b);

(j) The department will seek public participation regarding activities conducted under the site cleanup rules, using methods that the department determines to be appropriate for seeking public participation.

(k) If a discharge, release, or planned cleanup affects an anadromous fish-bearing stream or lake or an area designated under AS 16.20, activities under the site cleanup rules are subject to coordination with appropriate resource agencies, including the Department of Fish and Game under AS 16.05.871(a) or AS 16.20. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165; am 10/9/2008, Register 188; am 6/17/2015, Register 214; am 1/1/2016, Register 217; am 11/6/2016, Register 220; am 9/29/2018, Register 227)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.020
AS 46.03.050 AS 46.03.745 AS 46.04.070
AS 46.03.710 AS 46.03.822 AS 46.09.020

Editor's note: The department's *Procedures for Calculating Cumulative Risk*, adopted by reference in 18 AAC 75.325 may be viewed at or obtained from the department's offices in Anchorage, Fairbanks, Juneau, and Soldotna or the department's Internet website at http://dec.alaska.gov/spar/csp/guidance-forms/.

As of Register 166 (July 2003), and acting under AS 44.62.125(b)(6), the regulations attorney made technical changes to 18 AAC 75.325(k), to reflect Executive Order 107 (2003). Executive Order 107 transferred functions related to protection of fish habitat in rivers, lakes, and streams from the Department of Fish and Game to the Department of Natural Resources.

As of Register 179 (October 2006), and acting under AS 44.62.125(b)(6), the regulations attorney made a technical revision to 18 AAC 75.325(c)(1). This change reflects the enactment of sec. 2, ch. 102, SLA 2006, effective August 5, 2006, which repealed AS 46.03.360 and 46.03.363.

As of Register 186 (July 2008), and acting under AS 44.62.125(b)(6), the regulations attorney made technical changes to 18 AAC 75.325(k), to reflect Executive Order 114 (2008). Executive Order 114 transferred functions related to protection of fish habitat in rivers, lakes, and streams from the Department of Natural Resources to the Department of Fish and Game.

18 AAC 75.330. Interim removal actions. (a) The department, or a responsible person as provided in (c) of this section, will perform an interim removal action if the department determines that an interim removal action is necessary under the site cleanup rules to prevent

(1) human or environmental exposure to a hazardous substance at the site; or

(2) migration of a hazardous substance at or from the site.

(b) An interim removal action must, to the maximum extent practicable, contribute to the overall performance of any long-term cleanup action at the site. An interim removal action may

(1) achieve cleanup levels for a portion of the site;

(2) provide for a partial cleanup for all or part of the site, but not achieve cleanup levels; or

(3) provide for a partial cleanup at the site and not achieve cleanup levels, but provide information on how to achieve cleanup levels for the final cleanup action.

(c) An interim removal action may occur at any time during the cleanup process and may be performed by the department or by a responsible person with prior approval of the proposed action. An interim removal action may not be used to delay or supplant the cleanup process.

(d) An interim removal action must be followed by additional cleanup actions at the site unless the department determines that the interim removal action has met the requirements of the site cleanup rules.

(e) An interim removal action taken by the department does not

(1) require the department to take an additional response or cleanup action; or

(2) relieve a person from liability associated with the discharge or release. (Eff. 1/22/99, Register 149)

Authority: AS 46.03.020 AS 46.03.745 AS 46.04.070
AS 46.03.050 AS 46.03.755 AS 46.09.010
AS 46.03.710 AS 46.03.822 AS 46.09.020
AS 46.03.740 AS 46.04.020

18 AAC 75.333. Qualified environmental professionals and qualified samplers. (a) A responsible person shall ensure that a qualified environmental professional

(1) prepares the site characterization work plan required under 18 AAC 75.335(b)(1);

(2) prepares the site characterization report required under 18 AAC 75.335(c)(1);

(3) performs sampling collection required under 18 AAC 75.355(a), or that a qualified sampler performs sampling collection if the department approves the use of a qualified sampler under 18 AAC 75.355(a);

(4) conducts or supervises site cleanup work under 18 AAC 75.360;

(5) prepares the post-treatment sampling and analysis plan under 18 AAC 75.365(a)(1)(C);

(6) prepares the final cleanup report required under 18 AAC 75.380(a);

(7) prepares and signs a report to justify a request for a waiver under 18 AAC 75.390.

(b) For purposes of the site cleanup rules, an individual is a qualified environmental professional if the individual

(1) is an impartial third party;

(2) is qualified to perform site characterization and cleanup activities, including

(A) fate and transport analysis;

(B) remediation design; and

(C) other activities associated with contaminated sites;

(3) actively practices in the field of environmental science or another related scientific field;

(4) has not been found to have falsified environmental data or committed other acts of fraud directly related to environmental work; and

(5) meets one or more of the following minimum educational qualification and experience requirements:

(A) has a four-year undergraduate or a graduate degree from a nationally or internationally accredited postsecondary institution in environmental science or another related scientific field, and has at least one year of professional experience in contaminated site characterization and cleanup activities under the direct supervision of a qualified environmental professional completed after the degree described in this subparagraph was obtained;

(B) has a four-year degree from a nationally or internationally accredited postsecondary institution in any field or a two-year associate degree from a nationally or internationally accredited postsecondary institution in environmental science or another related scientific field, and has at least three years of professional experience in

contaminated site characterization and cleanup activities under the direct supervision of a qualified environmental professional completed after a degree described in this subparagraph was obtained;

(C) is certified as an environmental technician under an apprenticeship program with a registration under 29 C.F.R. Part 29, and has at least three years of professional experience in contaminated site characterization and cleanup activities under the direct supervision of a qualified environmental professional completed after the certification described in this subparagraph was obtained.

(c) For purposes of the site cleanup rules, an individual is a qualified sampler if the individual

(1) is an impartial third party;

(2) collects samples of environmental media for laboratory analysis; in this paragraph, "environmental media"

(A) includes soil, groundwater, and surface water;

(B) does not include air or soil gas;

(3) has not been found to have falsified environmental data or committed other acts of fraud directly related to environmental work;

(4) has successfully completed

(A) applied field work involving environmental sample collection of soil, groundwater, or surface water associated with coursework for a completed degree in environmental science or another related scientific field at a nationally or internationally accredited postsecondary institution; or

(B) an environmental sampling training program recognized by the department; and

(5) has at least three months of experience in environmental sampling under the direct supervision of a qualified environmental professional completed after the training described in (4)(A) or (B) of this subsection was obtained.

(d) In this section, "another related scientific field" includes engineering, geology, physical science, hydrology, biology, and chemistry. (Eff. 6/17/2015, Register 214)

Authority: AS 46.03.020 AS 46.03.745 AS 46.04.070
AS 46.03.050 AS 46.03.755 AS 46.09.010
AS 46.03.710 AS 46.03.822 AS 46.09.020
AS 46.03.740 AS 46.04.020

18 AAC 75.335. Site characterization. (a) Before proceeding with site cleanup under the site cleanup rules, a responsible person shall characterize the extent of hazardous substance contamination at the site.

(b) A responsible person shall submit a site characterization work plan to the department for approval before beginning site characterization work. The department will approve the site characterization work plan if the work plan is

(1) prepared by a qualified environmental professional; and

(2) designed, to the maximum extent practicable, to

(A) determine if a discharge or release of a hazardous substance has occurred;

(B) identify each hazardous substance at the site, including the concentration and extent of contamination; this information must be sufficient to determine cleanup options;

(C) identify site characteristics or conditions that could result in ongoing site contamination, including the potential for leaching of in-situ contamination and the presence of leaking barrels, drums, tanks, or other containers;

(D) evaluate the potential threat to human health, safety, and welfare, and to the environment from site contamination;

(E) identify any interim removal action necessary under 18 AAC 75.330;

(F) locate sources of known site contamination, including a description of potential releases into soil, sediment, groundwater, or surface water;

(G) evaluate the size of the contaminated area, including the concentrations and extent of any soil, sediment, groundwater, or surface water contamination;

(H) identify the vertical depth to groundwater and the horizontal distance to nearby wells, surface water, and water supply intakes;

(I) evaluate the potential for surface water run-off from the site and the potential for surface water or sediment contamination; and

(J) identify the soil type and determine if the soil is a continuing source for groundwater contamination.

(c) After completing site characterization work, the responsible person shall submit to the department for approval a site characterization report that

(1) is prepared by a qualified environmental professional;

(2) sets out the information obtained from activities performed in accordance with a site characterization work plan;

(3) sets out the results of sampling and analysis;

(4) demonstrates that the inspections, sampling, and analysis performed adequately characterize the extent of hazardous substance contamination; and

(5) proposes cleanup techniques for the site.

(d) The department will approve the report submitted under (c) of this section if the department determines that the work described in the report and the cleanup techniques proposed are protective of human health, safety, and welfare, and of the environment. The department will, as part of its approval, modify proposed cleanup techniques or require additional cleanup techniques for the site as the department determines to be necessary to protect human health, safety, and welfare, and the environment. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 6/17/2015, Register 214)

Authority: AS 46.03.020 AS 46.03.745 AS 46.04.070
AS 46.03.050 AS 46.03.755 AS 46.09.010
AS 46.03.710 AS 46.04.020 AS 46.09.020
AS 46.03.740

18 AAC 75.340. Soil cleanup levels; general requirements. (a) This section provides the requirements for cleanup levels for hazardous substances in soil. For each site, except as provided in (b) of this section, a responsible person shall propose soil cleanup levels for approval, shall base those cleanup levels upon an estimate of the reasonable maximum exposure expected to occur under current and future site conditions, and shall develop those cleanup levels using one or more of the following methods:

(1) method one for petroleum hydrocarbon-contaminated soil in

(A) a non-Arctic zone as set out in Table A1 of 18 AAC 75.341(a); or

(B) an Arctic zone as set out in Table A2 of 18 AAC 75.341(b);

(2) method two for soil contaminated with

(A) chemicals other than petroleum hydrocarbons as set out in Table B1 of 18 AAC 75.341(c); or

(B) petroleum hydrocarbons as set out in Table B2 of 18 AAC 75.341(d);

(3) method three, as described in (e) of this section, for developing site-specific alternative cleanup levels; or

(4) method four, as described in (f) of this section, for developing site-specific alternative cleanup levels.

(b) Alternative soil cleanup levels developed under method three or method four may not be used at another site without prior approval. If alternative cleanup levels are developed for one site within a facility with multiple similarly contaminated sites, and if the department determines that the use of those cleanup levels at another site within that facility will be protective of human health, safety, and welfare, and of the environment, the department will approve the use of those cleanup levels at the other site.

(c) For methods two, three, and four, a responsible person shall demonstrate that the Arctic zone soil cleanup level, if applicable, is protective of migration to surface water.

(d) The soil cleanup levels provided under method one and method two apply at a contaminated site unless the department develops an alternative cleanup level or approves an alternative cleanup level that the responsible person has proposed under method three or method four. To obtain approval for an alternative cleanup level, a responsible person must demonstrate that an alternative cleanup level proposed under method three or method four is protective of human health, safety, and welfare, and of the environment, and must demonstrate compliance with the applicable institutional control requirements under 18 AAC 75.375. The cleanup level that applies at a site is the most stringent of either the alternative cleanup level or, for a pathway where no alternative cleanup level was calculated, the listed value for a hazardous substance in Table B1 of 18 AAC 75.341(c) or Table B2 of 18 AAC 75.341(d).

(e) Under method three, a responsible person may propose for the department's approval or the department may set an alternative cleanup level for a hazardous substance listed in Table B1 of 18 AAC 75.341(c) or Table B2 of 18 AAC 75.341(d) that modifies the levels for the

(1) migration to groundwater or human health pathway in Table B1 or migration to groundwater or inhalation pathway in Table B2, based on the use of approved site-specific soil data, and the equations set out in the department's *Procedures for Calculating Cleanup Levels*, dated February 1, 2018, and adopted by reference;

(2) migration to groundwater pathway in Table B1 or Table B2 based on approved site-specific soil and groundwater data and an approved fate and transport model that demonstrates that alternative soil cleanup levels are protective of the applicable groundwater cleanup levels under 18 AAC 75.345; or

(3) human health pathway in Table B1 or ingestion or inhalation pathway in Table B2 based on use of commercial or industrial exposure parameters listed in Appendix B of the *Procedures for Calculating Cumulative Risk*, adopted by reference in (1) of this subsection, if the department determines that the site serves a commercial or industrial land use; the department will base a land use determination under this paragraph upon

(A) consultation with the public, including the local zoning authority, if any;

(B) a determination that the site does not serve a residential land use;

(C) a determination that the site will not serve a future residential land use based on consideration of the factors in EPA's *Land Use in the CERCLA Remedy Selection Process*, OSWER Dir. No. 9355.7-04, dated May 25, 1995, adopted by reference; land in an undeveloped area for which it would be difficult to determine a future use pattern is capable of being a residential area, unless demonstrated otherwise; and

(D) consent of each landowner who is affected by the contamination at the site that a cleanup level less stringent than a cleanup level appropriate to residential land use is appropriate for the site.

(f) Under method four, the department will approve a site-specific alternative cleanup level if a responsible person

(1) performs a site-specific risk assessment and submits a risk assessment report to the department for approval, and if the department determines that the alternative cleanup level is protective of human health, safety, and welfare, and of the environment based on the site-specific risk assessment; in performing the risk assessment, a responsible person shall follow the department's *Risk Assessment Procedures Manual*, dated February 1, 2018, and adopted by reference; and

(2) obtains the consent of each landowner who is affected by the contamination at the site that a cleanup level less stringent than a cleanup level appropriate to residential land use is appropriate for the site.

(g) The department will develop a site-specific cleanup level for a hazardous substance not listed under 18 AAC 75.341(c) using the procedures set out in the department's *Risk Assessment Procedures Manual*, adopted by reference in (f)(1) of this section, unless the responsible person demonstrates that a site-specific cleanup level is not necessary to ensure protection of human health, safety, and welfare, and of the environment.

(h) The department will approve less stringent soil cleanup levels subject to any institutional controls required under 18 AAC 75.375, if a responsible person demonstrates that

(1) background concentrations of a hazardous substance in the site area exceed the applicable cleanup level set out in 18 AAC 75.341 for the hazardous substance; or

(2) the limit of quantitation and limit of detection for the hazardous substance exceeds the applicable cleanup level set out in 18 AAC 75.341 for that substance.

(i) The department will require a responsible person to modify a cleanup level under this section or to perform a site-specific analysis of additional site risks if the department determines that

(1) as a result of site conditions or new data, a modification is necessary to protect human health, safety, or welfare, or the environment; or

(2) a site-specific analysis is necessary due to

(A) exposure pathways such as the potential for the accumulation of vapors in buildings or other structures at levels that threaten human health;

(B) sediment contamination;

(C) impacts to ecological receptors;

(D) other site uses such as recreational, agricultural, or subsistence use; or

(E) the presence of sensitive subpopulations who respond biologically to lower levels of exposure to a hazardous substance.

(j) Soil cleanup levels based on

(1) migration of a hazardous substance to groundwater must be attained in the surface soil and the subsurface soil;

(2) human exposure from ingestion of or dermal contact with soil, or inhalation of particulates or a volatile hazardous substance, must be attained in the surface soil and the subsurface soil to a depth of 15 feet, unless an institutional control or site conditions prevent human exposure to the subsurface soil; and

(3) the maximum allowable concentrations for petroleum hydrocarbons described in Table B2 of 18 AAC 75.341(d) must be attained in the surface soil and the subsurface soil.

(k) For a cleanup conducted under methods two and three, a chemical that is detected at one-tenth or more of the Table B1 human health cleanup levels set out in 18 AAC 75.341(c) must be included when calculating cumulative risk under 18 AAC 75.325(g). (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165; am 10/9/2008, Register 188; am 1/1/2016, Register 217; am 11/6/2016, Register 220; am 9/29/2018, Register 227)

Authority:	AS 46.03.020	AS 46.03.740	AS 46.04.070
	AS 46.03.050	AS 46.03.745	AS 46.09.020
	AS 46.03.710	AS 46.04.020	

Editor's note: The documents adopted by reference in 18 AAC 75.340 may be reviewed at, or requested from, the department's offices in Anchorage, Fairbanks, Juneau, and Soldotna. The documents adopted by reference may also be viewed through the department's Internet website at http://dec.alaska.gov/spar/csp/guidance-forms.

18 AAC 75.341. Soil cleanup levels; tables. (a) If a responsible person uses method one for petroleum hydrocarbons for a non-Arctic zone under 18 AAC 75.340, the soil cleanup levels must be based on Table A1 in this subsection.

TABLE A1. METHOD ONE – PETROLEUM HYDROCARBON SOIL CLEANUP LEVELS IN NONARCTIC ZONES
(See notes to table for further requirements)

Part A: Determine score for each item*

1. Depth to Groundwater		
Less than 5 feet	(10)	
5 feet to 15 feet	(8)	
More than 15 feet to 25 feet	(6)	
More than 25 feet to 50 feet	(4)	
More than 50 feet	(1)	
2. Mean Annual Precipitation		
More than 40 inches	(10)	
More than 25 inches to 40 inches	(5)	
15 inches to 25 inches	(3)	
Less than 15 inches	(1)	
3. Soil Type (Unified Soil Classification)		
Clean, coarse-grained soils	(10)	
Coarse-grained soils with fines	(8)	
Fine-grained soils (low organic carbon)	(3)	
Fine-grained soils (high organic carbon)	(1)	
4. Potential Receptors		
(Select the most applicable category)		
a. Public water system within 1000 feet, or private water system within 500 feet	(15)	
b. Public/private water system within 1/2 mile	(12)	
c. Public/private water system within one mile	(8)	
d. No water system within one mile	(4)	
e. Nonpotable groundwater	(1)	
5. Volume of Contaminated Soil		
More than 500 cubic yards	(10)	
More than 100 cubic yards to 500 cubic yards	(8)	
More than 25 cubic yards to 100 cubic yards	(5)	
10 cubic yards to 25 cubic yards	(2)	
Less than 10 cubic yards	(0)	

*The items to be scored are defined in note 1 to this table.

Part B: Add scores from Part A to determine matrix score and cleanup level

	Cleanup Level in mg/kg		
Matrix Score for Each Category	**Gasoline Range Organics**	**Diesel Range Organics**	**Residual Range Organics**
Category A: More than 40	50	100	2000
Category B: More than 26 to 40	100	200	2000
Category C: 21-26	500	1000	2000
Category D: Less than 21	1000	2000	2000

Notes to Table A1:
1. The following definitions for items 1 - 5 in Part A apply for purposes of using method one:

a. "depth to groundwater" means the measurement from the lowest point of the zone of soil contamination to the seasonal high groundwater table; a responsible person may not claim a lower matrix score for soil by moving contaminated soil to a higher elevation relative to the groundwater table;

b. "mean annual precipitation" is defined at 18 AAC 75.990;

c. "soil type" means the predominant Unified Soil Classification (USC) soil type between the deepest point of contamination and the seasonal high groundwater table; a responsible person may seek to demonstrate that otherwise coarse-grained soil has an organic carbon content that might enable a lower point classification. Soil types using the USC system are further defined as shown in Figure 1:

Figure 1

SOIL TYPE	UNIFIED SOIL CLASSIFICATIONS
Clean coarse-grained	GW, GP, SW, SP
Coarse-grained with fines	GM, GC, SM, SC, GP-GC, SP-SM, GW-GM, SW-SM, SW-SC
Fine-grained with low organic carbon	ML, CL, HM, CH
Fine-grained with high organic carbon	OL, OH, Pt

d. for the "potential receptors" categories,

(i) "public water system" and "private water system" have the meaning given those terms in 18 AAC 80.1990;

(ii) "nonpotable" means unusable for drinking water due to a water quality condition, such as salinity, that was not caused by or that does not arise from contamination at the site;

e. "volume of contaminated soil" means the total estimated volume of soil that is contaminated above the applicable cleanup level before a responsible person begins a removal or cleanup action.

2. For the “potential receptors” categories, a responsible person shall submit a demonstration supporting the score assigned, including the results of an approved water well survey; the most conservative score must be used to determine the proximity of potential receptors; for example, if a water system is within one-quarter mile, the category "public/private water system within one mile" that would score 8 would be superseded by the category "public/private water system within 1/2 mile" that would score 12.

3. The identity of a released refined petroleum product must be assumed to be unknown unless a responsible person demonstrates that the product is only gasoline, or only a refined nongasoline product; the department will waive the requirement that a product be identified by analysis if a responsible person demonstrates that only one type of product was stored or distributed at the site; the soil cleanup levels in Part B are based on gas chromatographic analytical measurements corresponding to a specific measured range of petroleum hydrocarbons as follows:

a. gasoline range organics: light-range petroleum products such as gasoline, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C_6 to the beginning of C_{10} and a boiling point range between approximately 60^o Centigrade and 170^o Centigrade;

b. diesel range organics: mid-range petroleum products such as diesel fuel, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C_{10} to the beginning of C_{25} and a boiling point range between approximately 170° Centigrade and 400° Centigrade;

c. residual range organics: heavy-range petroleum products such as lubricating oils, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C_{25} to the beginning of C_{36} and a boiling point range between approximately 400° Centigrade and 500° Centigrade.

4. In addition to meeting the soil cleanup levels in Part B, a responsible person shall ensure that the site meets the most stringent standards for benzene, toluene, ethylbenzene, and total xylenes for the applicable exposure pathway in Table B1 in (c) of this section.

(b) If a responsible person uses method one for petroleum hydrocarbons for an Arctic zone under 18 AAC 75.340, the soil cleanup levels must be based on Table A2 in this subsection.

TABLE A2. METHOD ONE - PETROLEUM HYDROCARBON SOIL CLEANUP LEVELS IN THE ARCTIC ZONE

PRODUCT	Cleanup Level in mg/kg		
	Diesel Range Petroleum Hydrocarbons	**Gasoline Range Petroleum Hydrocarbons**	**Residual Range Petroleum Hydrocarbons**
Gasoline	N/A	100	N/A
Diesel	200*	N/A	N/A
Unknown/Crude	200	100	N/A
Residual	N/A	N/A	2000

In this table, "N/A" means "not applicable."

* If a responsible party demonstrates that contamination is due to a diesel spill, that levels of benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are less than 15 mg/kg, that benzene levels are less than 0.5 mg/kg, and that other site conditions are favorable, and if the department determines that a less stringent level is protective of human health, safety, and welfare, and of the environment, the department will allow a cleanup level of 500 mg/kg for diesel range petroleum hydrocarbons.

The Arctic Zone numeric cleanup levels in this table cover only contamination related to manmade pads and roads. The department will determine the cleanup levels for undisturbed tundra or other undisturbed native vegetation on a site-specific basis, depending upon whether a cleanup action would cause more severe or long-term damage than would the discharge or release alone.

(c) If a responsible person uses method two for chemicals other than petroleum hydrocarbons under 18 AAC 75.340, the soil cleanup levels must be based on Table B1 in this subsection.

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2]	Under 40 Inch Zone[3]	Over 40 Inch Zone[4]	Migration to Groundwater[6] (mg/kg)
			Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	
Acenaphthene[7]	83-32-9	nc	6300	4600	3800	37
Acenaphthylene[7,8]	208-96-8	nc	3100	2300	1900	18
Acetone	67-64-1	nc	1.0×10^5; [9]	81000	65000	38
Aldrin	309-00-2	ca	0.67	0.49	0.40	0.0099
Anthracene[7]	120-12-7	nc	31000	23000	19000	390
Antimony (metallic)	7440-36-0	nc	55	41	33	4.6
Arsenic, Inorganic[11]	7440-38-2	ca	12	8.8	7.2	0.20
Barium	7440-39-3	nc	25000	20000	17000	2100
Benz[a]anthracene[7]	56-55-3	m	20	14	12	0.70
Benzaldehyde	100-52-7	nc	770 (3000)[10]	770 (2300)[10]	770 (1800)[10]	0.52
Benzene[7]	71-43-2	ca	16	11	8.1	0.022
Benzo[a]pyrene[7]	50-32-8	m	2.0	1.5	1.2	1.9
Benzo[b]fluoranthene[7]	205-99-2	m	20	15	12	20
Benzo[g,h,i]perylene[7,8]	191-24-2	nc	3100	2300	1900	15000
Benzo[k]fluoranthene[7]	207-08-9	m	200	150	120	190
Benzoic Acid	65-85-0	nc	1.0×10^5; [9]	1.0×10^5; [9]	1.0×10^5; [9]	200
Benzyl Alcohol	100-51-6	nc	11000	8200	6700	5.7
Beryllium and compounds	7440-41-7	nc	270	200	170	260
Bis(2-chloroethyl)ether	111-44-4	ca	4.0	2.8	2.1	0.00042
Bis(2-ethylhexyl)phthalate	117-81-7	ca	680	500	410	88
Bromobenzene	108-86-1	nc	160 (410)[10]	160 (290)[10]	160 (215)[10]	0.36
Bromodichloromethane	75-27-4	ca	5.3	3.6	2.6	0.0043
Bromoform	75-25-2	ca	340	240	170	0.10
Bromomethane	74-83-9	nc	15	10	7.4	0.024
Butadiene, 1,3-	106-99-0	ca	1.2	0.86	0.64	0.0012
Butanol, N-	71-36-3	nc	6500	6500	6500	5.3

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2] Human Health[5] (mg/kg)	Under 40 Inch Zone[3] Human Health[5] (mg/kg)	Over 40 Inch Zone[4] Human Health[5] (mg/kg)	Migration to Groundwater[6] (mg/kg)
			(14000)[10]	(10000)[10]	(8300)[10]	
Butyl Benzyl Phthalate	85-68-7	ca	5000	3700	3000	16
Butylbenzene, n-	104-51-8	nc	20 (6800)[10]	20 (5000)[10]	20 (4150)[10]	23
Butylbenzene, sec-	135-98-8	nc	28 (14000)[10]	28 (10000)[10]	28 (8300)[10]	42
Butylbenzene, tert-	98-06-6	nc	36 (14000)[10]	36 (10000)[10]	36 (10000)[10]	11
Cadmium	7440-43-9	nc	120	92	76	9.1
Carbon Disulfide	75-15-0	nc	500 (1600)[10]	500 (1100)[10]	500 (800)[10]	2.9
Carbon Tetrachloride	56-23-5	ca	13	9.1	6.6	0.021
Chlordane	12789-03-6	ca	29	22	17	0.18
Chlordecone (Kepone)	143-50-0	ca	0.95	0.70	0.58	0.0083
Chloroaniline, p-	106-47-8	ca	47	35	29	0.015
Chlorobenzene	108-90-7	nc	180 (370)[10]	180 (250)[10]	180 (180)[10]	0.46
Chloroform	67-66-3	ca	5.8	4.0	2.9	0.0071
Chloromethane	74-87-3	nc	250	170	120	0.61
Chloronaphthalene, Beta-	91-58-7	nc	8400	6200	5100	26
Chlorophenol, 2-	95-57-8	nc	680	510	410	0.71
Chromium(III), Insoluble Salts[12]	16065-83-1	nc	1.0×10^5; [9]	1.0×10^5; [9]	1.0×10^5; [9]	1.0×10^5; [9]
Chromium(VI)[12]	18540-29-9	m	4.9	3.9	3.2	0.089
Chrysene[7]	218-01-9	m	2000	1500	1200	600
Copper	7440-50-8	nc	5500	4100	3300	370
Cresol, m-	108-39-4	nc	5500	4100	3400	6.1
Cresol, o-	95-48-7	nc	5500	4100	3400	6.2
Cresol, p-	106-44-5	nc	11000	8200	6700	12
Cumene	98-82-8	nc	54 (2500)[10]	54 (1700)[10]	54 (1300)[10]	5.6
Cyanide (CN-)[13]	57-12-5	nc	48	34	26	0.20

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2]	Under 40 Inch Zone[3]	Over 40 Inch Zone[4]	Migration to Groundwater[6] (mg/kg)
			Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	
Cyclohexane	110-82-7	nc	77 (14000)[10]	77 (9400)[10]	77 (6700)[10]	150
DDD	72-54-8	ca	3.3	2.5	2.0	0.098
DDE, p,p'-	72-55-9	ca	34	25	20	0.72
DDT	50-29-3	ca	33	24	20	5.1
Dibenz[a,h]anthracene[7]	53-70-3	m	2.0	1.5	1.2	6.3
Dibenzofuran	132-64-9	nc	130	95	77	0.97
Dibromochloromethane	124-48-1	ca	140	110	88	0.0027
Dibromoethane, 1,2- (Ethylene Dibromide)	106-93-4	ca	0.62	0.42	0.31	0.00024
Dibromomethane (Methylene Bromide)	74-95-3	nc	45	31	22	0.025
Dibutyl Phthalate	84-74-2	nc	11000	8200	6700	16
Dichlorobenzene, 1,2-	95-50-1	nc	78 (2300)[10]	78 (1600)[10]	78 (1200)[10]	2.4
Dichlorobenzene, 1,3-[8]	541-73-1	nc	62 (2000)[10]	62 (1400)[10]	62 (1000)[10]	2.3
Dichlorobenzene, 1,4-	106-46-7	ca	31	21	15	0.037
Dichlorobenzidine, 3,3'-	91-94-1	ca	21	16	13	0.056
Dichlorodifluoromethane	75-71-8	nc	220	150	110	3.9
Dichloroethane, 1,1-	75-34-3	ca	67	46	33	0.092
Dichloroethane, 1,2-	107-06-2	ca	8.0	5.5	3.9	0.0055
Dichloroethylene, 1,1-	75-35-4	nc	480	330	240	1.2
Dichloroethylene, 1,2-cis-	156-59-2	nc	270	200	170	0.12
Dichloroethylene, 1,2-trans-	156-60-5	nc	960 (2700)[10]	960 (2000)[10]	960 (1700)[10]	1.3
Dichlorophenol, 2,4-	120-83-2	nc	330	250	200	0.21
Dichlorophenoxy Acetic Acid, 2,4-	94-75-7	nc	1200	910	740	0.53
Dichloropropane, 1,2-	78-87-5	nc	25	17	12	0.030
Dichloropropene, 1,3-	542-75-6	ca	30	21	15	0.018
Dieldrin	60-57-1	ca	0.59	0.44	0.36	0.0047
Diethyl Phthalate	84-66-2	nc	88000	66000	54000	60

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2] Human Health[5] (mg/kg)	Under 40 Inch Zone[3] Human Health[5] (mg/kg)	Over 40 Inch Zone[4] Human Health[5] (mg/kg)	Migration to Groundwater[6] (mg/kg)
Dimethylphenol, 2,4-	105-67-9	nc	2200	1600	1300	3.2
Dimethylphthalate[8]	131-11-3	nc	88000	66000	54000	48
Dinitrobenzene, 1,2-	528-29-0	nc	11	8.2	6.7	0.014
Dinitrobenzene, 1,3-	99-65-0	nc	11	8.2	6.7	0.014
Dinitrobenzene, 1,4-	100-25-4	nc	11	8.2	6.7	0.014
Dinitrophenol, 2,4-	51-28-5	nc	220	160	130	0.34
Dinitrotoluene, 2,4-	121-14-2	ca	30	23	18	0.024
Dinitrotoluene, 2,6-	606-20-2	ca	6.3	4.7	3.8	0.0050
Dinitrotoluene, 2-Amino-4,6-	35572-78-2	nc	270	200	160	0.25
Dinitrotoluene, 4-Amino-2,6-	19406-51-0	nc	270	200	160	0.25
Dioxane, 1,4-	123-91-1	ca	100	73	58	0.012
Diphenylamine	122-39-4	nc	11000	8200	6700	17
Endosulfan (Endosulfan I + Endosulfan II)	115-29-7	nc	820	610	500	9.3
Endrin	72-20-8	nc	33	25	20	0.61
Ethyl Chloride	75-00-3	nc	1400 (29000)[10]	1400 (20000)[10]	1400 (14000)[10]	72
Ethylbenzene[7]	100-41-4	ca	72	49	35	0.13
Ethylene Glycol	107-21-1	nc	1.0×10^5; [9]	1.0×10^5; [9]	1.0×10^5; [9]	110
Fluoranthene[7]	206-44-0	nc	4200	3100	2500	590
Fluorene[7]	86-73-7	nc	4200	3100	2500	36
Formaldehyde	50-00-0	ca	430	290	210	0.011
Heptachlor	76-44-8	ca	2.2	1.6	1.3	0.0076
Heptachlor Epoxide	1024-57-3	ca	1.2	0.86	0.69	0.0019
Hexachlorobenzene	118-74-1	ca	2.8	2.0	1.5	0.0082
Hexachlorobutadiene	87-68-3	nc	3.3 (14)[10]	3.3 (10)[10]	3.3 (7.2)[10]	0.020
Hexachlorocyclohexane, Alpha-	319-84-6	ca	1.5	1.1	0.91	0.0029
Hexachlorocyclohexane, Beta-	319-85-7	ca	5.3	3.9	3.2	0.010
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	ca	9.9	7.4	6.0	0.016

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2]	Under 40 Inch Zone[3]	Over 40 Inch Zone[4]	Migration to Groundwater[6] (mg/kg)
			Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	
Hexachlorocyclopentadiene	77-47-4	nc	2.0	1.4	1.0	0.0093
Hexachloroethane	67-72-1	ca	25	17	12	0.018
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	ca	110	79	64	0.027
Hexane, N-	110-54-3	nc	140 (1600)[10]	140 (1100)[10]	140 (750)[10]	130[10]
Hexanone, 2-	591-78-6	nc	380	270	210	0.11
Hydrazine	302-01-2	ca	0.76	0.55	0.40	3.1×10^{-5}
Indeno[1,2,3-cd]pyrene[7]	193-39-5	m	20	15	12	65
Isophorone	78-59-1	ca	10000	7400	6100	2.7
Isopropanol	67-63-0	nc	14000	9500	6800	1.1
Lead and Compounds[14]	7439-92-1	nc	400	400	400	n/a
Manganese	7439-96-5	nc	2900	2700	2000	370
Mercuric Chloride[8]	7487-94-7	nc	41	30	25	3.9
Mercury (elemental)	7439-97-6	nc	3.1 (28)[10]	3.1 (19)[10]	3.1 (14)[10]	0.36
Methanol	67-56-1	nc	1.0×10^5; [9]	1.0×10^5; [9]	1.0×10^5; [9]	54
Methoxychlor	72-43-5	nc	550	410	340	13
Methyl Ethyl Ketone (2-Butanone)	78-93-3	nc	23000 (53000)[10]	23000 (38000)[10]	23000 (30000)[10]	15
Methyl Isobutyl Ketone (4-methyl-2-pentanone)	108-10-1	nc	2200 (69000)[10]	2200 (47000)[10]	2200 (34000)[10]	18
Methyl Mercury	22967-92-6	nc	14	10	8.3	180
Methyl tert-Butyl Ether (MTBE)	1634-04-4	ca	970	670	480	0.40
Methylene Chloride	75-09-2	nc	630	460	360	0.33
Methylnaphthalene, 1-	90-12-0	ca	68 (310)[10]	68 (230)[10]	68 (190)[10]	0.41
Methylnaphthalene, 2-	91-57-6	nc	420	310	250	1.3
Naphthalene[7]	91-20-3	ca	42	29	20	0.038
Nickel Soluble Salts	7440-02-0	nc	2600	2000	1700	340
Nitrobenzene	98-95-3	ca	64	43	31	0.0079

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2]	Under 40 Inch Zone[3]	Over 40 Inch Zone[4]	Migration to Groundwater[6] (mg/kg)
			Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	Human Health[5] (mg/kg)	
Nitroglycerin	55-63-0	nc	11	8.2	6.7	0.0082
Nitroguanidine	556-88-7	nc	11000	8200	6700	5.8
Nitrosodimethylamine, N-	62-75-9	m	0.036	0.026	0.020	3.3×10^{-6}
Nitroso-di-N-propylamine, N-	621-64-7	ca	1.4	1.00	0.82	0.00068
Nitrosodiphenylamine, N-	86-30-6	ca	1900	1400	1200	4.6
Nitrotoluene, m-	99-08-1	nc	11	8.2	6.7	0.013
Nitrotoluene, o-	88-72-2	ca	55	41	34	0.024
Nitrotoluene, p-	99-99-0	nc	440	330	270	0.32
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	nc	6700	5000	4100	9.7
Octyl Phthalate, di-N-	117-84-0	nc	1100	820	670	370
Pentachlorophenol	87-86-5	ca	18	13	11	0.0043
Pentaerythritol tetranitrate (PETN)	78-11-5	nc	220	160	130	0.43
Perchlorate and Perchlorate salts	14797-73-0	nc	96	71	58	0.037
Perfluorooctanesulfonic Acid (PFOS)[8]	1763-23-1	nc	2.2	1.6	1.3	0.0030
Perfluorooctanoic Acid (PFOA)[8]	335-67-1	nc	2.2	1.6	1.3	0.0017
Phenanthrene[7,8]	85-01-8	nc	3100	2300	1900	39
Phenol	108-95-2	nc	33000	25000	20000	29
Phosphorus, White	7723-14-0	nc	2.7	2.0	1.7	0.020
Polychlorinated Biphenyls (total)[15]	1336-36-3	ca	1.0	1.0	1.0	n/a
Propyl benzene	103-65-1	nc	52 (5200)[10]	52 (3700)[10]	52 (2800)[10]	9.1
Pyrene[7]	129-00-0	nc	3100	2300	1900	87
Selenium	7782-49-2	nc	680	510	410	6.9
Silver	7440-22-4	nc	680	510	410	11
Strontium	7440-24-6	nc	82000	61000	50000	5600
Styrene	100-42-5	nc	180 (8100)[10]	180 (5700)[10]	180 (4200)[10]	10
TCDD, 2,3,7,8-[16]	1746-01-6	ca	8.2×10^{-5}	6.0×10^{-5}	4.9×10^{-5}	3.9×10^{-6}
Tetrachloroethane, 1,1,1,2-	630-20-6	ca	30	21	15	0.022

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2] Human Health[5] (mg/kg)	Under 40 Inch Zone[3] Human Health[5] (mg/kg)	Over 40 Inch Zone[4] Human Health[5] (mg/kg)	Migration to Groundwater[6] (mg/kg)
Tetrachloroethane, 1,1,2,2-	79-34-5	ca	8.8	6.1	4.4	0.0030
Tetrachloroethylene	127-18-4	nc	68 (140)[10]	68 (95)[10]	68 (69)[10]	0.19
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	nc	270	200	170	2.5
Thallium (Soluble Salts)	7440-28-0	nc	1.4	1.00	0.83	0.19
Toluene[7]	108-88-3	nc	200 (8000)[10]	200 (5800)[10]	200 (4500)[10]	6.7
Toxaphene	8001-35-2	ca	8.6	6.4	5.2	0.72
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	nc	740 (16000)[10]	740 (11000)[10]	740 (7700)[10]	310
Trichlorobenzene, 1,2,3-	87-61-6	nc	110	81	66	0.15
Trichlorobenzene, 1,2,4-	120-82-1	nc	66	45	32	0.082
Trichloroethane, 1,1,1-	71-55-6	nc	360 (160000)[10]	360 (11000)[10]	360 (7800)[10]	32
Trichloroethane, 1,1,2-	79-00-5	nc	2.3	1.6	1.1	0.0014
Trichloroethylene	79-01-6	nc	7.1	4.9	3.5	0.011
Trichlorofluoromethane	75-69-4	nc	980 (41000)[10]	980 (30000)[10]	980 (25000)[10]	41
Trichlorophenol, 2,4,5-	95-95-4	nc	11000	8200	6700	28
Trichlorophenol, 2,4,6-	88-06-2	nc	110	82	67	0.092
Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5	nc	1100	820	670	0.66
Trichlorophenoxypropionic acid, -2,4,5	93-72-1	nc	880	660	540	0.55
Trichloropropane, 1,2,3-	96-18-4	m	0.089	0.066	0.054	3.1×10^{-5}
Trimethylbenzene, 1,2,4-	95-63-6	nc	43 (400)[10]	43 (280)[10)]	43 (210)[10]	0.61
Trimethylbenzene, 1,3,5-	108-67-8	nc	37 (360)[10]	37 (250)[10]	37 (180)[10]	0.66
Tri-n-butyltin	688-73-3	nc	41	30	25	0.68
Trinitrobenzene, 1,3,5-	99-35-4	nc	3900	2900	2400	15
Trinitrotoluene, 2,4,6-	118-96-7	nc	64	47	39	0.39
Vanadium and Compounds	7440-62-2	nc	680	510	420	1100
Vinyl Acetate	108-05-4	nc	2100	1400	1000	1.1

TABLE B1. METHOD TWO – SOIL CLEANUP LEVELS TABLE (See notes for additional requirements)						
Hazardous Substance	CAS Number[1]	health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Arctic Zone[2] Human Health[5] (mg/kg)	Under 40 Inch Zone[3] Human Health[5] (mg/kg)	Over 40 Inch Zone[4] Human Health[5] (mg/kg)	Migration to Groundwater[6] (mg/kg)
Vinyl Chloride	75-01-4	ca	0.69	0.65	0.61	0.00080
Xylenes[7]	1330-20-7	nc	57 (710)[10]	57 (490)[10]	57 (350)[10]	1.5
Zinc and Compounds	7440-66-6	nc	41000	30000	25000	4900
See notes to table for further requirements. "n/a" means not applicable.						

NOTES TO TABLE B1 FOLLOW TABLE B2 IN (d) OF THIS SECTION

(d) If a responsible person uses method two for petroleum hydrocarbons under 18 AAC 75.340, the soil cleanup levels must be based on Table B2 in this subsection.

TABLE B2. METHOD TWO - PETROLEUM HYDROCARBON SOIL CLEANUP LEVELS

Petroleum Hydrocarbon Range	Arctic Zone[2] mg/kg			Under 40 Inch Zone[3]			Over 40 Inch Zone[4]			Maximum Allowable Concentrations[17] mg/kg
	Ingestion (mg/kg)[18]	Inhalation (mg/kg)[19]	Migration to Groundwater (mg/kg)[6]	Ingestion (mg/kg)[18]	Inhalation (mg/kg)[19]	Migration to groundwater (mg/kg)[6]	Ingestion (mg/kg)[18]	Inhalation (mg/kg)[19]	Migration to Groundwater (mg/kg)[6]	
For Laboratory Analysis using AK Methods 101, 102, and 103										
C_6-C_{10} GRO using AK 101	1400	1400	n/a	1400	1400	300	1400	1400	260	1400
C_{10}-C_{25} DRO using AK 102	12500	12500	n/a	10250	12500	250	8250	12500	230	12500
C_{25}-C_{36} RRO using AK 103	13700	22000	n/a	10000	22000	11000	8300	22000	9700	22000
For Laboratory Analysis using AK Aliphatic and Aromatic Fraction Methods 101AA, 102AA, and 103AA										
C_6-C_{10} Aliphatics	1000	1000	n/a	1000	1000	270	1000	1000	240	1000
C_6-C_{10} Aromatics	1000	1000	n/a	1000	1000	150	1000	1000	130	1000
C_{10}-C_{25} Aliphatics	10000	10000	n/a	10000	10000	7200	8300	10000	6400	10000
C_{10}-C_{25} Aromatics	5000	5000	n/a	4100	5000	100	3300	5000	90	5000
C_{25}-C_{36} Aliphatics	20000	20000	n/a	20000	20000	20000	20000	20000	20000	20000
C_{25}-C_{36} Aromatics	4100	10000	n/a	3000	10000	3300	2500	10000	2900	10000

See notes to table for further requirements. “n/a” means not applicable.

Notes to Tables B1 and B2:

If applicable, alternative cleanup levels must be protective of migration to surface water. Concentrations of hazardous substances in soil must be calculated and presented on a per dry weight basis. For volatile organic hazardous substances for which toxicity data are not currently available or calculated levels exceed the calculated saturation concentration, the cleanup level that applies at a site is the calculated saturation concentration determined using the equations set out in the *Procedures for Calculating Cleanup Levels*, adopted by reference in 18 AAC 75.340. The cleanup level from Table B1 or B2 that applies at a site is the most stringent of the applicable exposure pathway-specific cleanup levels based on human health, ingestion, inhalation, or migration to groundwater. Where the superscript figure "9" follows the exponent "10^{5}", separated by a semicolon, the figure "9" refers to Note 9.

1. "CAS Number" means the Chemical Abstract Service (CAS) registry number uniquely assigned to chemicals by the American Chemical Society and recorded in the CAS Registry System.

2. "Arctic zone" is defined at 18 AAC 75.990.

3. "Under 40 inch zone" means a site that receives mean annual precipitation of less than 40 inches each year.

4. "Over 40 inch zone" means a site that receives mean annual precipitation of 40 or more inches each year.

5. The "Human Health" exposure pathway is the cumulative exposure pathway through dermal contact, ingestion, and inhalation of volatile and particulate compounds from hazardous substances in the soil but excludes the vapor intrusion pathway of indoor air inhalation.

6. The "Migration to Groundwater" exposure pathway is the potential for hazardous substances to leach to groundwater where they may result in a completed human health exposure pathway through dermal contact, ingestion, or inhalation of contaminants at or above levels listed in Table C at 18 AAC 75.345(b)(1); soil cleanup levels protective of migration to surface water must be determined on a site-specific basis.

7. If using method two or method three, the applicable petroleum hydrocarbon cleanup levels must be met in addition to the applicable chemical-specific cleanup levels for benzene, ethylbenzene, toluene, and total xylenes; the chemical-specific cleanup levels for the polynuclear aromatic hydrocarbons acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]pyrene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, and pyrene must also be met unless the department determines that those cleanup levels need not be met to protect human health, safety, and welfare, and the environment.

8. Where one or more toxicological values were unavailable, toxicity values from surrogate compounds or other sources were used as presented in Table 6 in the *Procedures for Calculating Cleanup Levels*, adopted by reference in 18 AAC 75.340.

9. The ceiling limit of 100,000 mg/kg is equivalent to a chemical representing 10 percent by weight of the soil sample. At this contaminant concentration and higher, the assumptions for soil contact may be violated (for example, soil adherence and wind-borne dispersion assumptions) due to the presence of the foreign substance itself.

10. This level is based on a soil saturation concentration (Csat) using the equations set out in *Procedures for Calculating Cleanup Levels*, adopted by reference in 18 AAC 75.340. The Csat value is listed first, followed by the human health risk-based cleanup level in parentheses. The human health risk-based cleanup level assumptions do not take free product into consideration. In accordance with 18 AAC 75.325(f), free product must be recovered to the maximum extent practicable. Contaminant concentrations above the Csat value trigger the need

to assess the practicability of product recovery; if the department determines product recovery is impracticable, the risk-based cleanup level may be applied as long as the cumulative risk standards are met.

11. Due to the prevalence of naturally occurring arsenic throughout the state, arsenic at a site will be considered background arsenic unless anthropogenic contribution from a source, activity, or mobilization by means of another introduced contaminant is known or suspected.

12. Due to the prevalence of naturally occurring chromium III throughout the state, sample results reported for total chromium detected at a site will be considered background chromium III unless anthropogenic contribution of chromium III or VI from a source, activity, or mobilization by means of another introduced contaminant is known or suspected. The calculated chromium III migration to groundwater cleanup level exceeds 1,000,000 parts per million.

13. Cyanide expressed as free, or physiologically available cyanide.

14. Lead cleanup levels are based on land use; for residential land use, the soil cleanup level is 400 mg/kg. For commercial or industrial land use, as applied in 18 AAC 75.340(e)(3), the soil cleanup level is 800 mg/kg; through an approved site-specific risk assessment, conducted according to the *Risk Assessment Procedures Manual*, adopted by reference in 18 AAC 75.340, approved exposure models may be used to evaluate exposure to a child resident or an adult worker; a responsible person may also propose an alternative cleanup level, through a site-specific risk assessment conducted according to the *Risk Assessment Procedures Manual*, and based on a chemical speciation of the lead present at the site. For soils contaminated with lead more than 15 feet below ground surface, lead cleanup levels will be determined on a site-specific basis.

15. The applicable EPA regulation governing disposal and cleanup of PCB contaminated facilities under 40 C.F.R. 761.61 (PCB remediation waste) may apply to cleanup of polychlorinated biphenyls (PCBs) at a contaminated site. The PCB cleanup levels listed in Table B1 are based on cleanup levels referred to in 40 C.F.R. 761.61 for high occupancy areas with no cap. For unrestricted land use, polychlorinated biphenyls (PCBs) in soil shall be cleaned up to the listed value, unless the department determines that a different cleanup level is necessary as provided in 18 AAC 75.340(i); with the prior approval of the department, PCBs in soil may be cleaned up to

(A) between 1 and 10 mg/kg if the responsible person

(i) caps each area containing PCBs in soil at levels between 1 and 10 mg/kg; for purposes of this Note 15, “caps” means covering an area of PCB contaminated soil with an appropriate material to prevent exposure of humans and the environment to PCBs; to be approved, a cap must be designed and constructed of a material acceptable to the department and of sufficient strength and durability to withstand the use of the surface that is exposed to the environment; within 72 hours after discovery of a breach to the integrity of a cap, the responsible person or the landowner shall initiate repairs to that breach; and

(ii) provides the department within 60 days after completing the cleanup, documentation that the responsible person has recorded a deed notation in the appropriate land records, or on another instrument that is normally examined during a title search, documenting that PCBs remain in the soil, that the contaminated soil has been capped, and that subsequent interest holders may have legal obligations with respect to the cap and the contaminated soil; or

(B) an alternative PCB soil cleanup level developed through an approved site-specific risk assessment, conducted according to the *Risk Assessment Procedures Manual*, adopted by reference at 18 AAC 75.340.

16. This cleanup level is for 2,3,7,8-Tetrachlorordibenzo-*p*-Dioxin (TCDD) only; all cleanup levels for polychlorinated dibenzo-*p*-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) congeners must be determined on a site-specific basis using the TCDD toxicity equivalent (TEQ) approach described in the *Procedures for Calculating Cumulative Risk,* adopted by reference in 18 AAC 75.325.

17. This level is the concentration of C_6 - C_{10}, C_{10} - C_{25}, or C_{25} - C_{36} petroleum hydrocarbon range in surface and subsurface soil that if exceeded, indicates an increased potential for hazardous substance migration or for risk to human health, safety, or welfare, or to the environment; the level of a petroleum hydrocarbon may not remain at a concentration above the maximum allowable concentration unless a responsible person demonstrates that the petroleum hydrocarbon will not migrate and will not pose a significant risk to human health, safety, or welfare, or to the environment; free product must be recovered as required by 18 AAC 75.325(f).

18. "Ingestion" means a potential pathway of exposure to hazardous substances through direct consumption of the soil.

19. "Inhalation" means a potential pathway to volatile organic hazardous substances in the soil through volatilization, but excludes the vapor intrusion pathway of indoor air inhalation. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165; am 10/9/2008, Register 188; am 11/6/2016, Register 220; am 9/29/2018, Register 227)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020
AS 46.03.710 AS 46.04.020

18 AAC 75.345. Groundwater and surface water cleanup levels. (a) Except as otherwise provided in this section, cleanup of a discharge or release of a hazardous substance to groundwater or surface water must meet the requirements of this section.

(b) Contaminated groundwater must meet

(1) the cleanup levels in Table C if the current use or the reasonably expected potential future use of the groundwater, determined under 18 AAC 75.350, is a drinking water source;

TABLE C. GROUNDWATER CLEANUP LEVELS

Hazardous Substance	CAS Number[1]	Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Groundwater Human Health Cleanup Level[2] (micrograms /liter)
Acenaphthene	83-32-9	nc	530
Acenaphthylene[3]	208-96-8	nc	260
Acetone	67-64-1	nc	14000
Aldrin	309-00-2	ca	0.0092
Anthracene	120-12-7	nc	43 (1800)[4]
Antimony (metallic)	7440-36-0	nc	7.8

TABLE C. GROUNDWATER CLEANUP LEVELS			
Hazardous Substance	**CAS Number[1]**	**Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)**	**Groundwater Human Health Cleanup Level[2] (micrograms /liter)**
Arsenic, Inorganic[5]	7440-38-2	ca	0.52
Barium	7440-39-3	nc	3800
Benz[a]anthracene	56-55-3	m	0.30
Benzaldehyde	100-52-7	nc	190
Benzene	71-43-2	ca	4.6
Benzo[a]pyrene	50-32-8	m	0.25
Benzo[b]fluoranthene	205-99-2	m	2.5
Benzo[g,h,i]perylene[3]	191-24-2	nc	0.26 (600)[4]
Benzo[k]fluoranthene	207-08-9	m	0.80 (25)[4]
Benzoic Acid	65-85-0	nc	75000
Benzyl Alcohol	100-51-6	nc	2000
Beryllium and compounds	7440-41-7	nc	25
Bis(2-chloroethyl)ether	111-44-4	ca	0.14
Bis(2-ethylhexyl)phthalate	117-81-7	ca	56
Bromobenzene	108-86-1	nc	62
Bromodichloromethane	75-27-4	ca	1.3
Bromoform	75-25-2	ca	33
Bromomethane	74-83-9	nc	7.5
Butadiene, 1,3-	106-99-0	ca	0.18
Butanol, N-	71-36-3	nc	2000
Butyl Benzyl Phthalate	85-68-7	ca	160
Butylbenzene, n-	104-51-8	nc	1000
Butylbenzene, sec-	135-98-8	nc	2000
Butylbenzene, tert-	98-06-6	nc	690
Cadmium (Diet)	7440-43-9	nc	9.2
Carbon Disulfide	75-15-0	nc	810
Carbon Tetrachloride	56-23-5	ca	4.6
Chlordane	12789-03-6	ca	0.20
Chlordecone (Kepone)	143-50-0	ca	0.035
Chloroaniline, p-	106-47-8	ca	3.7
Chlorobenzene	108-90-7	nc	78
Chloroform	67-66-3	ca	2.2
Chloromethane	74-87-3	nc	190
Chloronaphthalene, Beta-	91-58-7	nc	750
Chlorophenol, 2-	95-57-8	nc	91

TABLE C. GROUNDWATER CLEANUP LEVELS			
Hazardous Substance	**CAS Number[1]**	**Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)**	**Groundwater Human Health Cleanup Level[2] (micrograms /liter)**
Chromium(III), Insoluble Salts[6]	16065-83-1	nc	22000
Chromium(VI)[6]	18540-29-9	m	0.35
Chrysene	218-01-9	m	2.0 (250)[4]
Copper	7440-50-8	nc	800
Cresol, m-	108-39-4	nc	930
Cresol, o-	95-48-7	nc	930
Cresol, p-	106-44-5	nc	1900
Cumene	98-82-8	nc	450
Cyanide (CN-)	57-12-5	nc	1.5
Cyclohexane	110-82-7	nc	13000
DDD	72-54-8	ca	0.060
DDE, p,p'-	72-55-9	ca	0.46
DDT	50-29-3	ca	2.3
Dibenz[a,h]anthracene	53-70-3	m	0.25
Dibenzofuran	132-64-9	nc	7.9
Dibromochloromethane	124-48-1	ca	8.7
Dibromoethane, 1,2- (Ethylene Dibromide)	106-93-4	ca	0.075
Dibromomethane (Methylene Bromide)	74-95-3	nc	8.3
Dibutyl Phthalate	84-74-2	nc	900
Dichlorobenzene, 1,2-	95-50-1	nc	300
Dichlorobenzene, 1,3-[3]	541-73-1	nc	300
Dichlorobenzene, 1,4-	106-46-7	ca	4.8
Dichlorobenzidine, 3,3'-	91-94-1	ca	1.3
Dichlorodifluoromethane	75-71-8	nc	200
Dichloroethane, 1,1-	75-34-3	ca	28
Dichloroethane, 1,2-	107-06-2	ca	1.7
Dichloroethylene, 1,1-	75-35-4	nc	280
Dichloroethylene, 1,2-cis-	156-59-2	nc	36
Dichloroethylene, 1,2-trans-	156-60-5	nc	360
Dichlorophenol, 2,4-	120-83-2	nc	46
Dichlorophenoxy Acetic Acid, 2,4-	94-75-7	nc	170
Dichloropropane, 1,2-	78-87-5	nc	8.2
Dichloropropene, 1,3-	542-75-6	ca	4.7
Dieldrin	60-57-1	ca	0.018
Diethyl Phthalate	84-66-2	nc	15000

TABLE C. GROUNDWATER CLEANUP LEVELS			
Hazardous Substance	**CAS Number[1]**	**Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)**	**Groundwater Human Health Cleanup Level[2] (micrograms /liter)**
Dimethylphenol, 2,4-	105-67-9	nc	360
Dimethylphthalate[3]	131-11-3	nc	16000
Dinitrobenzene, 1,2-	528-29-0	nc	1.9
Dinitrobenzene, 1,3-	99-65-0	nc	2.0
Dinitrobenzene, 1,4-	100-25-4	nc	2.0
Dinitrophenol, 2,4-	51-28-5	nc	39
Dinitrotoluene, 2,4-	121-14-2	ca	2.4
Dinitrotoluene, 2,6-	606-20-2	ca	0.49
Dinitrotoluene, 2-Amino-4,6-	35572-78-2	nc	39
Dinitrotoluene, 4-Amino-2,6-	19406-51-0	nc	39
Dioxane, 1,4-	123-91-1	ca	4.6
Diphenylamine	122-39-4	nc	1300
Endosulfan	115-29-7	nc	100
Endrin	72-20-8	nc	2.3
Ethyl Chloride	75-00-3	nc	21000
Ethylbenzene	100-41-4	ca	15
Ethylene Glycol	107-21-1	nc	40000
Fluoranthene	206-44-0	nc	260 (800)[4]
Fluorene	86-73-7	nc	290
Formaldehyde	50-00-0	ca	4.3
Heptachlor	76-44-8	ca	0.014
Heptachlor Epoxide	1024-57-3	ca	0.014
Hexachlorobenzene	118-74-1	ca	0.098
Hexachlorobutadiene	87-68-3	nc	1.4
Hexachlorocyclohexane, Alpha-	319-84-6	ca	0.072
Hexachlorocyclohexane, Beta-	319-85-7	ca	0.25
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	ca	0.42
Hexachlorocyclopentadiene	77-47-4	nc	0.41
Hexachloroethane	67-72-1	ca	3.3
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	ca	7.0
Hexane, N-	110-54-3	nc	1500
Hexanone, 2-	591-78-6	nc	38
Hydrazine	302-01-2	ca	0.011
Indeno[1,2,3-cd]pyrene	193-39-5	m	0.19 (2.5)[4]
Isophorone	78-59-1	ca	780

TABLE C. GROUNDWATER CLEANUP LEVELS			
Hazardous Substance	**CAS Number[1]**	**Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)**	**Groundwater Human Health Cleanup Level[2] (micrograms /liter)**
Isopropanol	67-63-0	nc	410
Lead and Compounds[7]	7439-92-1	nc	15
Manganese	7439-96-5	nc	430
Mercuric Chloride[3]	7487-94-7	nc	5.7
Mercury (elemental)	7439-97-6	nc	0.52
Methanol	67-56-1	nc	20000
Methoxychlor	72-43-5	nc	37
Methyl Ethyl Ketone (2-Butanone)	78-93-3	nc	5600
Methyl Isobutyl Ketone (4-methyl-2-pentanone)	108-10-1	nc	6300
Methyl Mercury	22967-92-6	nc	2.0
Methyl tert-Butyl Ether (MTBE)	1634-04-4	ca	140
Methylene Chloride	75-09-2	nc	110
Methylnaphthalene, 1-	90-12-0	ca	11
Methylnaphthalene, 2-	91-57-6	nc	36
Naphthalene	91-20-3	ca	1.7
Nickel Soluble Salts	7440-02-0	nc	390
Nitrobenzene	98-95-3	ca	1.4
Nitroglycerin	55-63-0	nc	2.0
Nitroguanidine	556-88-7	nc	2000
Nitrosodimethylamine, N-	62-75-9	m	0.0011
Nitroso-di-N-propylamine, N-	621-64-7	ca	0.11
Nitrosodiphenylamine, N-	86-30-6	ca	120
Nitrotoluene, m-	99-08-1	nc	1.7
Nitrotoluene, o-	88-72-2	ca	3.1
Nitrotoluene, p-	99-99-0	nc	43
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	nc	1000
Octyl Phthalate, di-N-	117-84-0	nc	22 (200)[4]
Pentachlorophenol	87-86-5	ca	0.41
Pentaerythritol tetranitrate (PETN)	78-11-5	nc	39
Perchlorate and Perchlorate Salts	14797-73-0	nc	14
Perfluorooctanesulfonic Acid (PFOS)[3]	1763-23-1	nc	0.40
Perfluorooctanoic Acid (PFOA)[3]	335-67-1	nc	0.40
Phenanthrene[3]	85-01-8	nc	170
Phenol	108-95-2	nc	5800
Phosphorus, White	7723-14-0	nc	0.40

TABLE C. GROUNDWATER CLEANUP LEVELS

Hazardous Substance	CAS Number[1]	Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)	Groundwater Human Health Cleanup Level[2] (micrograms /liter)
Polychlorinated Biphenyls (PCBs)	1336-36-3	ca	0.44
Propyl benzene	103-65-1	nc	660
Pyrene	129-00-0	nc	120
Selenium	7782-49-2	nc	100
Silver	7440-22-4	nc	94
Styrene	100-42-5	nc	1200
Strontium	7440-24-6	nc	12000
TCDD, 2,3,7,8-[8]	1746-01-6	ca	1.2×10^{-6}
Tetrachloroethane, 1,1,1,2-	630-20-6	ca	5.7
Tetrachloroethane, 1,1,2,2-	79-34-5	ca	0.76
Tetrachloroethylene	127-18-4	nc	41
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	nc	39
Thallium (Soluble Salts)	7440-28-0	nc	0.20
Toluene	108-88-3	nc	1100
Toxaphene	8001-35-2	ca	0.71
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	nc	10000
Trichlorobenzene, 1,2,3-	87-61-6	nc	7.0
Trichlorobenzene, 1,2,4-	120-82-1	nc	4.0
Trichloroethane, 1,1,1-	71-55-6	nc	8000
Trichloroethane, 1,1,2-	79-00-5	nc	0.41
Trichloroethylene	79-01-6	nc	2.8
Trichlorofluoromethane	75-69-4	nc	5200
Trichlorophenol, 2,4,5-	95-95-4	nc	1200
Trichlorophenol, 2,4,6-	88-06-2	nc	12
Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5	nc	160
Trichlorophenoxypropionic acid, -2,4,5	93-72-1	nc	110
Trichloropropane, 1,2,3-	96-18-4	m	0.0075
Trimethylbenzene, 1,2,4-	95-63-6	nc	56
Trimethylbenzene, 1,3,5-	108-67-8	nc	60
Tri-n-butyltin	688-73-3	nc	3.7
Trinitrobenzene, 1,3,5-	99-35-4	nc	590
Trinitrotoluene, 2,4,6-	118-96-7	nc	9.8
Vanadium and Compounds	7440-62-2	nc	86
Vinyl Acetate	108-05-4	nc	410
Vinyl Chloride	75-01-4	ca	0.19

TABLE C. GROUNDWATER CLEANUP LEVELS			
Hazardous Substance	**CAS Number[1]**	**Health effect that drives risk: carcinogen (ca); noncarcinogen (nc); mutagen (m)**	**Groundwater Human Health Cleanup Level[2] (micrograms /liter)**
Xylenes	1330-20-7	nc	190
Zinc and Compounds	7440-66-6	nc	6000
PETROLEUM HYDROCARBONS			
C_6-C_{10} GRO		nc	2200
C_{10}-C_{25} DRO		nc	1500
C_{25}-C_{36} RRO		nc	1100

Notes to Table C:

1. "CAS Number" means the Chemical Abstract Service (CAS) registry number uniquely assigned to chemicals by the American Chemical Society and recorded in the CAS Registry System.

2. The "Human Health" exposure pathway is the cumulative exposure pathway through dermal contact, ingestion, and inhalation of volatile compounds from hazardous substances in the water.

3. Where one or more toxicological values were unavailable, toxicity values from surrogate compounds or other sources were used as presented in Table 6 from the *Procedures for Calculating Cleanup Levels*, adopted by reference in 18 AAC 75.340.

4. This level is set at the compound's solubility concentration using the equations set out in the *Procedures for Calculating Cleanup Levels*, adopted by reference in 18 AAC 75.340. The solubility value is listed first, followed by the human health risk-based cleanup level in parentheses. The human health risk-based cleanup level assumptions do not take free product into consideration. In accordance with 18 AAC 75.325(f), free product must be recovered to the maximum extent practicable. Contaminant concentrations above the solubility value trigger the need to assess the practicability of product recovery; if the department determines product recovery is impracticable, the risk-based cleanup level may be applied as long as the cumulative risk standards are met.

5. Due to the prevalence of naturally occurring arsenic throughout the state, arsenic at a site will be considered background arsenic unless anthropogenic contribution from a source, activity, or mobilization by means of another introduced contaminant is known or suspected.

6. Due to the prevalence of naturally occurring chromium III throughout the state, sample results reported for total chromium detected at a site will be considered background chromium III unless anthropogenic contribution of chromium III or VI from a source, activity, or mobilization by means of another introduced contaminant is known or suspected.

7. The lead cleanup level is taken from EPA's action level for lead in water.

8. This cleanup level is for 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD) only; all cleanup levels for polychlorinated dibenzo-*p*-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) congeners must be determined on a site-specific basis using the TCDD toxicity equivalent (TEQ) approach described in the *Procedures for Calculating Cumulative Risk*, adopted by reference in 18 AAC 75.325.

(2) an approved cleanup level based on an approved site-specific risk assessment conducted under the *Risk Assessment Procedures Manual* adopted by reference in 18 AAC 75.340;

(3) an alternative cleanup level for a hazardous substance not listed under (1) of this subsection proposed by the responsible party and approved by the department, using the procedures set out in the department's *Risk Assessment Procedures Manual*, adopted by reference in 18 AAC 75.340, unless the responsible person demonstrates that an alternative cleanup level is not necessary to ensure protection of human health, safety, and welfare, and of the environment; or;

(4) an alternative cleanup level for a hazardous substance not listed under (1) of this subsection set by the department using the procedures set out in the department's *Risk Assessment Procedures Manual*, adopted by reference in 18 AAC 75.340.

(c) The department will set a more stringent cleanup level than the applicable level under (b) of this section, if the department determines that a more stringent cleanup level is necessary to ensure protection of human health, safety, or welfare, or of the environment, and based on actual onsite and actual or likely offsite uses of the groundwater that are likely to be affected by the hazardous substance. In making a determination under this subsection, the department may consider

(1) the risks to current or potential future users of the groundwater as a drinking water source, as determined under 18 AAC 75.350;

(2) the presence of sensitive subpopulations who respond biologically to lower levels of exposure to a hazardous substance;

(3) the groundwater use classifications other than for drinking water, as set out under 18 AAC 70.020(a)(1)(A) and 18 AAC 70.050(2);

(4) the primary or secondary maximum contaminant levels in 18 AAC 80.300 for actual or likely drinking water supplies;

(5) a health advisory value developed by EPA's Office of Water; and

(6) the cleanup levels in this section for groundwater contaminated with petroleum; the contamination may not exceed, for each petroleum hydrocarbon range applicable, including the gasoline range, the diesel range, and the residual range,

(A) a threshold odor number (TON) of 1 for odor, as measured by Method 2150B, *Standard Methods for the Examination of Water and Wastewater*, 22nd edition, American Public Health Association (2012), adopted by reference; or

(B) a flavor threshold number (FTN) of 1 for flavor, as measured by Method 2160B, *Standard Methods for the Examination of Water and Wastewater*, adopted by reference in (A) of this paragraph.

(d) Where the department determines that toxicity information is insufficient to establish a cleanup level for a hazardous substance or a pollutant that ensures protection of human health, safety, and welfare, and of the environment, the department may require a responsible person to provide an alternative source of drinking water for the affected parties or implement other institutional controls under 18 AAC 75.375 until a cleanup level is established under (b)(2), (3), or (4) of this section.

(e) Toxic substances in sediment may not cause, and may not be reasonably expected to cause, a toxic or other deleterious effect on aquatic life, except as authorized under 18 AAC 70. For purposes of this subsection, "toxic substances" has the meaning given in 18 AAC 70.990.

(f) The point of compliance where groundwater cleanup levels must be attained is throughout the site from each point extending vertically from the uppermost level of the zone of saturation to the lowest possible depth that could potentially be affected by the discharge or release of a hazardous substance, unless the department approves an alternative point of compliance as part of the cleanup action under 18 AAC 75.360. For the department to approve an alternative point of compliance under this subsection, the

(1) alternative point of compliance must be within the existing groundwater contamination plume; and

(2) cleanup levels established in (b) and (c) of this section must be met at the property boundary in an area where the current use or reasonably expected potential future use of groundwater in the neighboring property is determined to be a source of drinking water, unless a responsible person

(A) demonstrates that attainment of the applicable groundwater cleanup levels is not practicable; and

(B) provides an alternative source of water for affected persons.

(g) Groundwater that is closely connected hydrologically to nearby surface water may not cause a violation of the water quality standards in 18 AAC 70 for surface water or sediment. The department will, in consultation with local, state, and federal officials and the public, establish points of compliance with this subsection, taking into account

(1) groundwater travel time and distance from sources of hazardous substances to surface water;

(2) the contribution of the groundwater to the chemical and physical quantity and quality of the surface water;

(3) organisms living in or dependent upon the groundwater to surface water ecosystems;

(4) climatic, tidal, or seasonal variations;

(5) feasibility of attaining applicable water quality standards to support the designated uses of the surface water;

(6) presence of sediment contamination; and

(7) if conducted for the site, the conclusions of a site-specific risk assessment conducted under the *Risk Assessment Procedures Manual*, adopted by reference in 18 AAC 75.340.

(h) If the groundwater point of compliance is established at or near a property boundary or if groundwater is closely connected hydrologically to a surface waterbody, the department will, if the department determines that sentinel monitoring is necessary to ensure protection of human health, safety, or welfare, or the environment, require a responsible person to develop sentinel monitoring wells that monitor for any hazardous substances likely to migrate to the applicable point of compliance at concentrations that exceed the cleanup levels.

(i) The department will require long-term monitoring if the department determines that monitoring is necessary to ensure protection of human health, safety, or welfare, or of the environment and if groundwater, surface water, soil, or sediment contains residual concentrations of a hazardous substance that exceed the applicable cleanup levels. If long-term monitoring is required under this subsection, a responsible person shall submit a plan and schedule for monitoring as part of the requirements for cleanup operations under 18 AAC 75.360. Unless otherwise approved by the department, a responsible person shall conduct monitoring quarterly for at least one year to establish the concentration trend. The department will evaluate the monitoring program yearly. If the monitoring indicates that the concentration trend

(1) is increasing, the department will require additional follow-up monitoring and assess the need for additional cleanup; or

(2) is stable or decreasing, and that hazardous substance migration is not occurring, the department will decrease or discontinue the monitoring frequency and locations, if the responsible person demonstrates that continued monitoring is not necessary to ensure protection of human health, safety, and welfare, and of the environment.

(j) The department will require groundwater, surface water, soil, or sediment monitoring to estimate contaminant flux rates and to address potential bioaccumulation of each hazardous substance at the site, if the department determines that monitoring is necessary to ensure protection of human health, safety, or welfare, or of the environment. If monitoring is required under this subsection, a responsible person shall submit a plan and schedule for monitoring as part of the cleanup operation requirements under 18 AAC 75.360.

(k) Groundwater monitoring wells must be installed, developed, and decommissioned in accordance with an approved method that is protective of human health, safety, and welfare, and of the environment.

(*l*) For a cleanup conducted under (b)(1) of this section, a chemical that is detected at one-tenth or more of the Table C value must be included when calculating cumulative risk under 18 AAC 75.325(g). (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165; am 10/9/2008, Register 188; am 6/17/2015, Register 214; am 11/6/2016, Register 220; am 9/29/2018, Register 227)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.010
AS 46.03.710 AS 46.04.020 AS 46.09.020

Editor's note: *Standard Methods for the Examination of Water and Wastewater*, adopted by reference in 18 AAC 75.345, may be purchased from the American Water Works Association at http://www.awwa.org/store.aspx or by contacting the organization at service@awwa.org or (800) 926-7337. The document also may be viewed at the department's Anchorage, Fairbanks, Juneau, and Soldotna offices.

18 AAC 75.350. Groundwater use. Subject to 18 AAC 75.345(c), groundwater at the site is considered to be a drinking water source unless a responsible person demonstrates or the department determines that

(1) the groundwater is not

(A) used for a private or public drinking water system;

(B) within the zone of contribution of an active private or public drinking water system; or

(C) within a recharge area for a private or public drinking water well, a wellhead protection area, or a sole source aquifer;

(2) the groundwater is not a reasonably expected potential future source of drinking water, based on an evaluation of

(A) the availability of the groundwater as a drinking water source, including depth to groundwater, the storativity and transmissivity of the aquifer, the presence of permafrost, and other relevant information;

(B) actual or potential quality of the groundwater, including organic and inorganic substances, and as affected by background, saltwater intrusion, and known or existing areawide contamination;

(C) the existence and enforceability of institutional controls described in 18 AAC 75.375 or municipal ordinances or comprehensive plans that prohibit or limit access to the groundwater for use as drinking water;

(D) land use of the site and neighboring property, using the factors in EPA's *Land Use in the CERCLA Remedy Selection Process*, adopted by reference in 18 AAC 75.340;

(E) the need for a drinking water source and the availability of an alternative source; and

(F) whether the groundwater is exempt under 40 C.F.R. 146.4, revised as of July 1, 1997, and adopted by reference; and

(3) the groundwater affected by the hazardous substance will not be transported to groundwater that is a source of drinking water, or that is a reasonably expected potential future source of drinking water, in concentrations in the receiving groundwater that exceed the groundwater cleanup levels; in reviewing the demonstration required under this paragraph, the department will consider

(A) the areal extent of the affected groundwater;

(B) the distance to any existing or reasonably anticipated future water supply well;

(C) the likelihood of an aquifer connection due to well construction practices in the area where the site is located;

(D) the physical and chemical characteristics of the hazardous substance;

(E) the hydrogeological characteristics of the site;

(F) the presence of discontinuities in the affected geologic stratum at the site;

(G) the local climate;

(H) the degree of confidence in any predictive modeling performed; and

(I) other relevant information; the department will request additional information if the department determines that the information is necessary to protect human health, safety, or welfare, or the environment. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020
AS 46.03.710 AS 46.04.020

18 AAC 75.355. Sampling and analysis. (a) Unless the department determines that final confirmation sampling is not needed to meet the requirements of the site cleanup rules, a responsible person shall submit a sampling and analysis plan for approval under 18 AAC 75.360, and after implementing the plan, shall submit the analytical sampling results collected to the department. If approved in the sampling and analysis plan, sample collection for soil or water may be performed by a qualified sampler when a qualified environmental professional is not available. Based on the results of the analyses, a responsible person shall demonstrate compliance with the site cleanup rules.

(b) A responsible person and the owner or operator of an offsite or portable treatment facility under 18 AAC 75.365 shall ensure that the collection, interpretation, and reporting of data, and the required sampling and analysis is conducted or supervised by a qualified environmental professional.

(c) If a hazardous substance is suspected at the site because of empirical evidence or prior analysis, but is not detected or is detected at a concentration below the limit of quantitation, and the limit of quantitation is higher than the cleanup level for that substance,

(1) the department will determine the responsible person to have attained the cleanup level if the limit of quantitation or limit of detection is equal to or no greater than the limit of quantitation or limit of detection achieved by a laboratory approved for that method by the department under 18 AAC 78.800 – 18 AAC 78.815; and

(A) repealed 9/29/2018; or

(B) repealed 9/29/2018;

(2) if the department determines that additional action is necessary to ensure protection of human health, safety, or welfare, or of the environment, the department will require one or more of the following:

(A) use of a surrogate measure to estimate the concentration of the hazardous substance;

(B) use of a specialized sample collection or analytical method to improve the accuracy, precision, limit of detection, or limit of quantitation for the hazardous substances at the site; or

(C) monitoring to ensure that the concentration of the hazardous substance does not exceed quantitatable levels; and

(3) and if the department determines that an improved analytical method or other responsive action is necessary to ensure protection of human health, safety, or welfare, or of the environment, the department will, before site closure and if the site is in a monitoring stage, periodically consider whether improved analytical methods should be used at the site and will require the use of an improved analytical method or other responsive action.

(d) Analysis for petroleum contamination must follow the applicable Alaska methods for petroleum hydrocarbons referred to in Table 1 of Chapter 2 of the *Underground Storage Tanks Procedures Manual*, dated March 22, 2017. Table 1 of Chapter 2 and Appendices C and D of the *Underground Storage Tanks Procedures Manual*, dated March 22, 2017 are adopted by reference.

(e) Laboratory analysis under the site cleanup rules must be performed by a laboratory approved by the department under 18 AAC 78.800 - 18 AAC 78.815. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165; am 6/17/2015, Register 214; am 9/29/2018, Register 227)

Authority: AS 44.46.025 AS 46.03.710 AS 46.04.020
AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020

Editor's note. The document adopted by reference in 18 AAC 75.355 may be viewed at or obtained from the department's offices in Anchorage, Fairbanks, Juneau, and Soldotna, or the department's Internet website at http://dec.alaska.gov/spar/csp/guidance-forms.

18 AAC 75.360. Cleanup operation requirements. A responsible person shall ensure that site cleanup is conducted or supervised by a qualified environmental professional. A responsible person shall submit each of the following elements for approval before work on that element begins, and for additional approval if a modification to an element is anticipated:

(1) a schedule for conducting field work, monitoring, cleanup, and submittal of interim and final cleanup reports;

(2) a sampling and analysis plan that meets the requirements of 18 AAC 75.355;

(3) a waste management plan for handling, transporting and disposing of investigation-derived wastes, including

(A) purged water from a boring or monitoring well;

(B) cuttings, mud, and other wastes from well or boring installation and development; and

(C) contaminated equipment and materials;

(4) a cleanup plan that includes

(A) provisions for the cleanup of soil and groundwater contaminated at levels exceeding the applicable cleanup levels determined under the site cleanup rules;

(B) detailed specifications for each cleanup technique that the department has approved under 18 AAC 75.335(c) - (d);

(C) provisions for minimizing hazardous substance migration to previously unaffected areas;

(D) provisions for transporting contaminated soil as a covered load in compliance with 18 AAC 60.015; and

(E) provisions for the disposal of contaminated soil and groundwater, including the location and method of disposal;

(5) a list of chemical additives proposed for use and their potential effects on

(A) the hazardous substances at the site; and

(B) human health, safety, and welfare, and the environment;

(6) a site control plan, if necessary to protect human health, safety, or welfare, or the environment, including engineering measures, such as the installation of caps and liners, and provisions for restricting access, such as the use of fences, signs, or other barriers;

(7) a demonstration that site work and the cleanup action will comply with the air quality standards and requirements of 18 AAC 50;

(8) a plan for ensuring that contaminated soil does not come in contact with uncontaminated soil during the cleanup process, except under an approved cleanup plan under this subsection or an approved operations plan under 18 AAC 75.365;

(9) a nondomestic wastewater system plan under 18 AAC 72.600, if the cleanup operation requires construction, alteration, installation, modification, or operation of a nondomestic wastewater treatment works or disposal system; and

(10) the additional elements required under 18 AAC 75.365, as applicable;

(11) for ex-situ cleanup techniques,

(A) provisions for containment and handling of leachate, if leachate is produced;

(B) provisions for storing contaminated soil in compliance with the requirements of 18 AAC 75.370;

(C) if using a hot asphalt batch plant, written certification by a registered engineer that processes incorporating contaminated soils meet current industry standards for asphalt paving; and

(D) if combining contaminated soil with asphalt for the purpose of cold asphalt recycling;

(i) a pavement structure design study for incorporating the excavated material; the study must be certified by a registered engineer;

(ii) the leaching assessment or model proposed for use in determining hazardous substance migration; and

(iii) results of the approved hazardous substance leaching assessment or model, referenced under (ii) of this subparagraph; those results must demonstrate that hazardous substance concentrations in the soil will not migrate;

(E) if using bioremediation, a detailed description of

(i) cultured microbes, unless using an indigenous microbe population;

(ii) electron acceptor and nutrient source for microbes;

(iii) the expected rate of biodegradation;

(iv) intermediate and final breakdown products;

(v) type and amount of contamination;

(vi) any potential adverse effect on human health, safety, or welfare, or on the environment; and

(vii) other information requested by the department; the department will request additional information if it determines that the information is necessary to ensure protection of human health, safety, or welfare, or of the environment;

(F) if using solidification, a solidification report that includes

(i) a demonstration that hazardous substance concentrations in the solidified material will not migrate;

(ii) results of structural testing on the solidified material to demonstrate that the solidified material has an unconfined compressive strength of 2,000 psi or more after 28 days;

(iii) results of leachability testing of the solidified material; and

(iv) specifications for the ratio of the mass of contaminated soil to the mass of reagent;

(G) if using soil contaminated with petroleum hydrocarbons or metals as a base for a physical barrier,

(i) a demonstration that the contaminated soil that is used for the base will be blended with uncontaminated soil only if necessary to meet design specifications;

(ii) a physical barrier design study, certified by a registered engineer;

(iii) the leaching assessment or model proposed for use in determining hazardous substance migration;

(iv) results of the approved leaching assessment or model referenced under (iii) of this subparagraph; those results must demonstrate that hazardous substance concentrations in the soil will not migrate;

(v) a demonstration that the base for a physical barrier will use no more than 18 vertical inches of material containing contaminated soil;

(vi) a demonstration that the contaminated zone will be compacted to 95 percent or more of the maximum density as specified in American Society for Testing and Materials (ASTM) D 1557-07, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort*, updated November 2007 and adopted by reference or ASTM D 4253-00, *Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table*, updated March 2006 and adopted by reference;

(vii) a demonstration that the material containing contaminated soil will be placed in a zone directly beneath the final base course with at least 18 inches of impervious pavement extending beyond the horizontal limit of the material containing contaminated soil;

(viii) a demonstration that at least six feet will separate the seasonal high groundwater point from the lowest point of material containing contaminated soil; and

(ix) as-built drawings, certified by a registered engineer, that show the final location of material containing contaminated soil; and

(12) for in-situ cleanup techniques,

(A) a site monitoring plan showing proposed locations of monitoring wells;

(B) a hydrogeologic description of the site, including

(i) soil and sediments present;

(ii) stratigraphy;

(iii) aquifer characteristics, including groundwater gradient, confining layers, perched water, permeability, and aquifer transmissivity;

(iv) percolation rates from precipitation; and

(v) other relevant factors;

(C) results of hydrogeologic modeling performed to address capture zones, effects of hydraulic loading, and plume migration; and

(D) if using bioremediation, a demonstration of compliance with (11)(E) of this section. (Eff. 1/22/99, Register 149; am 10/9/2008, Register 188; am 6/17/2015, Register 214)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.020
AS 46.03.050 AS 46.03.745 AS 46.04.070
AS 46.03.710 AS 46.03.822 AS 46.09.020

Editor's note: The ASTM methods adopted by reference in 18 AAC 75.360 may be reviewed at the department's Anchorage, Fairbanks, Juneau, and Soldotna offices, and may be obtained from the ASTM International, Publications Department, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, Pennsylvania 19428-2959; telephone (610) 832-9585; fax (610) 832-9555.

As of Register 204 (January 2013), the regulations attorney made a technical revision under AS 44.62.125(b)(6), to 18 AAC 75.360(4)

18 AAC 75.365. Offsite or portable treatment facilities. (a) A person who owns or operates an offsite or portable treatment facility shall

(1) obtain approval of an operations plan before that person accepts or treats contaminated soil; the department will approve the plan if the department determines that the operations proposed in the plan are protective of human health, safety, and welfare, and of the environment; a plan submitted under this paragraph must include

(A) a facility diagram that shows the location of

(i) each soil treatment, storage, and transportation area;

(ii) major roads within or bordering the site or facility; and

(iii) monitoring wells, surface water, water supply wells, facility boundaries, and public or private buildings within 500 feet of the facility boundary;

(B) a detailed process description, including a discussion of

(i) air, water, and solid waste process streams;

(ii) startup and shutdown procedures;

(iii) maximum process flow rate;

(iv) air pollution control equipment;

(v) water treatment systems;

(vi) the projected maximum time necessary for the treatment method to achieve soil cleanup levels for contaminated soil; and

(vii) a detailed description of any additive to be used;

(C) a post-treatment sampling and analysis plan prepared by a qualified environmental professional in accordance with 18 AAC 75.355(b) to verify that the applicable cleanup levels have been met;

(D) provisions for complete containment of the contaminated soil before, during, and after treatment until the contaminated soil meets the applicable cleanup levels; alternatively, if the treatment process, such as landfarming or landspreading, will not contain the contaminated soil, the person who owns or operates the offsite or portable treatment facility must demonstrate that there will be no uncontrolled leachate from the treatment area;

(E) for an offsite treatment facility classified as a Category C or Category D facility, as described in the department's *Operation Requirements for Soil Treatment Facilities*, dated March 15, 2013, engineering plans and engineering record drawings for contaminated soil and water containment structures; the *Operation Requirements for Soil Treatment Facilities*, dated March 15, 2013, is adopted by reference; and

(F) site monitoring procedures that will measure for secondary contamination at the treatment facility;

(2) if the facility is a Category C or Category D facility, as described in the *Operation Requirements for Soil Treatment Facilities*, adopted by reference in (1) of this subsection, submit the following to the department before the owner or operator accepts or treats contaminated soil:

(A) proof of a performance bond or other approved means of fiscal responsibility that will provide the department with a source of funds to clean up contaminated soils that have been received for treatment if the facility operator fails to treat the contaminated soils in accordance with this chapter; a performance bond must be executed by an insurance company licensed in the state and include a bond amount that will cover cleanup of the contaminated soils at the treatment facility; the bond shall be based on

(i) the quantity of contaminated soil allowed at the facility specified in the facility’s approved operation plan; and

(ii) the cost per ton for treating contaminated soil at that facility location; and

(B) proof of pollution liability insurance that will provide the department with a source of funds to clean up secondary contamination at the facility property that is caused by the soil treatment facility during soil treatment operations;

(3) perform confirmation sampling of treated soil in accordance with a sampling and analysis plan approved under this subsection to verify that applicable cleanup levels have been met;

(4) submit to the department an assessment of background contamination at the facility before initial startup of the treatment facility; and

(5) submit to the department within 90 days after terminating operation of the treatment facility, a closure assessment demonstrating that secondary contamination did not occur at the facility; if secondary contamination did occur at the facility, the owner or operator of the portable treatment facility shall perform a cleanup of the contamination by in-situ or ex-situ treatment within two years after terminating operation.

(b) If the owner or operator of an offsite or portable treatment facility fails to process soils to the department's satisfaction in accordance with the operations plan approved under (a)(1) of this section, the department will withdraw approval under (a)(1) of this section, and that owner or operator may not process or receive contaminated soil.

(c) For purposes of this section

(1) "engineering plans" means a set of plans approved and sealed by a registered engineer;

(2) "engineering record drawings" means the approved original plans prepared for construction and department approval under (a)(1) of this section, revised to reflect how the containment structure or system was constructed or installed, and sealed by a registered engineer;

(3) "facility" has the meaning given in AS 46.03.900; "facility" includes the land, structures, and equipment associated with treatment of contaminated soil;

(4) "offsite or portable treatment facility" has the meaning given in the *Operation Requirements for Soil Treatment Facilities*, adopted by reference in (a)(1) of this section;

(5) "owner or operator" has the meaning given to "owner" and "operator" in AS 46.03.826;

(6) "performance bond" means a written agreement between the owner or operator and the department guaranteeing performance of the obligations covered by the agreement;

(7) "registered engineer" means a professional engineer registered to practice in the state under AS 08.48. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 1/30/2003, Register 165; am 6/17/2015, Register 214)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020
AS 46.03.710 AS 46.04.020

Editor's note: The department's *Operation Requirements for Soil Treatment Facilities,* adopted by reference in 18 AAC 75.365(a)(1), may be viewed at or obtained from the department's offices in Anchorage, Fairbanks, Juneau, and Soldotna, or the department's Internet website at http://dec.alaska.gov/spar/csp/guidance-forms.

18 AAC 75.370. Soil storage and disposal. (a) Unless the department approves the activity in question as protective of human health, safety, and welfare, and of the environment, a responsible person may not blend contaminated soil with uncontaminated soil and shall

(1) segregate contaminated soil based on

(A) the intended cleanup alternatives; and

(B) the specific hazardous substance present;

(2) store contaminated soil

(A) 100 feet or more from surface water, a private water system, or a fresh water supply system that uses groundwater for a use designated in 18 AAC 70.020(a)(1)(A) and 18 AAC 70.050(2); and

(B) 200 feet or more from a water source serving a community water system, a non-transient non-community water system, or a transient non-community water system, as defined in 18 AAC 80.1990;

(3) place contaminated soil on a liner or on or within another impermeable surface that prevents soil and groundwater beneath the liner from becoming contaminated;

(4) place petroleum-contaminated soil on a liner that meets the minimum specifications for the testing methods set out in Table D of this section;

TABLE D. BOTTOM LINER SPECIFICATIONS

Method	Coated Fabric	Extruded Fabric
Short-term storage of petroleum-contaminated soil (less than 180 days)		
Cold crack (ASTM D 2136-02(2012), updated 2012)	-60° Fahrenheit	-60° Fahrenheit
Black carbon content (ASTM D 1603-14, updated 2014)	two percent or greater	two percent or greater
Tensile strength (ASTM D 751-06(2011), updated 2011)	125 pounds (warp)	N/A
Mullen burst (ASTM D 751-06(2011), updated 2011)	250 pounds per square inch (psi)	N/A
One inch tensile strength (ASTM D 882-12, updated August 2012)	N/A	25 pounds (warp)
One inch elongation MD (machine direction)	N/A	550 percent
Nominal thickness	10 mil	10 mil
Oil resistance (ASTM D 471-12a, updated December 2012)	No signs of deterioration and more than 80 percent retention of tensile and seam strength after immersion for 30 days at 73° Fahrenheit	No signs of deterioration and more than 80 percent retention of tensile and seam strength after immersion for 30 days at 73° Fahrenheit
Long-term storage of petroleum-contaminated soil (180 days to two years)		
Cold crack (ASTM D 2136-02(2012), updated 2012)	-60° Fahrenheit	-60° Fahrenheit
Black carbon content (ASTM D 1603-12, updated May 2012)	two percent or greater	two percent or greater
Tensile strength (ASTM D 751-06(2011), updated 2011)	300 pounds (warp)	N/A
Mullen burst (ASTM D 751-06(2011), updated May 2011)	500 pounds per square inch (psi)	N/A
One inch tensile strength (ASTM D 882-12, updated August 2012)	N/A	45 pounds (warp)
One inch elongation MD (machine direction)	N/A	625 percent
Nominal thickness	20 mil	20 mil
Oil resistance (ASTM D 471-12a, updated December 2012)	No signs of deterioration and more than 80 percent retention of tensile and seam strength after immersion for 30 days at 73° Fahrenheit	No signs of deterioration and more than 80 percent retention of tensile and seam strength after immersion for 30 days at 73° Fahrenheit
The ASTM International methods referred to in this table are adopted by reference. "N/A" means not applicable.		

(5) place nonpetroleum contaminated soil on a liner compatible with the type of hazardous substance, and meet the general strength and thickness requirements of Table D;

(6) cover and protect the contaminated soil stockpile from weather with no less than a six-mil, reinforced polyethylene liner or its equivalent, with the edge of the cover lapped over the bottom liner to prevent water running through the soil; and

(7) inspect and maintain the contaminated soil stockpile regularly to ensure that the cover remains intact and that the soil and any liquid leachate derived from the soil is contained.

(b) A responsible person, owner, or operator shall obtain approval before moving or disposing of soil subject to the site cleanup rules. (Eff. 1/22/99, Register 149; am 8/27/2000, Register 155; am 10/9/2008, Register 188; am 6/17/2015, Register 214; am 11/6/2016, Register 220)

Authority: AS 46.03.020 AS 46.03.740 AS 46.04.070
AS 46.03.050 AS 46.03.745 AS 46.09.020
AS 46.03.710 AS 46.04.020

Editor's note: The ASTM International methods adopted by reference in Table D of 18 AAC 75.370(a) may be reviewed at the department's Anchorage, Fairbanks, Juneau, and Soldotna offices, or may be obtained from the ASTM International, Publications Department, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, Pennsylvania 19428-2959; telephone (610) 832-9585; fax (610) 832-9555 or www.astm.org.

As of Register 215 (October 2015), the regulations attorney made technical corrections under AS 44.62.125(b)(6), to 18 AAC 75.370(a), Table D.

18 AAC 75.375. Institutional controls. (a) The department will, after consultation with each landowner of the site, determine that the use of an institutional control is necessary, on a site-specific basis, if the department determines that controls are required to ensure

(1) compliance with an applicable cleanup level;

(2) protection of human health, safety, or welfare, or the environment; or

(3) the integrity of site cleanup activities or improvements.

(b) Institutional controls include

(1) the requirement for and maintenance of physical measures, such as fences and signs, to limit an activity that might interfere with cleanup or result in exposure to a hazardous substance at the site;

(2) the requirement for and maintenance of engineering measures, such as liners and caps, to limit exposure to a hazardous substance;

(3) restrictive covenants, easements, deed restrictions, or other measures that would be examined during a routine title search, and that limit site use or site conditions over time or provide notice of any residual contamination; and

(4) a zoning restriction or land use plan by a local government with land use authority.

(c) The use of institutional controls must, to the maximum extent practicable, be

(1) appurtenant to and run with the land so that the control is binding on each future owner of the site; and

(2) maintained by each responsible person or owner of the site.

(d) If the department determines any of the following are necessary to protect human health, safety, or welfare, or the environment, the department will require that institutional controls be designed to accomplish one or more of the following:

(1) prohibit activities on the site that might interfere with the site cleanup, operation and maintenance, monitoring, or other response actions;

(2) prohibit activities that might result in the release of a hazardous substance that was contained as a part of the site cleanup activities;

(3) require written notice to the department of any proposal to use the site in a manner that is inconsistent with a restrictive covenant or other measure described in (b)(3) of this section; and

(4) grant the department and its designated representatives the right to enter the property at reasonable times to evaluate compliance with the institutional control, including the right to take samples, inspect any cleanup actions taken at the site, and inspect records relating to the operation and maintenance of the institutional control.

(e) If the department determines that financial assurance is necessary to ensure protection of human health, safety, or welfare, or of the environment, the department will require a responsible person to provide financial assurance sufficient to cover costs of operation and maintenance, including compliance monitoring and corrective measures, for any institutional control.

(f) If the concentrations of all residual hazardous substances remaining at the site are subsequently determined to be below the levels that allow for unrestricted use, the department will approve elimination of the institutional control. (Eff. 1/22/99, Register 149; am 10/9/2008, Register 188)

Authority: AS 46.03.020 AS 46.03.050 AS 46.03.710 AS 46.03.740 AS 46.03.745 AS 46.04.020 AS 46.04.070 AS 46.04.110 AS 46.09.060 AS 46.09.070

18 AAC 75.380. Final reporting requirements and site closure. (a) A responsible person shall submit a written final cleanup report to the department for each site undergoing cleanup under the site cleanup rules. The report must be prepared by a qualified environmental professional.

(b) The written report required by (a) of this section must contain, as applicable,

(1) the date and time of the discharge or release;

(2) the location of the discharge or release, including latitude and longitude coordinates;

(3) the name and physical address of the site, facility, or operation;

(4) the name, mailing address, and telephone number of the owner and of the operator of the site, facility, or operation;

(5) the type and amount of each hazardous substance discharged or released;

(6) a description of environmental damage caused by the discharge, release, or containment, to the extent the damage can be identified;

(7) a demonstration that the free product was recovered in compliance with 18 AAC 75.325(f)(1)(B) and that provides, at a minimum, the following information:

(A) the estimated amount, type, and thickness of free product observed or measured in wells, boreholes, and excavations;

(B) the type of free product recovery system used;

(C) whether a discharge or release has occurred or will occur at the site or offsite during the recovery operation and where the discharge or release occurred or will occur;

(D) the type of treatment applied to, and the effluent quality resulting or expected from, any substance that has been discharged or released or will be discharged or released;

(E) whether a discharge or other permit was required under local, state, or federal law and if each required permit was obtained;

(F) the date, location, and method of disposal of the recovered free product, dissolved phase product, or contaminated soil; and

(G) whether free product remains at the site, and, if so, the estimated quantity;

(8) a summary of each applicable soil and groundwater cleanup level approved under the site cleanup rules and a description of the factors used in determining each applicable cleanup level;

(9) a description of cleanup actions taken, including

(A) a demonstration that cleanup was conducted in accordance with the elements, including modifications to the elements, approved under 18 AAC 75.360;

(B) sampling reports and a description of the soil and groundwater sampling protocol and sampling locations;

(C) a summary of the laboratory reports for the final verification samples collected at the site; the laboratory or a responsible person shall keep those reports and make them available to the department upon request for at least 10 years after submission of the summary to the department;

(D) a detailed explanation of what was done if a sample exceeded the applicable required cleanup level;

(E) a demonstration that contaminated soil and groundwater were stored, treated, and disposed of in an approved manner;

(F) an estimate of the extent of any remaining residual contamination, above and below the applicable cleanup levels;

(G) a demonstration that surface soil staining was evaluated and that a cleanup of that staining was performed;

(H) whether permits were required under local, state, or federal law and if each required permit was obtained;

(I) confirmation that any hazardous waste generated was stored, treated, or disposed of in compliance with 42 U.S.C. 6901 - 6992k (Solid Waste Disposal Act, as amended by Resource Conservation Recovery Act), as amended through January 6, 2003 and adopted by reference; and

(J) other information requested by the department, as the department determines necessary to ensure protection of human health, safety, or welfare, or of the environment;

(10) a demonstration of compliance with applicable institutional control requirements under 18 AAC 75.375.

(11) cumulative risk calculations.

(c) The department will determine final compliance with the

(1) applicable soil cleanup levels, based on sampling results from onsite contaminated soil and from contaminated soil moved offsite for treatment or disposal, calculated and presented on a per dry weight basis and based on the maximum concentrations detected, unless the department approves an appropriate statistical method, in which case compliance will be based on the mean soil concentration at the 95th percent upper confidence limit; approval of a statistical method will be based on

(A) the number and location of samples taken;

(B) whether large variations in hazardous substance concentrations relative to the mean concentration exist; and

(C) whether a large percentage of concentrations are below the method detection limit; and

(2) groundwater cleanup levels, based on an analysis of unfiltered groundwater samples unless a responsible person demonstrates that a filtered sample provides a more representative measure of groundwater quality; the department will determine compliance based on the maximum concentrations of a hazardous substance detected in the final confirmation samples; before closure, the size of the dissolved plume must be steady state or shrinking and concentrations of the hazardous substance must be decreasing.

(d) After reviewing the final cleanup report submitted under this section, if the department determines that

(1) a site has been adequately characterized under 18 AAC 75.335 and has achieved the applicable requirements under the site cleanup rules, the department will issue a written determination that the cleanup is complete, subject to a future department determination that the cleanup is not protective of human health, safety, or welfare, or of the environment; or

(2) the cleanup and applicable institutional controls are not protective of human health, safety, or welfare, or of the environment, the department will, as necessary to ensure protection of human health, safety, or welfare, or of the environment, require a responsible person to conduct additional actions that meet the requirements of the site cleanup rules. (Eff. 1/22/99, Register 149; am 10/9/2008, Register 188; am 6/17/2015, Register 214)

Authority: AS 46.03.020 AS 46.03.050 AS 46.03.710 AS 46.03.740 AS 46.03.745 AS 46.03.755 AS 46.04.020 AS 46.04.070 AS 46.09.010 AS 46.09.020

18 AAC 75.385. Appeals. A person aggrieved by a final department decision 18 AAC 75.380 or a final department decision revoking an approval under the site cleanup rules may request informal review under 18 AAC 15.185 or may request an adjudicatory hearing under 18 AAC 15.195 - 18 AAC 15.340. (Eff. 1/22/99, Register 149; am 7/11/2002, Register 163; am 1/30/2003, Register 165; am 11/7/2017, Register 224)

Authority: AS 46.03.020 AS 46.35.090 AS 46.04.890

18 AAC 75.390. Waiver or modification. (a) Except as provided in (b) of this section, and if the department determines that a waiver or modification will be protective of human health, safety, and welfare, and of the environment, the department will waive or modify the site cleanup rules based on a review of the quantity or concentration of the discharge or release, soil and groundwater conditions, surface water and topography, geology, water and land use, construction methods and materials, and any other human health or environmental factor important to the evaluation. A responsible person seeking a waiver or modification of a provision of the site cleanup rules under this section shall submit a written report to justify the request and to demonstrate that the waiver or modification is protective of human health, safety, and welfare, and of the environment. A qualified environmental professional shall prepare and sign the report submitted under this section.

(b) For purposes of the site cleanup rules, the department will waive on a site-specific basis the requirement in 18 AAC 75.333(b)(1) that a qualified environmental professional be an impartial third party or the requirement in 18 AAC 75.333(c)(1) that a qualified sampler be an impartial third party if

(1) a responsible person, or if the waiver is for an offsite or portable treatment facility under 18 AAC 75.365, a responsible person, owner, or operator

(A) who seeks a waiver from 18 AAC 75.333(b)(1) demonstrates that work performed will be conducted or supervised by an objective individual who meets the requirements of 18 AAC 75.333(b)(2) - (5);

(B) who seeks a waiver from 18 AAC 75.333(c)(1) demonstrates that work performed will be conducted or supervised by an objective individual who meets the requirements of 18 AAC 75.333(c)(2) - (5); and

(C) submits

(i) a written request for a waiver;

(ii) the resume of the person qualified to conduct or supervise the work to be performed, showing relevant education, vocational training, related work experience, and any special training, license, certificate, or registration held by that person; and

(iii) a description of the supervisory and organizational structure related to the person identified in (ii) of this subparagraph; and

(2) the department determines that a waiver is protective of human health, safety, and welfare, and of the environment, and that strict compliance with the impartial third party requirement is not practicable. (Eff. 1/22/99, Register 149; am 6/17/2015, Register 214)

Authority: AS 46.03.020 AS 46.03.745 AS 46.09.010
AS 46.03.050 AS 46.03.755 AS 46.09.020
AS 46.03.710 AS 46.04.070

18 AAC 75.395. Interference with cleanup prohibited. A person may not interfere with, hinder, or obstruct the containment or cleanup of a hazardous substance conducted under this chapter. This prohibition does not apply to the United States Coast Guard or EPA. (Eff. 1/22/99, Register 149)

Authority: AS 46.03.020 AS 46.04.070 AS 46.09.020
AS 46.04.020

18 AAC 75.396. Local control. Subject to AS 29.35.020, AS 46.04.110, and AS 46.09.060, the requirements of 18 AAC 75.300 - 18 AAC 75.390 do not preempt local control that is as stringent as, or more stringent than, those requirements, and that is consistent with a regional master plan prepared under AS 46.04.210. (Eff. 1/22/99, Register 149)

Authority: AS 46.03.020 AS 46.04.210 AS 46.09.060
AS 46.04.110

Article 4. Oil Discharge Prevention and Contingency Plans and Nontank Vessel Plans.

Section

400. Applicability
405. Pre-application notification and consultation for oil discharge prevention and contingency plans; new plans and plan renewals
408. General procedures to apply for oil discharge and contingency plans
410. Procedures to apply for oil discharge prevention and contingency plans; new plans
412. (Repealed)
413. (Repealed)
414. Procedures to apply for oil discharge prevention and contingency plans; owner and operator changes
415. Procedures to apply for oil discharge prevention and contingency plans; plan amendments
420. Procedures to apply for oil discharge prevention and contingency plans; plan renewals
421. Procedures to apply for nontank vessel streamlined oil discharge prevention and contingency plans
425. Oil discharge prevention and contingency plan contents
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427. (Repealed)
428. Response planning facilitator
430. Response planning standards
432. Response planning standards for oil terminal facilities
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436. Response planning standards for crude oil pipelines
438. Response planning standards for crude oil tank vessels and barges
440. Response planning standards for noncrude oil tank vessels and barges
441. Response planning standards for nontank vessels
442. Response planning standards for multiple operations
443. (Repealed)
445. Approval criteria for oil discharge prevention and contingency plans
446. (Repealed)
447. Department examination of new technologies
455. Department review procedures for oil discharge prevention and contingency plans; new plans, plan renewals, and major plan amendments
456. Department decision on nontank vessel streamlined oil discharge prevention and contingency plans
457. Emergency modification of review process
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460. Department decision on oil discharge prevention and contingency plans; new plans, plan renewals, and major plan amendments
465. Proof of approved plan
470. Transfers between plan holders
475. Notification of nonreadiness
480. Inspections
485. Discharge exercises
490. Failure to comply
495. Regional master discharge prevention and contingency plan boundaries
496. Regional response operations plan boundaries for nontank vessels

18 AAC 75.400. Applicability. (a) A person who is subject to AS 46.04.030 or AS 46.04.055(j) must file an application for approval of an oil discharge prevention and contingency plan as required under 18 AAC 75.400 - 18 AAC 75.420 and meet the applicable requirements of 18 AAC 75.425 - 18 AAC 75.495. A person who is subject to AS 46.04.055(f) must file an application for approval of a nontank vessel plan as required under 18 AAC 75.400 – 18 AAC 75.421 and meet the applicable requirements of 18 AAC 75.426 – 18 AAC 75.496. The application must be made

(1) for an oil terminal facility that has a storage capacity of 5,000 barrels or more of crude oil or 10,000 barrels or more of noncrude oil as provided in AS 46.04.050(a), by the owner or operator of the facility;

(2) for a vessel, by

(A) the charterer, if the vessel is chartered by demise;

(B) the operator of the vessel;

(C) the owner of the vessel, if the agents or employees of the owner retain control and responsibility for the operation of the vessel; or

(D) in any other case, the person with primary operational control;

(3) for an exploration or production facility, whether mobile or fixed, by the lease holder or the operator;

(4) for a pipeline, by the lease holder or the operator; or

(5) for a railroad tank car, by the railroad transporting the railroad tank car.

(b) If it determines that an exemption will be protective of human health, safety, and welfare, and of the environment, the department will exempt from the requirements of AS 46.04.030(c) and 46.04.055(f), a vessel that is conducting, or is available only for conducting, an oil discharge response operation. A person seeking an exemption under this subsection must apply on an application form supplied by the department. The department will approve or deny the request for an exemption not later than 10 working days after it receives an application. In an emergency response to an actual discharge, a person seeking an exemption may make a verbal request, and the department may issue a verbal approval. The department will confirm a verbal approval in writing, stating the period during which the approval is valid.

(c) The owner or operator of an oil terminal facility that is subject to the requirements of AS 46.04.030 and 18 AAC 75.400 - 18 AAC 75.495 may apply for an exemption to those requirements upon proof to the department that the effective storage capacity of the facility has been permanently reduced below the amounts set out in AS 46.04.050. For purposes of reducing effective storage capacity, tanks and associated piping must be emptied and rendered unusable to the department's satisfaction. Tanks removed from service must be clearly marked with the words “Out of Service” and the date taken out of service. A person seeking an exemption under this subsection must apply on an application form supplied by the department. The department will approve or deny the request for an exemption not later than 30 days after it receives an

application. Before reactivation of a tank that has been removed from service for the purposes of an exemption under this subsection, the owner or operator must notify the department and, if necessary, must file a new application for approval of an oil discharge prevention and contingency plan. For the purpose of changes to the storage capacity of a tank, any change must be made in a permanent manner. The department will conduct inspections as necessary to ensure compliance with this subsection.

(d) The department may accept a single plan from an operator to address multiple facilities based on similarities in operations, receiving environments, logistical consideration, or other factors indicating to the satisfaction of the department that a single plan is appropriate given the commonality of operations.

(e) The requirements of this section do not apply to a nontank vessel operating in the waters of the state if the nontank vessel is entering waters of the state under circumstances determined by the department to be necessary under AS 46.04.055(e). A person shall notify the department as soon as the person is aware of circumstances warranting a nontank vessel to enter state waters without an approved plan.

(f) A natural gas production or natural gas terminal facility as defined in AS 46.04.050(b) is not required to submit an oil discharge prevention and contingency plan application.

(g) An exploration facility meeting the natural gas exploration facility exemption provisions of AS 46.04.050(c) is not required to submit an oil discharge prevention and contingency plan application.

(h) An oil discharge prevention and contingency plan is required for

(1) an oil terminal facility, except for a vessel operating as an oil terminal facility, until the storage capacity of the facility has been permanently reduced as set out in (c) of this section;

(2) a pipeline, while the pipeline

(A) is connected to a production facility or oil terminal facility; or

(B) contains oil;

(3) an exploration or production facility until the Alaska Oil and Gas Conservation Commission determines that all wells have been plugged as required under 20 AAC 25.112 and abandoned as required under 20 AAC 25.105; and

(4) a vessel while in the waters of the state.

(i) In this section, “receiving environment” means fresh or marine water, ice, or land outside of an impermeable secondary containment area. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 12/14/ 2002, Register 164; am 5/26/2004, Register 170; am 4/16/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.050 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.405. Pre-application notification and consultation for oil discharge prevention and contingency plans; new plans and plan renewals. (a) At least 60 days before submitting an application for approval of a new oil discharge prevention and contingency plan under 18 AAC 75.410 or for renewal of approval under 18 AAC 75.420, the applicant must notify the department in writing of its intent to submit an application. An electronic mail or facsimile transmission delivered to the appropriate department office will be considered written notice for purposes of this subsection.

(b) The applicant must consult with the department not later than 30 days before submitting the application package to ensure that the application meets the requirements of 18 AAC 75.408 and the requirements of 18 AAC 75.410 or 18 AAC 75.420, to discuss the contents of the proposed plan, and to discuss the review process under 18 AAC 75.455.

(c) Pre-application notification and consultation is not required for a nontank vessel streamlined application submitted under 18 AAC 75.421. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.050 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.408. General procedures to apply for oil discharge and contingency plans. (a) An application for approval of an oil discharge prevention and contingency plan must contain

(1) an application form supplied by the department containing

(A) the applicant's legal name, address, and telephone number;

(B) the name, location, and type of facility or operation covered by the plan;

(C) for a vessel, the vessel's name, official number, and country of registry, the name and address of the owner, and the name and address of the operator;

(D) for a railroad tank car, the name of the railroad covered by the plan;

(E) the scheduled date for the operations covered by the plan to begin; and

(F) any other information on the application form that is applicable to the facility or operation;

(2) a copy of the plan or amendment to the plan as applicable; and

(3) supporting documentation as requested by the department.

(b) The application form must be signed as follows:

(1) for a corporation, by a principal executive officer of at least the level of vice president or that officer's authorized representative, if the representative is responsible for the overall management of the project or operation;

(2) for a partnership, by a general partner;

(3) for a sole proprietorship, by the proprietor;

(4) for a municipal, state, federal, or other public facility, by either a principal executive officer, ranking elected official, or other authorized employee;

(5) for a joint venture, by the operator;

(6) for a limited liability company, by a member;

(7) by an agent who has been delegated that authority in writing to the department by the responsible party under (1) – (6) of this subsection.

(c) The initial application package, responses to requests for additional information, and final versions of the plan must comply with the following:

(1) the format must be electronic, paper, or both, as the department specifies;

(2) the department will specify the number of copies;

(3) the department will specify the electronic format to be used; the submittal must be electronically searchable;

(4) for new plans, plan renewals, and major amendments, the applicant must provide all copies to the department, the Department of Natural Resources, the Department of Fish and Game; regional citizens' advisory councils, and other persons designated by the department;

(5) for minor amendments and routine updates, the applicant must

(A) provide all copies to the department;

(B) provide copies of the final version of the plan to the Department of Natural Resources, the Department of Fish and Game, regional citizens' advisory councils, and other persons designated by the department;

(6) an applicant must notify the Department of Natural Resources, the Department of Fish and Game, regional citizens' advisory councils, and other persons designated by the department when a proposed minor amendment is provided to the department; parties requesting a copy of the minor amendment shall submit the request to the applicant and the applicant shall provide a copy;

(7) all proposed additions, revisions, and deletions must be identified in the plan as applicable; the department may also request a summary of changes in a table format;

(8) for new plans, plan renewals, and major amendments, the department will post a copy of the proposed and final version of the application package on the department's website; for minor amendments and routine updates, the department will post a copy of the final version of the application package on the department's website. (Eff. 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

Editor's note: The application form referenced in 18 AAC 75.408 is available on the department's Internet website.

18 AAC 75.410. Procedures to apply for oil discharge prevention and contingency plans; new plans. (a) An application for approval of a new oil discharge prevention and contingency plan must be submitted in accordance with 18 AAC 75.408. An application must be submitted at least 180 days before the proposed start of operation.

(b) Repealed 4/16/2016.

(c) The department will review an application for a new plan using the procedures set out under 18 AAC 75.455 and will issue its decision under 18 AAC 75.460(a).

(d) Repealed 4/16/2016.

(e) Repealed 4/16/2016. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 4/8/2012, Register 202; am 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.412. Transitional provisions for review of plans approved before May 14, 1992. Repealed. (Eff. 5/14/92, Register 122; repealed 11/27/2002, Register 164)

18 AAC 75.413. Transitional provisions for review and approval of nontank vessel plans. Repealed. (Eff. 11/27/2002, Register 164; repealed 9/4/2014, Register 211)

18 AAC 75.414. Procedures to apply for oil discharge prevention and contingency plans; owner or operator changes. A change in the owner, operator, or name of the owner or operator of a facility or operation with an approved oil discharge prevention and contingency plan or a nontank vessel equivalent plan requires that the new owner or operator submit an application package as an amendment under 18 AAC 75.415. (Eff. 4/16/2016, Register 218; am 3/23/2017, Register 221)

Authority. AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.415. Procedures to apply for oil discharge prevention and contingency plans; plan amendments. (a) An application for approval of an amendment to an oil discharge prevention and contingency plan must be submitted in accordance with 18 AAC 75.408 and approved by the department, before a change to a plan may take effect, unless it is a routine plan update under (b) of this section. A plan amendment that incorporates one or more of the following will be reviewed as a major amendment:

(1) an increase to the response planning standard volume that exceeds the response capabilities of the plan holder documented in the plan;

(2) a change that affects the response scenarios, including a change to the

(A) scenario location;

(B) receiving environment as defined in 18 AAC 75.400(i); or

(C) season of operations;

(3) expansion of the operations to include one or more new physical locations outside of the current operational area of the plan;

(4) a change in the amount or quality of prevention, response resources, or training that reduces the existing level of prevention or response capabilities;

(5) a change that requires an increase in prevention, response resources, or training.

(b) A routine plan update must be submitted in accordance with 18 AAC 75.408 not later than five days after the date the proposed change occurs. Routine plan updates include

(1) a deletion from the list of vessels operating under the approved plan if the deleted vessel is not included as a response asset in the current response action plan under 18 AAC 75.425(e)(1); and

(2) a revision to the list of names, addresses, or telephone numbers of spill command and response personnel;

(c) An application for approval of a plan amendment to allow the addition of a vessel to operate under an approved oil barge or tank vessel oil discharge prevention and contingency plan must include the information required by 18 AAC 75.425(e)(1)(H) and (3)(A)(iii), (v), (vi), (viii), and (x). A plan amendment for the addition of an oil barge or tank vessel must be submitted not later than five working days before the vessel operates in state waters. The department will review the amendment and issue a written decision not later than five working days after receiving a proposed plan amendment under this subsection unless the department determines that it is a major amendment under (a) of this section.

(d) Repealed 3/23/2017.

(e) Repealed 4/16/2016.

(f) If the department determines that a proposed plan amendment submitted under (a) of this section is a major amendment, the department will notify the plan holder not later than 10 working days after receipt of the amendment. If the department determines that a proposed plan amendment is a minor amendment, the department will notify the plan holder not later than 10 working days after receipt of the amendment and issue a written decision not later than 30 days after receipt of the proposed plan amendment.

(g) A major amendment will be reviewed under 18 AAC 75.455. A minor amendment will not be reviewed under 18 AAC 75.455.

(h) For a minor amendment approved under (f) of this section, the plan holder shall distribute copies in accordance with 18 AAC 75.408(c) not later than 30 days after approval. The department will notify parties identified in 18 AAC 75.408(c)(5) that the approved amended plan is available on the department's Internet website. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 12/14/2002, Register 164; am 4/8/2012, Register 202; am 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.420. Procedures to apply for oil discharge prevention and contingency plans; plan renewals. (a) A plan holder must apply for renewal of the department's approval of an oil discharge prevention and contingency plan in accordance with 18 AAC 75.408. The application must be submitted at least 180 days, or the number of days stated in the plan approval letter under 18 AAC 75.460(a), in advance of expiration of the plan to allow sufficient time for department review before the plan approval expires.

(b) Repealed 4/16/2016.

(c) If no change will be made in the plan when it is renewed, a copy of the original plan need not be submitted and may be incorporated by reference on the application form unless otherwise requested by the department.

(d) Repealed 4/16/2016.

(e) An application for a plan renewal will be reviewed under the provisions of 18 AAC 75.455. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.421. Procedures to apply for nontank vessel streamlined oil discharge prevention and contingency plans. (a) An application for approval of a new nontank vessel streamlined oil discharge prevention and contingency plan must be made on an application form supplied by the department.

(b) An application for approval of an amendment to a nontank vessel streamlined oil discharge prevention and contingency plan must be submitted using an application form supplied by the department and approved by the department before a change to the plan may take effect.

(c) An application for approval of a new nontank vessel streamlined plan, an amendment to a previously approved streamlined plan, or a reinstatement of a suspended streamlined plan must be submitted to the department for review and approval not later than five working days before a vessel covered in the plan enters waters of the state.

(d) A plan holder must apply for renewal of the department's streamlined plan approval, using an application form supplied by the department, not later than five working days in advance of the expiration of the plan.

(e) A plan holder may voluntarily suspend or terminate an approved streamlined plan by submitting a nontank vessel streamlined plan notification form supplied by the department. The department will provide acknowledgment of the plan holder's suspension or termination not later than five working days after receiving the notification.

(f) A terminated or expired streamlined plan cannot be reinstated. Before a vessel can enter state waters after a streamlined plan has been terminated or expired, an application for a nontank vessel streamlined plan must be submitted under (a) of this section. (Eff. 4/16/2016, Register 218)

Authority. AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.425. Oil discharge prevention and contingency plan contents. (a) An oil discharge prevention and contingency plan submitted for approval under 18 AAC 75.400 - 18 AAC 75.495 must be in a form that is usable as a working plan for oil discharge prevention, control, containment, cleanup, and disposal. A plan must contain enough information, analyses, supporting data, and documentation to demonstrate the plan holder's ability to meet the requirements of AS 46.04.030 and 18 AAC 75.400 - 18 AAC 75.495.

(b) The plan for a facility comprised of multiple operations as described at 18 AAC 75.442, must describe, for each category of operation at the facility, the appropriate response measures to meet the applicable portion of the response planning standard.

(c) The submitted plan must be accompanied by a cover page or promulgation letter that includes

(1) the name of the plan holder, and the covered vessel, barge, railroad, facility, or operation, followed by the words "Oil Discharge Prevention and Contingency Plan";

(2) the date of the plan; and

(3) a statement, signed by an individual with appropriate authority, committing the oil discharge prevention and response resources necessary to implement the plan.

(d) The plan must

(1) include the official plan title;

(2) consist of five parts and contain the information described in (e)(1) - (5) of this section;

(3) contain a complete table of contents and lists of any tables or figures, with corresponding page numbers; and

(4) be presented in the order shown in (e) of this section, or include a cross-reference table that directs the reader to the appropriate information.

(e) The information in the plan must include

(1) Part 1 - Response Action Plan: The response action plan must provide in sufficient detail to clearly guide responders in an emergency event, all information necessary to guide response to a discharge of any size, up to and including a discharge that is equal to the applicable response planning standard set out at 18 AAC 75.430 - 18 AAC 75.442; the response action plan must include the following information:

(A) Emergency action checklist - a short checklist of the immediate response and notification steps to be taken if an oil discharge occurs; it is recommended that this summary be duplicated on a wallet-size card, to be carried by the appropriate response personnel while on duty;

(B) Reporting and notification - a description of the immediate spill reporting actions to be taken at any hour of the day, including

(i) the title and telephone number of facility personnel responsible for making the notification; and

(ii) the telephone number of each appropriate government agency to be notified if a discharge occurs;

(C) Safety - based on applicable safety standards, a description of the steps necessary to develop an incident-specific safety plan for conducting a response;

(D) Communications - a description of field communications procedures, including, if applicable, assigned radio channels or frequencies and their intended use by response personnel;

(E) Deployment strategies - a description of proposed initial response actions that may be taken, including

(i) procedures for the transport of equipment, personnel, and other resources to the spill site, including plans for alternative methods in adverse weather conditions; and

(ii) if the operator is not the primary spill responder, procedures to notify and mobilize the response action contractor or other responder identified in the plan, including a description of the interim actions that the operator will perform until the responder identified in the plan initiates a full response to the discharge;

(F) Response scenario - a written description of a hypothetical spill incident and response that demonstrates a plan holder's ability to respond to a discharge of each applicable response planning standard volume within the required time frames using the resources described in the contingency plan, and that identifies the spill location, time of year, and time of day, the source and cause of the spill, the quantity and type of oil spilled, the relevant environmental conditions, including weather, sea state, and visibility, the spill trajectory, and the expected timeline for response actions, describing response actions to be taken; the response scenario must be usable as a general guide for a discharge of any size, must describe the discharge containment, control, and cleanup actions to be taken, which clearly demonstrate the strategies and procedures adopted to conduct and maintain an effective response, and if the response scenario is for an exploration or production facility, must also meet the applicable requirements of (I) of this paragraph; if required by the department, the plan holder must provide additional response strategies to account for variations in receiving environments and seasonal conditions; if the information required by this subparagraph is contained within a separate document developed by the plan holder or the plan holder's primary response action contractor identified in (3)(H) of this subsection, the plan holder may incorporate the information by reference upon obtaining the department's approval; response strategies must include

(i) procedures to stop the discharge at its source and prevent its further spread;

(ii) a description of methods to prevent or control a potential fire hazard;

(iii) repealed 5/26/2004;

(iv) procedures and methods for real-time surveillance and tracking of the discharged oil on open water and forecasting of its expected points of shoreline contact;

(v) for a stationary facility or operation, or a railroad, and, if requested by the department, for a vessel, a description of site-specific strategies for the protection of environmentally sensitive areas and areas of public concern identified under (3)(J) of this subsection, including, for a land-based facility or railroad, protection of groundwater and public water supplies; if identification of those areas and site-specific strategies for protection of those areas are in an applicable subarea contingency plan, the plan holder may incorporate that information by reference;

(vi) a description of the actions to be taken to contain and control the spilled oil, including, as applicable, boom deployment strategies, construction of temporary berms, and other methods;

(vii) a description of the actions to be taken to recover the contained or controlled oil using mechanical response options, including procedures and provisions for skimming, absorbing, or otherwise recovering the contained or controlled product from water or land;

(viii) procedures for lightering, transfer, and storage of oil from damaged tanks or from undamaged tanks that might be at risk of discharging additional oil;

(ix) procedures for transfer and storage of recovered oil and oily water, including methods for estimating the amount of recovered oil;

(x) procedures and locations for temporary storage and ultimate disposal of oil contaminated materials, oily wastes, and sanitary and solid wastes, including procedures for obtaining any required permits or authorizations for temporary storage or ultimate disposal;

(xi) procedures and methods for the protection, recovery, disposal, rehabilitation, and release of potentially affected wildlife, including: minimizing wildlife contamination through hazing or other means, when appropriate; the recovery of oiled carcasses to preclude secondary contamination of scavengers; and the capture, cleaning, rehabilitation, and release of oiled wildlife, when appropriate; and

(xii) if applicable, a description of procedures for the deployment of shoreline cleanup equipment and personnel, including cleanup and restoration methods and techniques to be used if the shoreline is impacted by the discharge;

(G) nonmechanical response options - if applicable, a description of actions to be taken to obtain the necessary permits and approvals to initiate dispersant application, in situ burning, or other nonmechanical response options, the basis for determining the conditions or circumstances under which these options will be used, and how the nonmechanical response options will be implemented, including a description of all required equipment and personnel; and

(H) facility, railroad, or vessel diagram - a plan diagram of the facility, vessel, or operation for reference in conducting emergency response operations, with locations of response equipment and other features pertinent to the response plan clearly marked, including surrounding topography, roads, air transportation and other transportation access, location and bathymetry of adjacent water bodies, mooring areas, oil transfer locations, pipelines, control stations, drip pans and drainage of drip pans, and a representation of the distance and gradients to surface water for an operation located on land, by topographic map, aerial photographs, or other means; for a railroad tank car or locomotive, a diagram must be included for each distinct type of railroad tank car or locomotive showing locations of fuel and lubrication systems and oil storage tanks, piping, and valves;

(I) response scenario for an exploration or production facility – if the facility is an exploration or production facility, a response scenario that, in addition to complying with (F) of this paragraph, includes as part of the response strategies a summary of planned methods, equipment, logistics, and time frames proposed to be employed to control a well blowout within 15 days; the plan holder shall certify that the plan holder maintains a separate blowout contingency plan; the blowout contingency plan is not part of an application required under 18 AAC 75.410 - 18 AAC 75.420, but must be made available to the department for inspection upon request under 18 AAC 75.480; a plan holder may use for development of a response scenario the July 1997 S.L. Ross oil deposition model for surface oil well blowouts, or another oil deposition model approved by the department for surface oil well blowouts; if required by the department to account for variations in seasonal conditions, a plan holder must provide a response scenario for a discharge of the applicable response planning standard volume under typical summer environmental conditions and typical winter environmental conditions; if the information required by this subparagraph is contained within a separate document developed by the plan holder or the plan holder's primary response action contractor identified in (3)(H) of this subsection, the plan holder may incorporate the information by reference upon obtaining the department's approval; for purposes of this subparagraph,

(i) "predominant wind directions" means those directions that occur greater than 10 percent of the time indicated;

(ii) "typical summer environmental conditions" means the average wind speeds and predominant wind directions as depicted by a wind rose, temperature, sea state, and other climatic and environmental conditions occurring during the period of May through October, based on National Weather Service data or local weather records of a duration sufficient to determine a reasonable average;

(iii) "typical winter environmental conditions" means the average wind speeds and predominant wind directions as depicted by a wind rose, temperature, sea state, and other climatic and environmental conditions occurring during the period of November through April, based on National Weather Service data or local weather records of a duration sufficient to determine a reasonable average;

(iv) "wind rose" means a polar coordinate plot designed to show the distribution of wind directions and speeds at a given location over a considerable period of time, with the distance from the origin proportional to the

probability of the wind direction being at the given angle, measured in 16 cardinal compass points, and the disposition of the wind speeds indicated for each direction;

(2) Part 2 - Prevention Plan: The prevention plan must include a detailed description of all oil discharge prevention measures and policies employed at the facility, vessel, or operation, with reference to the specific oil discharge risks involved. The prevention plan must describe how the applicant meets all the applicable requirements of 18 AAC 75.005-18 AAC 75.085. The prevention plan may be submitted as a separate volume, and must include, at a minimum, the following information:

(A) discharge prevention programs - a description and schedule of regular oil discharge prevention, inspection, and maintenance programs in place at the facility or operation, including

(i) oil discharge prevention training programs required by 18 AAC 75.020(a);

(ii) substance abuse and medical monitoring programs required by 18 AAC 75.007(e);

(iii) security and surveillance programs required by 18 AAC 75.007(f).

(B) discharge history -a history of all known oil discharges greater than 55 gallons that have occurred at the facility within the state; the history must include

(i) the source, cause, amount of each discharge;

(ii) corrective action taken;

(iii) an analysis of the relationship, if any, between the frequency, cause, and size of the discharges; and

(iv) a description of actions to be taken to prevent or mitigate similar discharges in the future;

(C) potential discharge analysis - an analysis of potential oil discharges, including size, frequency, cause, duration, and location, and a description of actions taken to prevent a potential discharge;

(D) specific conditions - a description of

(i) any conditions specific to the facility or operation that might increase the risk of a discharge, including physical or navigation hazards, traffic patterns, and other site-specific factors; and

(ii) any measures that have been taken to reduce the risk of a discharge attributable to these conditions, including a summary of operating procedures designed to mitigate the risk of a discharge;

(E) discharge detection - a description of the existing and proposed means of discharge detection, including surveillance schedules, leak detection, observation wells, monitoring systems, and spill-detection instrumentation; if electronic or mechanical instrumentation is employed, detailed specifications, including threshold detection, sensitivities, and limitations of equipment must be provided;

(F) waivers - for an operation subject to a waiver, alternate compliance schedule, or existing condition of plan approval under 18 AAC 75.005 - 18 AAC 75.085 or 18 AAC 75.400 – 18 AAC 75.496, documentation of

(i) each waiver, alternate compliance schedule, or existing condition of plan approval; and

(ii) the approval of each waiver, alternate compliance schedule, or existing condition of plan approval;

(3) Part 3 - Supplemental Information: The supplemental information section must provide background and verification information, including

(A) facility description and operational overview - a general description of the oil storage, transfer, exploration, or production activities of the operation, including

(i) the number, type, and oil storage capacity of each container covered under the plan and its installation date, design, construction, and general condition;

(ii) the type and amount of oil stored in each container;

(iii) for vessels, a general chart showing routes normally used for the transportation of oil products within state waters, and the frequency of use for each route;

(iv) for a railroad, a map showing the location of each main line, siding, and yard area;

(v) for vessels, plans or diagrams that identify cargo, bunker, and ballast tanks, all tank capacities, cargo piping, ballast piping, winches, emergency towing equipment, power plants, manifold pipe size, containment structures and equipment, and a description of the method of containing a discharge from fuel oil tank vent overflow and fill pipes;

(vi) a general description of the procedures for the loading or transfer of oil from or to a pipeline, facility, tank vessel, oil barge, railroad tank car, or storage tank;

(vii) for a production facility, a description of the flow and gathering lines and processing facilities;

(viii) for vessels, a description of the methods for retention and disposal of oily wastes and bilge slops;

(ix) for a railroad, a description of railroad tank cars and locomotives normally in service, including type, number and capacity, general piping diagrams, location of valves, and tank volumes; and

(x) any other information required by the department to evaluate the response capability of a vessel, including verifying that the vessel is in compliance with the applicable stability requirements as set out in 46 C.F.R. 109.227, as amended through September 11, 1992;

(B) receiving environment - for a land-based facility or operation:

(i) the potential routes of travel of oil discharged from the facility or operation to open water in the form of a drainage diagram or map, showing gradients and potential containment sites and features, including identification and explanation of all measures that will be taken to prevent a discharge from entering open water; and

(ii) based on the information in (i) of this subparagraph, an estimate of what percentage of the applicable response planning standard volume set out at 18 AAC 75.430 - 18 AAC 75.436, or 18 AAC 75.442 for the facility or operation will reach open water;

(C) command system - a description of the command system to be used in response to a discharge, including the title, address, telephone number, and affiliation by company, agency, or local government of each person, including a person identified in (1)(B) of this subsection, who by law or through employment, contract, or cooperative agreement, is responsible for responding to a discharge, and each person's functional role in the command system; this list must include command, fiscal, operations, planning, and logistics lead personnel; the command system must be compatible with the state's response structure outlined in the state master plan prepared under AS 46.04.200;

(D) realistic maximum response operating limitations - a description of the realistic maximum response operating limitations that might be encountered at the facility or operation and, based on environmental and safety considerations, an analysis of the frequency and duration, expressed as a percentage of time, of limitations that would render mechanical response methods ineffective; the realistic maximum response operating limitations for a response must be defined, with a description of any additional specific temporary prevention or response measures that will be taken to reduce the environmental consequences of a discharge, including nonmechanical response options, during those periods when environmental conditions exceed this maximum; environmental conditions to be considered in this analysis must include

(i) weather, including wind, visibility, precipitation and temperature;

(ii) sea states, tides, and currents;

(iii) ice and debris presence;

(iv) hours of daylight; and

(v) other known environmental conditions that might influence the efficiency of the response equipment or the overall effectiveness of a response effort;

(E) logistical support - identification of aircraft, vessels, and other means that may be used to transport equipment and personnel during a discharge response, including information on ownership and availability of identified means of transportation;

(F) response equipment - a complete list of contracted or other oil discharge containment, control, cleanup, storage, transfer, lightering, and related response equipment to meet the applicable response planning standard, and to protect environmentally sensitive areas and areas of public concern that are identified in (J) of this paragraph and that may be reasonable expected to suffer an impact from a spill of the response planning standard volume as described in the response strategies developed under (1)(F) and (1)(I) of this subsection, the list must include

(i) the location, inventory, and ownership of the equipment;

(ii) the time frame for delivery and startup of response equipment and trained personnel located outside the facility's primary region of operation;

(iii) the manufacturer's rated capacities, limitations, and operational characteristics for each item of oil recovery equipment, including any nonmechanical response techniques;

(iv) each vessel designated for oil recovery operations, including skimming vessels and platforms and vessels designated to tow and deploy boom;

(v) information on additional vessels available from other sources for oil recovery operations, including, if applicable, procedures for inventorying, training personnel, and equipping vessels;

(vi) pumping, transfer and temporary storage, and lightering equipment for transferring oil from damaged or undamaged tanks; and

(vii) the procedures for storage, maintenance, and inspection of spill response equipment under the immediate control of the operator when not in use, including procedures for periodic testing and maintenance of response equipment;

(G) nonmechanical response information - if a nonmechanical option such as dispersant use or in situ burning is proposed as a response option, the plan must include

(i) a description of the specific mechanisms in place to assess the environmental consequences of the nonmechanical response option and to provide continuous monitoring of its environmental effects;

(ii) a complete inventory of nonmechanical response equipment and supplies, including the type and toxicity of each dispersant, with procedures for storage, maintenance, and deployment;

(iii) identification of all necessary approvals, and a completed application for department approval for open burning if in situ burning is a proposed response option;

(iv) identification of all permits, approvals, or authorizations for use of nonmechanical response options and the timeline for obtaining them; and

(v) a plan for protecting environmentally sensitive areas identified in (J) of this paragraph, areas of public concern identified in (J) of this paragraph, and the public from any adverse effects of the nonmechanical response option;

(H) oil spill primary response action contractor information - if a plan holder proposes to use the services of an oil spill primary response action contractor to meet a requirement of AS 46.04.030 or 18 AAC 75.400 - 18 AAC 75.495, the contractor must be registered under 18 AAC 75.500 - 18 AAC 75.580; the plan holder shall include a correct and complete list of each primary response action contractor, with name, address, telephone number, and affiliation by company, the response contractor information described in 18 AAC 75.445(i), and a description of the response equipment and services provided; the use of an oil spill primary response action contractor does not relieve the plan holder of its responsibility to provide the information required by this subsection and to meet all other applicable requirements of 18 AAC 75.400 - 18 AAC 75.495;

(I) training - a detailed description of the training programs for discharge response personnel;

(J) protection of environmentally sensitive areas and areas of public concern - for a stationary facility or operation, or a railroad, and, if required by the department, for a vessel, identification of environmentally sensitive areas and areas of public concern that may suffer an impact from a spill of the applicable response planning standard volume; if identification of those areas and site-specific strategies for protection of those areas are in an applicable subarea contingency plan, the plan holder may incorporate that information by reference; whether prepared separately or incorporated by reference, the identification of and planned protection measures for those areas must be based on mapped predictions of discharge movement, spreading, and probable points of contact, based on expected local, seasonal, meteorologic, and oceanographic or topographic conditions; and, for each probable point of contact, must include a description of each environmentally sensitive area and each area of public concern, including

(i) the effect of seasonal conditions on the sensitivity of each area;

(ii) a discussion of the toxicity effects and persistence of the discharge, based on type of product; and

(iii) an identification of which areas will be given priority attention if a discharge occurs;

(K) additional information - other information necessary to provide background for or verification of the plan contents; and

(L) bibliography - a list of data and information sources used to determine the information contained in the plan; and

(4) Part 4 -- Best Available Technology Review: Unless application of a state requirement would be preempted by federal law, the plan must provide for the use of best available technology consistent with the applicable criteria in 18 AAC 75.445(k). In addition, the plan must

(A) identify technologies applicable to the applicant's operation that are not subject to response planning or performance standards specified in 18 AAC 75.445(k)(1) and (2); these technologies include, at a minimum,

(i) for all contingency plans, communications described under (1)(D) of this subsection; source control procedures to stop the discharge at its source and prevent its further spread described under (1)(F)(i) of this subsection; trajectory analyses and forecasts described under (1)(F)(iv) of this subsection; and wildlife capture, treatment, and release procedures and methods described under (1)(F)(xi) of this subsection;

(ii) for a terminal, a crude oil transmission pipeline, or an exploration and production contingency plan: an approved corrosion control system if required by 18 AAC 75.065(i)(3) or (j)(3); a leak detection system for each tank if required by 18 AAC 75.065(i)(4) or (j)(4); any other prevention or control system approved by the department under 18 AAC 75.065(h)(1)(D); a means of immediately determining the liquid level of bulk storage tanks as specified in 18 AAC 75.065(k)(3) and (4) or in 18 AAC 75.066(g)(1)(C) and (D); a corrosion control program for metallic piping containing oil as required by 18 AAC 75.080(b); protective coating and cathodic protection if required by 18 AAC 75.080(d), (*l*), or (m)(1) or (2) ; and cathodic protection surveys required by 18 AAC 75.080(k)(2);

(iii) for a tank vessel contingency plan: measures to assure prompt detection of an oil discharge as required by 18 AAC 75.027(d); operation of a tank vessel under escort in a manner that permits an escort vessel to be available immediately to provide the intended assistance to the tank vessel as required by 18 AAC 75.027(e); tow lines as required by 18 AAC 75.027(f); and escort vessels;

(iv) for a crude oil transmission pipeline contingency plan: leak detection, monitoring, and operating requirements for crude oil pipelines that include prompt leak detection as required by 18 AAC 75.055(a);

(v) for a barge contingency plan: measures to assure prompt detection of an oil discharge as required by 18 AAC 75.037(d) and means to recover a barge that breaks free of its towing vessel as required by 18 AAC 75.037(f); and

(vi) for a railroad tank car contingency plan, measures to assure prompt detection of a tank car leak, spill prevention and containment devices for locomotive fueling systems, spill collection and recovery devices at locomotive fueling and tank car filling locations, track-mounted railroad tank car defect detector systems, and avalanche detection and mitigation systems;

(B) for each applicable technology under (A) of this paragraph, identify all available technologies and include a written analysis of each technology, using the applicable criteria in 18 AAC 75.445(k)(3); and

(C) include a written justification that the technology proposed to be used is the best available for the applicant's operation.

(5) Part 5 – Response Planning Standard: A calculation of the applicable response planning standards set out in 18 AAC 75.430 - 18 AAC 75.440 and 18 AAC 75.442, including a detailed basis for the calculation of reductions, if any, to be applied to the response planning standards.

(f) For purposes of this section and 18 AAC 75.445, "technology" means equipment, supplies, other resources, and related practices. (Eff. 5/14/92, Register 122; am 9/25/93, Register 127; am 3/28/96, Register 137; am 4/4/97, Register 142; am 12/14/2002, Register 164; am 5/26/2004, Register 170; am 12/30/2006, Register 180; am 9/4/2014, Register 211; am 3/23/2017, Register; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.426. Nontank vessel streamlined plan contents. A nontank vessel streamlined plan application must contain the following information:

(1) the name, address, and telephone number of the plan holder;

(2) for each covered vessel, the

(A) vessel's name, official number, and country of registry;

(B) name and address of the owner; and

(C) name and address of the operator;

(3) the application date and the first scheduled date of entry into waters of the state;

(4) the name, telephone number, title, electronic mail address, and facsimile number of each qualified individual for the plan holder;

(5) a description of the immediate spill reporting actions to be taken at any hour of the day, including

(A) the title and telephone number, any electronic mail address, and any facsimile number of personnel responsible for making notifications; and

(B) the telephone number of each appropriate government agency to be notified if a discharge occurs;

(6) the length overall, maximum beam, gross tonnage, and type and configuration of each covered vessel;

(7) a description or diagram of each covered vessel for reference in conducting emergency response operations; each diagram must clearly mark the location of any feature pertinent to the response, including

(A) the location, size, and storage capacity of each oil storage tank;

(B) the type of oil carried in each tank; and

(C) any other information that a responder may need to know in an emergency;

(8) the name, location, and telephone number of an emergency contact for gaining access to detailed plans for each vessel showing the

(A) location of personnel quarters and each emergency exit;

(B) location of all fuel piping locations, including valve locations and identification;

(C) the location and size of each tank, tank valve, overflow pipe, and tank access point;

(D) the location of each internal or portable pump on board;

(E) the location of each emergency shutdown switch; and

(F) other detailed information pertinent to emergency response operations;

(9) the maximum fuel capacity, in barrels, of each covered vessel and the volume used to calculate the response planning standard under 18 AAC 75.441 for each vessel; if the volume used to calculate the vessel's response planning standard is less than the maximum fuel capacity of the vessel, the vessel operator must certify that the volume used to calculate the vessel's response planning standard under 18 AAC 75.441 is the maximum volume of fuel carried by the vessel in state waters;

(10) each region of operation for each covered vessel;

(11) except for a plan using a response planning facilitator who is providing the response services described in 18 AAC 75.428(a)(2), the name and telephone number, any electronic mail address, and any facsimile number of each contracted nontank vessel cleanup contractor and nontank vessel incident management team;

(12) except for a plan using a response planning facilitator who is providing the response services described in 18 AAC 75.428(a)(2), a statement certifying that

(A) for each region of operation identified in the plan, the applicant has a contract with, or is a member of, at least one nontank vessel cleanup contractor for that region of operation;

(B) each nontank vessel cleanup contractor identified in the statement is registered under 18 AAC 75.500 - 18 AAC 75.580 for the appropriate vessel fuel classification under 18 AAC 75.561(b)(1), Table F, and region of operation identified in the plan; and

(C) each contract or membership agreement with the nontank vessel cleanup contractor demonstrates that the nontank vessel cleanup contractor will respond on behalf of the applicant;

(13) except for a plan using a response planning facilitator who is providing the response services described in 18 AAC 75.428(a)(2), a statement certifying that

(A) for each region of operation identified in the plan, the applicant has a contract with at least one nontank vessel incident management team for that region of operation;

(B) each nontank vessel incident management team identified in the statement is registered under 18 AAC 75.500 - 18 AAC 75.580 for the appropriate vessel fuel classification under 18 AAC 75.562(b), Table G, and region of operation identified in the plan; and

(C) each contract with the nontank vessel incident management team demonstrates that the nontank vessel incident management team will respond on behalf of the applicant;

(14) for a plan submitted by a response planning facilitator, the name, telephone number, and title, any electronic mail address, and any facsimile number of that response planning facilitator, and the role of the response planning facilitator as described in 18 AAC 75.428(a)(1) or (2);

(15) for a plan using a response planning facilitator who is providing the response services described in 18 AAC 75.428(a)(2), a statement certifying that the

(A) applicant has a contract with the response planning facilitator to provide oil spill response services to the applicant to meet the applicable requirements of 18 AAC 75.400 – 18 AAC 75.496 for each region of operation identified in the plan and the appropriate vessel fuel classification under 18 AAC 75.561(b)(1), Table F and 18 AAC 75.562(b), Table G; and

(B) contract under (A) of this paragraph demonstrates that the response planning facilitator will respond on behalf of the applicant;

(16) a statement certifying that each vessel complies with applicable federal and international maritime requirements;

(17) a statement, signed by an individual with the authority described in the statement, committing the resources necessary to implement the plan, and certifying the contents of the application; the statement must read as follows: "I certify, under penalty of unsworn falsification in violation of AS 11.56.210, that I am the applicant, a principal of the applicant, an authorized agent for the applicant, or an official of the applicant; that I have authority to sign this application and commit the resources necessary to implement the plan on behalf of the applicant; and that I have examined this application in its entirety and to the best of my knowledge, information, and belief, find it to be true, correct and complete." (Eff. 11/27/2002, Register 164; am 12/13/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

Editor's note: As of Register 221 (April 2017), the regulations attorney made technical corrections under AS 44.62.125(b)(6), to 18 AAC 75.426, changing cross-referenced table headers from "Table G" to "Table F" and from "Table H" to "Table G", to reflect the agency's repeal of 18 AAC 75.446, including former Table F, as part of amendments that took effect March 23, 2017, Register 221.

18 AAC 75.427. Nontank vessel equivalent plan contents. Repealed (Eff. 11/27/2002, Register 164; repealed 3/23/2017, Register 221)

18 AAC 75.428. Response planning facilitator. (a) A response planning facilitator registered under 18 AAC 75.500 – 18 AAC 75.580 may submit a nontank vessel streamlined plan under 18 AAC 75.421 on behalf of a plan holder. A response planning facilitator may

(1) act as an intermediary between the plan holder and one or more nontank vessel cleanup contractors and one or more nontank vessel incident management teams in order to facilitate the submission of a nontank vessel streamlined plan under 18 AAC 75.421, including facilitation of the execution of a contract or membership agreement between the plan holder and each nontank vessel cleanup contractor and nontank vessel incident management team as described in 18 AAC 75.426(12) and (13); or

(2) enter into a contract with the plan holder to meet the requirements of 18 AAC 75.400 – 18 AAC 75.496; the response planning facilitator's registration application under 18 AAC 75.553 must

(A) certify that the response planning facilitator has a contract with, or is a member of, one or more nontank vessel cleanup contractors and has a contract with one or more nontank vessel incident management teams registered under 18 AAC 75.500 – 18 AAC 75.580 in each region of operation and for the response planning standard appropriate to each vessel covered under the nontank vessel streamlined plan; and

(B) contain a statement, signed by the response planning facilitator and each nontank vessel cleanup contractor and nontank vessel incident management team, that the nontank vessel cleanup contractor and nontank vessel incident management team will respond on behalf of a plan holder who enters into a contract with the response planning facilitator to meet the requirements of 18 AAC 75.400 – 18 AAC 75.496.

(b) A response planning facilitator may sign a streamlined plan application form as an authorized agent on behalf of the plan holder. An application signed by a response planning facilitator has the full force and effect of an application signed by the plan holder as described in 18 AAC 75.400(a)(2). (Eff. 11/27/2002, Register 164; am 4/16/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.430. Response planning standards. (a) Notwithstanding the response planning standards set out in 18 AAC 75.430 - 18 AAC 75.442, the plan must demonstrate the general procedures to clean up a discharge of any size, including the greatest possible discharge that could occur, subject to the provisions of AS 46.04.020 and AS 46.09.020.

(b) Except for the requirements of 18 AAC 75.438(b)(1) and (2), 18 AAC 75.440, and 18 AAC 75.441, the department will consider and provide modifications to the response planning standards set out in 18 AAC 75.430 - 18 AAC 75.442 for a prevention measure that is in addition to those listed in 18 AAC 75.432 - 18 AAC 75.438, if the plan holder demonstrates to the department's satisfaction that the proposed measure reduces the potential size or risk of a discharge.

(c) If more than one prevention measure is used to modify the response planning standard, each subsequent reduction will be applied separately to the response planning standard value that results from application of the previous modification. However, in no case will the department reduce the response planning standard below an amount equal to

(1) 15 percent of the response planning standard applicable to a crude or noncrude oil terminal facility, an exploration or production facility, or a crude oil pipeline as determined under 18 AAC 75.432(b) or (c), 18 AAC 75.434, or 18 AAC 75.436(b), respectively; or

(2) 30 percent of the response planning standard for a crude oil tank vessel or barge as determined by 18 AAC 75.438(c).

(d) The department will, in its discretion, revoke or reduce a prevention credit set out in 18 AAC 75.432 - 18 AAC 75.438 if the department finds that the plan holder has failed to execute or has not effectively implemented the prevention measure used to determine that credit.

(e) Liquefied petroleum gas is exempt from the requirements of 18 AAC 75.430 - 18 AAC 75.442. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 5/26/2004, Register 170)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.432. Response planning standards for oil terminal facilities. (a) For a crude or noncrude oil terminal facility, the plan holder shall maintain or have available under contract within the plan holder's region of operation or another approved location, sufficient oil discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to

(1) contain or control and clean up within 72 hours that portion of the response planning standard volume that enters open water; and

(2) contain or control within 72 hours, and clean up within the shortest possible time consistent with minimizing damage to the environment, that portion of the response planning standard volume that enters a receiving environment other than open water.

(b) The response planning standard volume for a crude or noncrude oil terminal facility is equal to the capacity of the largest oil storage tank at the facility covered by the plan, unless there are specific natural or man-made conditions outside the facility which could place the facility at an increased risk of an oil discharge affecting one or more storage tanks.

(c) For an increased risk described in (b) of this section, the response planning standard volume is equal to the capacity of all of the potentially affected oil storage tanks at the facility. The plan must set out the basis for selecting the storage tanks and the volume of oil planned for in the response.

(d) The department will, in its discretion, reduce the requirements of (b) of this section, by a percentage up to that shown, for each of the following prevention measures in place at the facility:

(1) alcohol and drug testing of key personnel: 5 percent;

(2) an operations training program with a professional organization or federal certification or licensing of program participants: 5 percent;

(3) on-line leak detection systems for tanks and piping: 5 percent;

(4) a sufficiently impermeable secondary containment area with a dike capable of holding the contents of the largest tank, or all potentially affected tanks in the case of increased risk, and precipitation: 60 percent;

(5) for secondary containment as described in (4) of this subsection, designed with the following enhancements, an additional allowance for

(A) cathodic protection: 10 percent;

(B) fail-safe valve piping systems: 15 percent; or

(C) impervious containment area extending under the full area of each storage tank or double bottoms with leak detection: 25 percent; and

(6) containment outside the secondary containment area: 10 percent. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.433. Response planning standards for railroad tank cars. For a railroad tank car, the plan holder shall maintain, or have available under contract within the plan holder's region of operation or another approved location, sufficient oil discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to

(1) contain and control 15 percent of the maximum oil capacity of the train within 48 hours after a spill; and

(2) clean up the discharge within the shortest possible time consistent with minimizing damage to the environment. (Eff. 12/14/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070
AS 46.04.055

18 AAC 75.434. Response planning standards for exploration or production facilities. (a) For an exploration or production facility, the plan holder shall maintain or have available under contract within the plan holder's region of operation or another approved location, sufficient oil discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to

(1) contain or control and clean up within 72 hours that portion of the response planning standard volume that enters open water; and

(2) contain or control within 72 hours, and clean up within the shortest possible time consistent with minimizing damage to the environment, that portion of the response planning standard volume that enters a receiving environment other than open water.

(b) The response planning standard for an exploration facility is

(1) 16,500 barrels, unless relevant well data, exploration data, and other supporting technical documentation provided to the department and to the Alaska Oil and Gas Conservation Commission demonstrates to the satisfaction of the department that a lower response planning standard volume is appropriate; and

(2) an additional 5,500 barrels for each of 12 days beyond 72 hours, unless relevant well data, exploration data, and other supporting technical documentation provided to the department and to the Alaska Oil and Gas Conservation Commission demonstrates to the satisfaction of the department that a lower response planning standard volume is appropriate.

(c) Repealed 5/26/2004.

(d) If the actual flow rate of a well at an exploration facility exceeds 5,500 barrels per day, and the facility is to continue operations, the department will increase the response planning standard volume determined under (b) of this section for subsequent exploration wells drilled at that facility to a response planning standard volume taking into account the actual well flow rate of that well. The plan holder must submit a plan amendment under 18 AAC 75.415 addressing the increased response planning standard volume within 30 days after the department notifies the plan holder of the department's determination under this section. The department will review the plan amendment under 18 AAC 75.455.

(e) The response planning standard for a production facility is

(1) three times the annual average daily oil production volume for the maximum producing well at the facility; and

(2) for a production facility with wells without assisted lift, an additional volume equal to the annual average daily oil production volume for the maximum producing well at the facility for each of 12 days beyond 72 hours.

(f) The department may consult with the Alaska Oil and Gas Conservation Commission and other agencies as necessary to

(1) verify the production data submitted under (d) of this section; and

(2) determine, under (b) of this section, a lower response planning standard for exploration facilities.

(g) If an operator proposes the planned voluntary ignition of a well blowout, the operator shall submit data, analyses, and supporting documentation that indicates to the satisfaction of the department that any discharged oil would have an American Petroleum Institute (API) gravity of 35 or greater, a gas-oil ratio in excess of 2,000, and an anticipated combustion efficiency of at least 90 percent, that well ignition would not exceed national ambient air quality standards set

under 42 U.S.C. 7409 (Clean Air Act), and that well ignition will be protective of human health, safety, and welfare, and of the environment. The department will adjust the response planning standard determined under (b) - (e) of this section based on the submitted data. The department may consult with the Alaska Oil and Gas Conservation Commission and other agencies in evaluating the data provided by the operator under this subsection.

(h) If exploration and production facilities are covered under a single plan accepted under 18 AAC 75.400(d), the department will consider the largest of the response planning standards determined under (b) - (e) of this section to be the response planning standard for that plan.

(i) The department will protect from public disclosure any data, analyses, or supporting documentation that is required under this section and held confidential by the department or another state agency under applicable constitutional law, statutes, and common law doctrines that protect trade secrets within the meaning of AS 45.50.940 and other commercially sensitive, confidential, and proprietary information. If disclosure of that information is required in an adjudicatory hearing under 18 AAC 15.185 - 18 AAC 15.340, the hearing officer shall limit and condition disclosure to the extent necessary to comport with applicable constitutional, statutory, and common law doctrines that protect trade secrets within the meaning of AS 45.50.940 and other commercially sensitive, confidential, and proprietary information. In limiting or conditioning disclosure under this subsection, the hearing officer shall or department will, as necessary

(1) review confidential information in-camera; and

(2) redact department decisions to protect confidential information.

(j) The department may reduce the requirements of (b) - (e) of this section, up to the limits set out in 18 AAC 75.430(c)(1), for prevention measures in place at the facility beyond those measures imposed by the Alaska Oil and Gas Conservation Commission or another agency. (Eff. 5/14/92, Register 122; am 5/26/2004, Register 170)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.436. Response planning standards for crude oil pipelines. (a) For a crude oil pipeline facility, the plan holder shall maintain or have available under contract within the plan holder's region of operation or another approved location, sufficient oil discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to

(1) contain or control and clean up within 72 hours that portion of the response planning standard volume that enters open water; and

(2) contain or control within 72 hours, and clean up within the shortest possible time consistent with minimizing damage to the environment, that portion of the response planning standard volume that enters a receiving environment other than open water.

(b) The response planning standard volume for a crude oil pipeline facility is the amount of oil which equals the length of the pipeline between pumping or receiving stations or valves (Lpl), minus the hydraulic characteristics of the pipeline due to terrain profile (Hpl), times the capacity of the pipeline in barrels per lineal measure (Cpl), plus the flow rate of the pipeline in

barrels per time period (FRpl), multiplied by the estimated time to detect a spill event (TDpl), plus the time to shut down the pipeline pump or system (TSDpl). Written as a formula, the response planning standard is (Lpl - Hpl) * Cpl + FRpl * (TDpl + TSDpl).

(c) The department will, in its discretion, reduce the requirements of (b) of this section, by a percentage up to that shown, for each of the following prevention measures in place at the facility:

(1) alcohol and drug testing of key personnel: 5 percent;

(2) an operations training program with a professional organization or federal certification or licensing of program participants: 5 percent;

(3) on-line leak detection systems: 5 percent;

(4) corrosion control using

(A) ultrasonic thickness meters: 15 percent;

(B) instrumented in-line cleaning and diagnostic equipment ("smart pigs"): 15 percent; or

(C) a method described in (A) or (B) of this paragraph, coupled with cathodic-profile inspection at least triennially: 30 percent; and

(5) underwater pipeline cathodic- and burial-profile inspection: 5 percent. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.04.070 AS 46.04.030

18 AAC 75.438. Response planning standards for crude oil tank vessels and barges. (a) For a crude oil tank vessel or barge, the plan holder shall maintain or have available under contract within its region of operation, sufficient discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to

(1) contain or control and clean up within 72 hours that portion of the response planning standard volume set out in (b) of this section that enters open water; and

(2) contain or control within 72 hours, and clean up within the shortest possible time consistent with minimizing damage to the environment, that portion of the response planning standard volume set out in (b) of this section that enters a receiving environment other than open water.

(b) For purposes of the requirements of (a) of this section, the response planning standard volume for a crude oil tank vessel or barge is

(1) 50,000 barrels, if the tank vessel or barge has a cargo volume of less than 500,000 barrels; and

(2) 300,000 barrels, if the tank vessel or barge has a cargo volume of 500,000 barrels or more.

(c) In addition to the requirements of (a) of this section, for all crude oil tank vessels and barges, the plan holder shall plan to have deployed and operating within 72 hours, from within or outside its region of operation, sufficient oil discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to contain and control, and clean up at least 60 percent of the total cargo volume of the tank vessel or barge.

(d) The department will, in its discretion, reduce the requirements of (c) of this section, by a percentage up to that shown, for each of the following prevention measures in place for the vessel or barge:

(1) hydrostatic loading: 20 percent;

(2) double hulls and bottoms: 30 percent;

(3) double bottoms: 25 percent; and

(4) emergency-response vessels and procedures described as follows:

(A) vessel escort during entire vessel transit in port area;

(B) escort vessels capable of

(i) providing steering and propulsion assistance with the ability to attach towing cables in a timely fashion under the weather conditions of transit; and

(ii) exerting sufficient force to change or maintain the escorted vessel's course;

(C) limits on the escorted vessel's speed in order to match escort vessel's ability to render assistance; and

(D) escort vessels have on-board oil discharge response equipment: 11 percent.

(e) A crude oil tank vessel or barge that has been exempted under 18 AAC 75.400(b) is exempt from the requirements of this section. (Eff. 5/14/92, Register 122; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.440. Response planning standards for noncrude oil tank vessels and barges. (a) For a noncrude oil tank vessel or barge, the plan holder shall maintain or have available under contract within the plan holder's region of operation or another approved location, sufficient oil discharge containment, storage, transfer, and cleanup equipment, personnel, and other resources to

(1) contain or control within 48 hours, and to clean up within the shortest possible time, that portion of the response planning standard volume that enters open water; and

(2) contain or control, and clean up within the shortest possible time consistent with minimizing damage to the environment, that portion of the response planning standard volume that enters a receiving environment other than open water.

(b) The response planning standard volume for a noncrude oil tank vessel or barge is equal to 15 percent of the total cargo volume of the oil tank vessel or barge. (Eff. 5/14/92, Register 122; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.441. Response planning standards for nontank vessels. (a) For a nontank vessel, the plan holder shall maintain or have available under contract or membership agreement within the plan holder's region of operation, sufficient oil discharge containment and control equipment and shall maintain or have available under contract or membership agreement within the plan holder’s region of operation or capable of arriving in the region of operation within 24 hours, sufficient storage, transfer, and cleanup equipment, personnel, and other resources to contain and control 15 percent of the maximum oil capacity of the nontank vessel within 48 hours. The plan holder must clean up the discharge within the shortest possible time consistent with minimizing damage to the environment.

(b) For purposes of AS 46.04.055(c)(1) and this section, “maximum oil capacity” means the

(1) total fuel tankage of the nontank vessel; or

(2) demonstrated actual maximum fuel volume that the vessel will carry in state waters, as certified by the vessel owner or operator. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

Editor's note: As of Register 170 (July 2004), the regulations attorney made a technical revision under AS 44.62.125(b)(6) to 18 AAC 75.441(a).

18 AAC 75.442. Response planning standards for multiple operations. For a facility having more than one category of operation that requires an approved oil discharge prevention and contingency plan, the plan holder must plan to respond to a discharge of the applicable response planning standard volume for each separate category of operation at the facility as established under 18 AAC 75.430 - 18 AAC 75.440. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.443. Prevention credits for nontank vessels. Repealed. (Eff. 11/27/2002, Register 164; repealed 9/4/2014, Register 211)

18 AAC 75.445. Approval criteria for oil discharge prevention and contingency plans. (a) The department will use the criteria set out in this section to review an oil discharge prevention and contingency plan submitted under 18 AAC 75.425.

(b) General response procedures. The plan must identify the maximum possible discharge that could occur at the facility or operation, and the general procedures to be followed in responding to a discharge of that magnitude, including the identification of resources in addition to those maintained by the plan holder or available under contract to meet the applicable response planning standard for that facility or operation.

(c) Deployment strategies. The plan must demonstrate that the identified personnel and equipment are sufficient to meet the applicable response planning standard and can be deployed and operating within the time specified under 18 AAC 75.430 - 18 AAC 75.442. The plan must state what conditions were assumed and must take into account the realistic maximum response operating limitation and their effects on response capability and the deployment of resources. Plans using contractual resources must demonstrate that the transition and substitution of equipment and resources will occur without interruption of response or cleanup.

(d) Response strategies. The response strategies must take into account the type of product discharged and must demonstrate that

(1) procedures are in place to stop the discharge at its source within the shortest possible time;

(2) for an exploration or production facility, a summary of planned methods, equipment, logistics, and time frames in place that provide for the control of a well blowout within 15 days; the plan holder shall certify that the plan holder has a blowout contingency plan and shall make the blowout contingency plan available to the department for inspection upon request under 18 AAC 75.480; the department may consult with the Alaska Oil and Gas Conservation Commission, the Department of Natural Resources, or other agencies to determine the adequacy of the planned methods, equipment, logistics, and time frames for the control of a well blowout;

(3) procedures and equipment are sufficient to monitor and track the discharge in order to ensure proper allocation and deployment of response personnel and equipment;

(4) sufficient oil discharge response equipment, personnel, and other resources are maintained and available for the specific purpose of preventing discharged oil from entering an environmentally sensitive area or an area of public concern that would likely be impacted if a discharge occurs, and that this equipment and personnel will be deployed and maintained on a time schedule that will protect those areas before oil reaches them according to the predicted oil trajectories for an oil discharge of the volumes established under 18 AAC 75.430 - 18 AAC 75.442; areas identified in the plan must include areas added by the department as a condition of plan approval;

(5) plan strategies are sufficient to meet the applicable response planning standard established under 18 AAC 75.430 - 18 AAC 75.442 for containment, control, recovery, transfer, storage, and cleanup within the specified time and under environmental conditions that might reasonably be expected to occur at the discharge site;

(6) there is access to sufficient lightering equipment and personnel to transfer all oil from damaged tanks and from undamaged tanks if the risk of an additional discharge is present; the plan must provide for commencement and completion of lightering within the shortest possible time, consistent with ensuring the safety of personnel; and

(7) adequate temporary storage and removal capacity for recovered oil and oily wastes will be available at or near the site of the spill to keep up with the skimming and recovery operations and to meet the applicable planning standard established under 18 AAC 75.430 - 18 AAC 75.442 for control, containment, and cleanup; plans for temporary storage and ultimate disposal must include the specific actions to be taken to obtain all necessary permits and approvals.

(e) Receiving environment. For an onshore facility or operation, the applicant must determine and clearly demonstrate that, based on an analysis of the facility or operation, resources identified in the plan are sufficient to clean up that portion of a discharge of the applicable planning standard volume that might realistically be expected to reach open water within the applicable time limit set out in 18 AAC 75.430 - 18 AAC 75.442.

(f) Realistic maximum response operating limitations. In designing a spill response, severe weather and environmental limitations that might be reasonably expected to occur during a discharge event must be identified. The plan must use realistic efficiency rates for the specified response methods to account for the reduction of control or removal rates under those severe weather or other environmental limitations that might reasonably be expected to occur. The department may require the plan holder to take specific temporary prevention or response measures until environmental conditions improve to reduce the risk or magnitude of an oil discharge during periods when planned mechanical spill response options are rendered ineffective by environmental limitations. Plans that propose the use of nonmechanical response options under 18 AAC 75.425(e)(3)(D) must meet the requirements of 18 AAC 75.425(e)(1)(G), 18 AAC 75.425(e)(3)(G), and (h) of this section.

(g) Response equipment. Response equipment identified in the plan must meet the following conditions:

(1) the applicant must have ready access to enough equipment to meet the applicable response planning standards established under 18 AAC 75.430 - 18 AAC 75.442 using mechanical methods of oil control, containment, and cleanup;

(2) identified equipment must reflect the best available technology at the time the plan is submitted or renewed;

(3) types and amounts of boom, boom connectors, and anchorage devices must be of the appropriate design for the particular oil product, type of environment, and environmental conditions experienced at the facility or operation; the boom must be of sufficient length to mount an effective response to the volume of discharged oil established under 18 AAC 75.430 - 18 AAC 75.442 for each type of facility or operation;

(4) vessels used to deploy and tow boom must be of a number, size, and power adequate to deploy the types and amounts of boom addressed in (3) of this subsection and must be capable of operating in the manner and at the speeds necessary for the effective use of boom;

(5) the number and size of skimmers and pumps to be used must be appropriate and adequate for recovery of the response planning standard volume of the type of oil discharged within the response planning standard time frame for cleanup established under 18 AAC 75.430 - 18 AAC 75.442, using an effective oil recovery capacity of 20 percent of the equipment manufacturer's rated throughput capacity over a 24-hour period, unless an analysis demonstrates to the satisfaction of the department that another effective daily oil recovery capacity is appropriate; equipment types must be compatible with each other as necessary to ensure an efficient response;

(6) the capacity of the temporary storage system for recovered oil and oil wastes must be appropriate and adequate for the total volume recovered within the response planning standard time frames for cleanup established under 18 AAC 75.430 – 18 AAC 75.442.

(h) Nonmechanical response information. Plans which propose the use of dispersants, in situ burning, or other nonmechanical response techniques during periods when environmental conditions or other factors limit the use of mechanical spill response methods must demonstrate their efficiency and effectiveness and must include a full assessment of potential environmental consequences, provisions for continuous monitoring and real-time assessment of environmental effects, and full compliance with all applicable approval requirements. If in situ burning is proposed as a response technique, a completed application for approval by the department must be included.

(i) Oil Spill Primary Response Action Contractor Information. If a plan holder proposes to use the services of an oil spill primary response action contractor to meet a requirement of AS 46.04.030 or 18 AAC 75.432 - 18 AAC 75.442, the contractor must be registered under 18 AAC 75.500 - 18 AAC 75.580. The plan holder shall include a correct and complete list of each primary response action contractor, with name, address, telephone number, and affiliation by company, and, for each response action contract, a statement signed by the plan holder and the primary response action contractor attesting to the department that the contract

(1) clearly specifies that the contractor is obligated to

(A) provide the response services and equipment listed for that contractor in the contingency plan;

(B) respond if a discharge occurs;

(C) notify the plan holder immediately if the contractor cannot carry out the response actions specified in the contract or the contingency plan;

(D) give written notice at least 30 days before terminating its contract with the plan holder;

(E) respond to a department-conducted discharge exercise required of the plan holder; and

(F) continuously maintain in a state of readiness, in accordance with industry standards, the equipment and other spill response resources to be provided by the contractor under the contingency plan; and

(2) contains the provisions required under AS 46.04.030(q), if the contract is between the plan holder for a tank vessel or oil barge carrying crude oil that has been transported by the Trans Alaska Pipeline System and a primary response action contractor who is the common operating agent for the holders and lessees of the right-of-way agreement for the Trans Alaska Pipeline System.

(j) Training. In addition to maintaining continuous compliance with other applicable state and federal training requirements, the plan holder shall demonstrate that

(1) designated oil spill response personnel are trained and kept current in the specifics of plan implementation, including deployment of containment boom, operation of skimmers and lightering equipment, and organization and mobilization of personnel and resources;

(2) personnel are trained and kept current in methods of preventing oil discharges as required by 18 AAC 75.020; and

(3) proof of that training is maintained for five years and is made available to the department upon request.

(k) Best Available Technology Review. For purposes of 18 AAC 75.425(e)(4), the department will review a plan and make a best available technology determination using the following criteria, as applicable:

(1) technology used for oil discharge containment, storage, transfer, and cleanup to satisfy a response planning standard in 18 AAC 75.430 - 18 AAC 75.442 will be considered best available technology if the technology of the applicant's oil discharge response system as a whole is appropriate and reliable for the intended use as well as the magnitude of the applicable response planning standard;

(2) technology that complies with the performance standards of 18 AAC 75.005 - 18 AAC 75.080 and that is not subject to a best available technology review under 18 AAC 75.425(e)(4)(A), will be considered best available technology;

(3) technology identified under 18 AAC 75.425(e)(4)(A) will be evaluated using the following criteria, if applicable:

(A) whether each technology is the best in use in other similar situations and is available for use by the applicant;

(B) whether each technology is transferable to the applicant's operations;

(C) whether there is a reasonable expectation each technology will provide increased spill prevention or other environmental benefits;

(D) the cost to the applicant of achieving best available technology, including consideration of that cost relative to the remaining years of service of the technology in use by the applicant;

(E) the age and condition of the technology in use by the applicant;

(F) whether each technology is compatible with existing operations and technologies in use by the applicant;

(G) the practical feasibility of each technology in terms of engineering and other operational aspects; and

(H) whether other environmental impacts of each technology, such as air, land, water pollution, and energy requirements, offset any anticipated environmental benefits.

(*l*) If the department's determination under (k) of this section is that a technology proposed for use by the applicant is not the best available technology, the department will provide a written finding explaining its decision.

(m) Prevention Plan**.** The prevention plan required by 18 AAC 75.425(e)(2) must describe all oil discharge prevention programs in place at the facility or operation. The plan must demonstrate that the applicant meets all applicable requirements of 18 AAC 75.005 - 18 AAC 75.085 and 18 AAC 75.425(e)(2).

(n) Response Planning Standard. The response planning standard required by 18 AAC 75.425(e)(5) must provide a mathematical calculation of the applicable response planning standards set out in 18 AAC 75.430 – 18 AAC 75.440 and 18 AAC 75.422, and include a detailed calculation and justification of any reductions to the response planning standard. (Eff. 5/14/92, Register 122; am 9/25/93, Register 127; am 3/28/96, Register 137; am 4/4/97, Register 142; am 5/26/2004, Register 170; am 12/30/2006, Register 180)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070
AS 46.04.020 AS 46.04.035

Editor's note: As of Register 164 (January 2003), the regulations attorney made a technical revision under AS 44.62.125(b)(6), adding an authority citation for 18 AAC 75.445. In 1995, the revisor of statutes under AS 04.05.031, relettered former AS 46.04.030(r) as AS 46.04.030(q), and relettered former AS 46.04.030(q) as AS 46.04.030(r). As of Register 207 (October 2013), and acting under AS 44.62.125(b)(6), the regulations attorney made a conforming technical revision to 18 AAC 75.445(i), so that the cross-reference to former AS 46.04.030(r) now refers to the relettered subsection, AS 46.04.030(q).

18 AAC 75.446. Approval criteria for nontank vessel equivalent plans. Repealed (Eff. 11/27/2002, Register 164; am 4/16/2016, Register 218; repealed 3/23/2017, Register 221)

18 AAC 75.447. Department examination of new technologies. (a) To assure that proven new technologies are considered for use in oil discharge prevention and contingency plans, the department will review and appraise technology applied at other locations in the United States and the world that represent alternatives to the technologies used by plan holders in their oil discharge prevention and contingency plans submitted to meet response planning

standards in 18 AAC 75.430 - 18 AAC 75.442 and the performance standards of 18 AAC 75.005 - 18 AAC 75.080. The department will conduct this review and appraisal by

(1) sponsoring a technology conference at least every five years and in cooperation with persons, organizations, and groups with interests and expertise in relevant technologies; this conference will provide interested parties with an opportunity to describe the status of existing technologies in use as well as technologies that may be considered superior to those in use at that time; and

(2) engaging in studies, inquiries, surveys, or analyses the department believes appropriate to the consideration of new technologies.

(b) After its review and appraisal under (a) of this section, the department will issue written findings identifying new technologies that the department considers represent proven technological breakthroughs in oil discharge containment, control, or cleanup equipment. In its findings, the department will

(1) provide an evaluation of the technologies applied at other locations based on the applicable criteria in 18 AAC 75.445(k)(3);

(2) identify the evidence that clearly and convincingly supports the determination that the equipment represents a proven technology breakthrough that could result in superior advances in the efficiency or effectiveness of oil spill response efforts; and

(3) identify specific operations, geographical locations, or physical environments where the technology could be applied.

(c) If a finding is issued under (b) of this section, the department will inform plan holders, primary response action contractors, and other interested persons of the department's findings, the availability of the new technology, and the opportunity to submit comment on the report to the department. (Eff. 4/4/97, Register 142)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.455. Department review procedures for oil discharge prevention and contingency plans; new plans, plan renewals and major plan amendments. (a) Not later than seven working days after receipt of an oil discharge prevention and contingency plan application package for a new plan, plan renewal or major amendment, the department will determine if the application package is sufficient for review. If the application package is not sufficient for review, the department will notify the applicant in writing.

(b) When the department determines that an application package is sufficient for review, the department will

(1) notify the applicant in writing;

(2) direct the applicant to provide copies of the application package to reviewers in accordance with 18 AAC 75.408(c);

(3) set the public comment period for a minimum of 30 days; if the department determines the package to be unusually large or complex, or determines a longer comment period to be in the public interest, the department will set the public comment period for a maximum of 45 days;

(4) send a letter to the applicant, the parties specified in 18 AAC 75.408(c)(4), and other persons who have made a written request for information regarding submissions subject to review under this section; in the letter the department will include

(A) information on the public comment period established under (3) of this subsection; and

(B) a statement that the department will accept comments on the plan and proposed requests for additional information until the end of the public comment period; and

(5) direct the applicant to publish a one-time notice provided by the department announcing the public comment period for the plan; the applicant is responsible for paying the cost of the notice under this paragraph; the applicant must publish the notice in one or more publications of general circulation in the area that would be affected by the operation; in the notice the department will include

(A) a statement that a person may submit comments or propose requests for additional information by providing them to the department before the published deadline;

(B) information on the nature and location of the plan;

(C) a statement that a copy of the application package is available for review at specific offices of the department and other locations as determined by the department; and

(D) a statement that the package is available on the department's Internet website.

(c) If the department determines that additional information is required to evaluate if the application package is complete,

(1) the department will notify the applicant in writing that a request for additional information will be transmitted; the department will transmit the request for additional information not later than 90 days after the end of the public comment period in (b) of this section; the department may set a deadline for the submittal of the additional information;

(2) the applicant must provide responses to the department's requests for additional information as required by 18 AAC 75.408(c)(1) – (4) and (7);

(3) if the applicant has not provided the information requested or if the applicant's responses to requests for additional information cause the department to identify the need for additional information, the department will send subsequent requests for additional information until the department determines that the applicant has supplied the necessary information in response to the requests; and

(4) when the department has verified all requests have been addressed, the applicant must provide copies of the responses to the requests for additional information in accordance with 18 AAC 75.408(c)(1) – (4) and (7).

(d) Upon receipt by the department of the additional information requested under (c) of this section, the department will provide notice to the parties described in 18 AAC 75.408(c)(4) of a minimum 10-day public comment period on the additional information. The comment period under this subsection is limited to the additional information submitted in response to the request for additional information.

(e) The department will make a determination as to whether an application package is complete not later than seven working days after the end of the public comment period established in (d) of this section, or if no additional information was requested under (c) of this section, not later than seven working days after the end of the comment period established under (b)(3) of this section. The department will notify the applicant when the application package is complete.

(f) The department will, if it determines good cause exists, hold a public hearing on an application package in the manner provided under 18 AAC 15.060.

(g) Not later than 65 days after the department determines that an application package is complete under (e) of this section, the department will approve, approve with conditions, or disapprove a plan and issues a decision under 18 AAC 75.460.

(h) To assist the department in its review of oil discharge prevention and contingency plans under this chapter, the department will enter into an annual agreement with the Department of Natural Resources and the Department of Fish and Game to provide expertise regarding protection of fish and game, state land, areas of public concern, and environmentally sensitive areas. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 4/8/2012, Register 202; am 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.456. Department decision on nontank vessel streamlined oil discharge prevention and contingency plans. (a) The department will make a decision on a nontank vessel streamlined oil discharge prevention and contingency plan or plan amendment not later than five working days after receipt of a complete application. The department will approve a nontank vessel streamlined plan application submitted under 18 AAC 75.421 if the plan meets the following requirements:

(1) the information submitted conforms to the requirements of 18 AAC 75.426;

(2) any nontank vessel cleanup contractor identified under 18 AAC 75.426(11) is registered under 18 AAC 75.500 - 18 AAC 75.580 for the appropriate vessel fuel classification and region of operation identified in the application;

(3) any nontank vessel incident management team identified under 18 AAC 75.426(11) is registered under 18 AAC 75.500 - 18 AAC 75.580 for the appropriate vessel fuel classification and region of operation identified in the application;

(4) any response planning facilitator identified under 18 AAC 75.426(14) is registered under 18 AAC 75.500 – 18 AAC 75.580 to provide the appropriate response planning facilitation services identified in the application.

(b) A nontank vessel plan is effective for

(1) five years after the date the plan is approved by the department; or

(2) a time period shorter than five years, as specified in the department's approval letter.

(c) Nontank vessel plans are available for review as public records upon request to the department. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211; am 4/16/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.457. Emergency modification of review process. If, due to an emergency as described in AS 26.23, AS 46.04.080, or other applicable law, an applicant needs an expedited review, or if the commissioner or the commissioner's designee finds that an expedited review is necessary for the preservation of the public peace, health, safety, or general welfare, the commissioner or the commissioner's designee may, consistent with the requirements of AS 46.04.030(j), modify the review process established in 18 AAC 75.455 as necessary to meet the emergency. Any modifications in the review process made under this section will be made in writing by the commissioner or the commissioner's designee based upon clear and convincing evidence of a need for the modification. (Eff. 5/14/92, Register 122; am 4/16/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.459. Preissuance conference. (a) At any time before the department's decision under 18 AAC 75.460, the applicant may request a preissuance conference from the appropriate department office. The request may be made orally, and will be granted if the applicant demonstrates that holding a conference will materially aid the department in reaching its decision.

(b) A preissuance conference under this section will be conducted in the manner provided under 18 AAC 15.070. However, the time period for the department's review will not be held in abeyance pending completion of the conference. (Eff. 5/14/92, Register 122; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

Editor's note: As of Register 164 (January 2003), the regulations attorney made a technical revision under AS 44.62.125 (b)(6), adding an authority citation for 18 AAC 75.459.

18 AAC 75.460. Department decision on oil discharge prevention and contingency plans; new plans, plan renewals, and major plan amendments. (a) After considering the information, analyses, and commitments contained in a complete application package for approval of an oil discharge prevention and contingency plan and comments received not later than the close of the public comment period set out in 18 AAC 75.455, the department will approve, approve with conditions, or disapprove an oil discharge prevention and contingency plan.

(b) A decision issued under (a) of this section will include

(1) the department’s written decision, if it is the department's determination that an oil discharge prevention and contingency plan approval should be issued; the department will provide a summary of the basis for its decision to approve a plan, disapprove a plan, or subject a plan to conditions specific to the activity;

(2) a statement that, if aggrieved by the department's decision, the applicant or any person who submitted comments on the application not later than the close of the public comment period set out in 18 AAC 75.455 may request

(A) an informal review in accordance with 18 AAC 15.185; or

(B) an adjudicatory hearing by submitting the information required under 18 AAC 15.200(a), and that any hearing requested under this subparagraph will be subject to the procedures set out under 18 AAC 15.195 – 18 AAC 15.340; and

(3) a statement that the plan holder will provide copies of the approved plan in accordance with 18 AAC 75.408 not later than 30 days after approval; the department will send a notice by electronic mail to the parties specified in 18 AAC 75.408(c)(4) that the document is available on the department’s Internet website.

(c) The department's decision will be served on the applicant and each person who submitted comments on the application not later than the close of public comment period set out in 18 AAC 75.455(b), or the close of the public comment period set out in 18 AAC 75.455(d) if the request for additional information was made. The applicant and any person who submitted comments on the application not later than the close of the public comment period set out in 18 AAC 75.455(b), or the close of the public comment period set out in 18 AAC 75.455(d) if a request for additional information was made, may request an informal review in accordance with 18 AAC 15.185 or an adjudicatory hearing in accordance with 18 AAC 15. 195 - 18 AAC

15.340. An informal review request must be delivered in accordance with 18 AAC 15.185 to the Anchorage office of the director of the department division that oversees spill prevention and response. An adjudicatory hearing request must be delivered in accordance with 18 AAC 15.200 to the Juneau office of the commissioner.

(d) An approval under this section is effective for

(1) five years after the date it is issued;

(2) a time period shorter than five years, as specified in the department's approval letter and certificate. (Eff. 5/14/92, Register 122; am 7/11/2002, Register 163; am 11/27/2002, Register 164; am 9/4/2014, Register 211; am 4/16/2016, Register 218; am 3/23/2017, Register 221; am 10/27/2018, Register 228)

Authority: AS 46.03.020 AS 46.04.070 AS 46.04.890
AS 46.04.030

Editor's note: The mailing address for informal review requests for purposes of 18 AAC 75.460 is Department of Environmental Conservation, Office of the Director, Division of Spill Prevention and Response, 555 Cordova Street, Anchorage, Alaska 99501 – 2617. The mailing address for adjudicatory hearing requests is Department of Environmental Conservation, Office of the Commissioner, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801.

Department of Environmental Conservation approval under 18 AAC 75.460 does not negate any other requirement for approval to operate under other statutes or regulations.

18 AAC 75.465. Proof of approved plan. (a) The owner or operator of an oil terminal facility may not cause or permit the transfer of oil to or from a vessel, barge, or railroad tank car unless

(1) the operator of the vessel, barge, or railroad tank car has produced for inspection by the facility owner or operator the original certificate, or a true photocopy of the original, approving the oil discharge prevention and contingency plan or nontank vessel plan for that operation; and

(2) the operator of the vessel or barge has certified, on a contingency plan verification log supplied by the department and maintained by the owner or operator of the oil terminal facility, that copies of the response action and prevention plan sections of the current approved oil discharge prevention and contingency plan, or the original certificate or a true photocopy of the original nontank vessel plan approval certificate, for that vessel or barge is on board the vessel or barge, or for a railroad tank car is available from the operator of the railroad tank car.

(b) The owner or operator of an oil terminal facility shall certify on the contingency plan verification log that the operator of the vessel or barge has complied with (a)(1) and (a)(2) of this section. The facility owner or operator shall maintain the log on a monthly basis and shall submit the log for the previous month to the department not later than the fifth day of the following month. Submission is effective upon personal delivery, facsimile transmission, or electronic mail transmission, or on the date of mailing by certified mail to the department. The

department will retain copies of all logs received under this subsection for five years after receipt.

(c) On the first working day after the operator of a vessel or railroad tank car fails to comply with the requirements of (a)(1) or (2) of this section, the oil terminal facility owner or operator shall report that failure to the department by telephone, electronic mail or facsimile transmission.

(d) Verification and entry on the contingency plan verification log referred to under (b) of this section is required for each separate loading or unloading operation of a vessel at an oil terminal facility.

(e) Any tank vessel, oil barge, or railroad tank car required to have a plan under AS 46.04.030 and 46.04.055 and approved under 18 AAC 75.460(a) must have the original or true photocopy of the following on board the tank vessel or oil barge and available for inspection when operating in state waters, or for a railroad tank car, available from the operator of the railroad tank car:

(1) copies of the response action and prevention plan sections of the current approved oil discharge prevention and contingency plan;

(2) the approval letter and certificate of approval issued by the department; and

(3) any additional department approval letters issued after initial plan approval is granted.

(f) A nontank vessel required to have a plan under AS 46.04.030 and 46.04.055 and approved under 18 AAC 75.456(a) must have the original or true photocopy of the following on board the vessel and available for inspection when operating in state waters:

(1) the approved nontank vessel streamlined plan;

(2) the approval letter and certificate of approval issued by the department; and

(3) any additional department approval letters issued after initial plan approval is granted. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 12/14/2002, Register 164; am 4/16/2016, Register 218)

Authority: AS 46.03.020 AS 46.04.050 AS 46.04.070
AS 46.04.030 AS 46.04.055 AS 46.04.900

18 AAC 75.470. Transfers between plan holders. (a) If approved under this section, a plan holder, or an oil spill response contractor or cooperative upon which one or more plan holders rely, may furnish to another plan holder or to another person, equipment, materials, or personnel to assist in response to an oil discharge. A description of the proposed transfer that addresses each of the considerations set out in (b) of this section must be provided with the request for approval of a transfer.

(b) The department will, in its discretion, approve a transfer under this section after considering

(1) for a provider of oil spill response equipment, materials, or personnel:

(A) the amount and types of equipment, personnel, or other resources to be transferred in response to a discharge and where it will be transferred;

(B) the number and types of other plan holders who rely upon the provider's response equipment, personnel, and other resources;

(C) the percentage by which the provider's response capability will be reduced by the transfer;

(D) the ability of the provider to acquire and deploy alternate response equipment if an emergency discharge occurs while equipment, materials, or personnel are transferred; and

(E) any compensating measures that will be taken by the provider to prevent or reduce the size of potential discharges during the period of reduced response capability; and

(2) for a plan holder receiving the equipment, the time estimated for the response equipment to reach the discharge.

(c) The department will, in its discretion, attach terms and conditions to an approval issued under (b) of this section.

(d) The provider shall reorder and replace equipment or materials that are

(1) exhausted, lost, destroyed, or rendered inoperable as soon the condition is known by the provider; and

(2) not expected to be returned, such as sorbent boom, sorbent pads, and dispersant, as soon as they are transferred.

(e) If equipment, materials, or personnel are not replaced or returned to the provider within 30 days after the transfer, the plan holder may request an extension from the department. If the extension is denied, the provider must apply for approval of an amendment to its approved prevention and contingency plan under 18 AAC 75.415.

(f) Except in response to a major or catastrophic discharge, the department will not approve a transfer of equipment, materials, or personnel to another plan holder if the provider's spill response capability would be reduced to less than 40 percent of the response capability identified in its plan. If a major or catastrophic oil discharge occurs, the department will, in its discretion, approve an immediate transfer of up to 100 percent of the provider's response equipment, personnel, and other resources.

(g) The department will issue a verbal approval for a transfer if a discharge poses an imminent threat to life, property, the environment, or other significant public concern. The verbal approval will be verified in writing by the department. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070

18 AAC 75.475. Notification of nonreadiness. (a) All spill response and other equipment identified in the approved oil discharge prevention and contingency plan or nontank vessel plan to meet the response planning standards set out at 18 AAC 75.430 - 18 AAC 75.442 must be maintained in operational condition. Any equipment found not to be operating properly must be repaired or replaced immediately.

(b) Except for a transfer approved under 18 AAC 75.470, if a significant change occurs in, or is made to, any component of a plan that would diminish the plan holder's response capability, the plan holder shall, within 24 hours, notify the department in writing and provide a schedule for a prompt return to operational status. An electronic mail or facsimile transmission delivered to the appropriate department office will be considered written notice for purposes of this subsection. If the department finds that, as a result of the change, the plan holder is no longer able to execute the plan, it will take appropriate action under 18 AAC 75.490.

(c) Notwithstanding (a) and (b) of this section, removal or inactivation of any major response item for maintenance or repair must be approved by the department before removal or inactivation. A request under this subsection must be submitted at least 10 days before the scheduled action or as soon as possible for an unanticipated repair. The request must state what substitute or temporary measures will be taken to provide equivalent response capability, reduce the time out of service, or otherwise ensure that equivalent response capability is maintained.

(d) A plan holder shall notify the department in writing within 24 hours if a significant change occurs in, or is made to, one or more of the following systems, and if, as a result of that change, the system no longer meets the applicable performance requirements;

(1) a leak detection system required by 18 AAC 75.047(d)(1);

(2) a leak detection system required by 18 AAC 75.055(a),

(3) a secondary containment system required by 18 AAC 75.075. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 12/30/2006, Register 180; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.480. Inspections. (a) To verify compliance with the provisions of AS 46.04.030, AS 46.04.055, and 18 AAC 75.400 - 18 AAC 75.496, the department may conduct announced and unannounced inspections of a vessel, barge, pipeline, or other operation that is subject to the requirements of AS 46.04.030, AS 46.04.055, and 18 AAC 75.400 -

18 AAC 75.496. If practicable, an inspection under this section will be coordinated with other regulatory agencies.

(b) Based on the results of an inspection made under this section, the department will, in its discretion, take appropriate action under 18 AAC 75.490. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.065
AS 46.04.030 AS 46.04.060 AS 46.04.070

18 AAC 75.485. Discharge exercises. (a) The department may conduct announced and unannounced discharge exercises to assure that an oil discharge prevention and contingency plan or nontank vessel plan is adequate in content and execution. No more than two exercises will be required for an oil discharge prevention and contingency plan in each 12-month period, unless an exercise demonstrates, in the department's judgment, a plan holder's failure to implement the plan effectively.

(b) Execution of a plan during a discharge exercise will be considered inadequate if the readiness for response and response performance stated in the plan are significantly deficient due to inadequate mobilization or performance of personnel, equipment, other resources, or other factors, including the mobilization or performance of a response action contractor identified under 18 AAC 75.445(i).

(c) If a plan holder cannot adequately execute the plan during a discharge exercise, the department will, in its discretion,

(1) require additional exercises until it is satisfied that the prevention and contingency plan and its execution are adequate; or

(2) take other appropriate action as described at 18 AAC 75.490.

(d) The department will consider a regularly scheduled training exercise initiated by a plan holder as a discharge exercise if the department monitors, evaluates, or participates in the exercise and concurs that it is equivalent to a discharge exercise conducted by the department. A plan holder shall notify the department in advance of the exercise and shall provide an opportunity for a department representative to be present and participate.

(e) The department will conduct announced or unannounced discharge exercises appropriate to the plan holder's current status of operations. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; 3/23/2017, Register 221)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

18 AAC 75.490. Failure to comply. (a) If a plan holder fails to comply with an approved oil discharge prevention and contingency plan or nontank vessel plan, demonstrates an inability to maintain continuous access to the quality or quantity of resources identified in the

plan, fails to respond with those resources in the shortest possible time if a discharge occurs, or is in any other way subject to the terms of AS 46.04.030(f)(1) - (4) or AS 46.04.055, the department may

(1) revoke the approval of the plan after notice and opportunity for hearing under (c) of this section;

(2) suspend its approval of the plan after notice and opportunity for hearing under (c) of this section, stating the conditions under which the department will reinstate the approval and allow operations to resume;

(3) order the plan holder to file an application to amend the plan within a specified time under 18 AAC 75.415; or

(4) take other necessary action to correct the failure to comply.

(b) If a plan holder fails to apply for an amendment as required under (a)(3) of this section, the department may revoke the approval of the plan after notice and opportunity for hearing under (c) of this section.

(c) If the department issues a notice of intent to revoke an approval under this chapter, the plan holder may request an adjudicatory hearing under 18 AAC 15.195 – 18 AAC 15.340. (Eff. 5/14/92, Register 122; am 7/11/2002, Register 163; am 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.03.740 AS 46.03.745 AS 46.03.750 AS 46.04.030 AS 46.04.055 AS 46.04.070 AS 46.04.890 AS 46.35.090

18 AAC 75.495. Regional master discharge prevention and contingency plan boundaries. (a) The regions described in this subsection and depicted on the map at Figure 1 are established for the purpose of preparing a regional master oil and hazardous substance discharge prevention and contingency plan as required by AS 46.04.210:

(1) Southeast Alaska Region: that area of the state east of 142E W. longitude and south of a line just west of Icy Bay that connects the U.S.-Canadian border with the Gulf of Alaska, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(2) Prince William Sound Region: that area south of 63E30' N. latitude, west of the region described in (1) of this subsection, and east of the region described in (3) of this subsection, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(3) Cook Inlet Region: that area encompassed by the boundaries of the Kenai Peninsula Borough, the Municipality of Anchorage, and the Matanuska-Susitna Borough,

including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(4) Kodiak Island Region: that area encompassed by the boundaries of the Kodiak Island Borough, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(5) Aleutian Region: those areas encompassed by the boundaries of the Aleutians East Borough, the Aleutians West Coastal Resource Service Area, and the Pribilof Islands, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(6) Bristol Bay Region: that area encompassed by the boundaries of the Bristol Bay Coastal Resource Service Area, the Bristol Bay Borough, and the Lake and Peninsula Borough, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(7) Western Alaska Region: that area north of the area described in (6) of this subsection, encompassed by the boundaries of the southernmost boundary of the Bering Straits Regional Corporation, and Iditarod and Kuspuk Regional Educational Attendance Areas, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(8) Northwest Arctic Region: that area encompassed by the Northwest Arctic Borough and the Bering Straits Regional Corporation, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured;

(9) North Slope Region: that area encompassed by the boundaries of the North Slope Borough, including adjacent shorelines and state waters, and having as its seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured; and

(10) Interior Alaska Region: that area of the state not included in (1) - (9) of this subsection.

(b) If the department finds that a discharge that could occur in an area beyond the territorial sea would not have a significant adverse impact on the resources of the state or on other interests of the state, the department will, in its discretion, adjust the seaward boundary of a region established in (a) of this section to exclude that area. (Eff. 5/14/92, Register 122; am 11/27/2002, Register 164; am 10/9/2008, Register 188)

Authority: AS 46.03.020 AS 46.04.070 AS 46.04.210

18 AAC 75.496. Regional response operations plan boundaries for nontank vessels. The regions described in this section and depicted on the map at Figure 1 are established for the purpose of establishing boundaries for nontank vessel plans:

(1) Southeast Alaska Region: that area of the state east of 142º W. longitude and south of a line just west of Icy Bay that connects the U.S. - Canadian border with the Gulf of Alaska, including adjacent shorelines and state waters;

(2) Prince William Sound Region: that area south of 63º30' N. latitude, west of the region described in (1) of this section, and east of the region described in (3) of this section, including adjacent shorelines and state waters;

(3) Cook Inlet Region: that area encompassed by the boundaries of the Kenai Peninsula Borough, the Municipality of Anchorage, and the Matanuska-Susitna Borough, including adjacent shorelines and state waters;

(4) Kodiak Island Region: that area encompassed by the boundaries of the Kodiak Island Borough, including adjacent shorelines and state waters;

(5) Aleutian Region: those areas encompassed by the boundaries of the Aleutians East Borough, the Aleutians West Coastal Resource Service Area, and the Pribilof Islands, including adjacent shorelines and state waters;

(6) Bristol Bay Region: that area encompassed by the boundaries of the Bristol Bay Coastal Resource Service Area, the Bristol Bay Borough, and the Lake and Peninsula Borough, including adjacent shorelines and state waters;

(7) Western Alaska Region: that area north of the area described in (6) of this section, encompassed by the boundaries of the southernmost boundary of the Bering Straits Regional Corporation, and Iditarod and Kuspuk Regional Educational Attendance Areas, including adjacent shorelines and state waters;

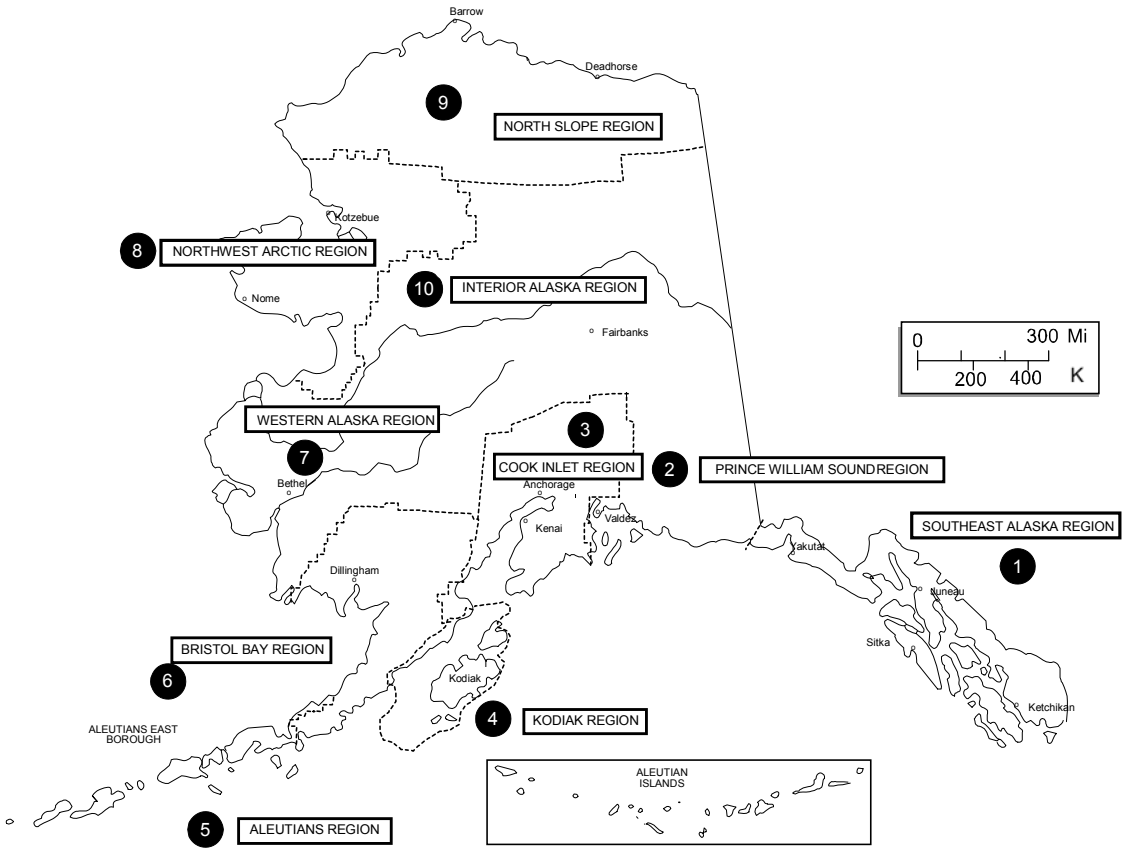
(8) Northwest Arctic Region: that area encompassed by the Northwest Arctic Borough and the Bering Straits Regional Corporation, including adjacent shorelines and state waters;

(9) North Slope Region: that area encompassed by the boundaries of the North Slope Borough, including adjacent shorelines and state waters;

(10) Interior Alaska Region: that area of the state not included in (1) - (9) of this section. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.030

Figure 1. Regional Response Operations Plan Boundaries (18 AAC 75.496)



Article 5. Oil Spill Primary Response Action Contractors.

Section

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501. Applicability with respect to nontank vessel cleanup contractors, nontank vessel incident management teams, and response planning facilitators
510. General provisions
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521. Application for nontank vessel cleanup contractor registration
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530. Registration application contents for oil spill primary response action contractors
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562. Minimum registration standards for nontank vessel incident management teams
563. Minimum registration standards for response planning facilitators
565. Discharge exercises for nontank vessel cleanup contractors and nontank vessel incident management teams
570. Failure to comply
580. Voluntary termination of registration

18 AAC 75.500. Definition of oil spill primary response action contractor; applicability. (a) As used in AS 46.04.035 and 18 AAC 75.500 - 18 AAC 75.580, "oil spill primary response action contractor" means a person who is or intends to be obligated under contract to the holder of an approved oil discharge prevention and contingency plan issued under AS 46.04.030 to provide resources or equipment to contain, control, or clean up an oil discharge. "Oil spill primary response action contractor" does not include

(1) a person who provides only ancillary services or equipment not for the specific purpose of containing, controlling, or cleaning up an oil discharge; or

(2) an approved oil discharge prevention and contingency plan holder who provides to another plan holder resources or equipment to contain, control, or clean up an oil discharge.

(b) A response action contractor is not required to register under 18 AAC 75.500 - 18 AAC 75.580 unless the contractor is directly obligated to a plan holder by contract to provide spill response resources to meet the requirements of AS 46.04.030 and 18 AAC 75.400 - 18 AAC 75.495 and is listed in that plan holder's oil discharge prevention and contingency plan as providing all or part of the response resources required to demonstrate compliance with an applicable response planning standard under 18 AAC 75.432 - 18 AAC 75.442.

(c) The holder of an approved oil discharge prevention and contingency plan whose resources are listed in the plan of another plan holder to meet the requirements of AS 46.04.030 and 18 AAC 75.400 - 18 AAC 75.495 is not required to register as an oil spill primary response action contractor, but is subject to all other requirements of 18 AAC 75.425(e)(3)(H) and 18 AAC 75.445(i)(1) and (2).

(d) Any person may apply to the department for registration under 18 AAC 75.500 - 18 AAC 75.580 as an oil spill primary response action contractor. (Eff. 9/25/93, Register 127; am 3/28/96, Register 137)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070
AS 46.03.825 AS 46.04.035

Editor's note: As of Register 164 (January 2003), the regulations attorney made a technical revision under AS 44.62.125(b)(6), adding an authority citation for 18 AAC 75.500.

18 AAC 75.501. Applicability with respect to nontank vessel cleanup contractors, nontank vessel incident management teams, and response planning facilitators. (a) The department will not consider a person to be a nontank vessel cleanup contractor, nontank vessel incident management team, or response planning facilitator, or to be otherwise subject to the registration requirements of AS 46.04.055 and 18 AAC 75.500 - 18 AAC 75.580, if the person

(1) provides only ancillary services or equipment not for the specific purpose of

(A) containing, controlling, or cleaning up an oil discharge under a contract or membership agreement to meet all or part of the requirements of AS 46.04.055 and 18 AAC 75.400 - 18 AAC 75.496;

(B) providing incident management services for a spill under a contract to meet all or part of the requirements of AS 46.04.055 and 18 AAC 75.400 - 18 AAC 75.496; or

(C) response plan facilitation to develop the response operations plan under 18 AAC 75.428 to meet all or part of the requirements of AS 46.04.055 and 18 AAC 75.400 - 18 AAC 75.496; or

(2) is an approved oil discharge prevention and contingency plan holder or nontank vessel plan holder who provides to another plan holder resources or equipment to

(A) contain, control, or clean up an oil discharge;

(B) provide incident management services for a spill; or

(C) provide response plan facilitation services.

(b) A nontank vessel cleanup contractor is not required to register under this chapter unless that contractor is listed in a nontank vessel plan as providing containment, control, or cleanup actions under a contract or membership agreement to meet all or part of the requirements of AS 46.04.055 and 18 AAC 75.400 – 18 AAC 75.496.

(c) A nontank vessel incident management team is not required to register under this chapter unless that team is listed in a nontank vessel plan as providing incident management team services under a contract to meet all or part of the requirements of AS 46.04.055 and 18 AAC 75.400 – 18 AAC 75.496.

(d) A response planning facilitator is not required to register under this chapter unless that facilitator is listed in a nontank vessel plan as providing response planning facilitation services under 18 AAC 75.428 to meet all or part of the requirements of AS 46.04.055 and 18 AAC 75.400 – 18 AAC 75.496.

(e) Nothing in this chapter prohibits a person from registering as more than one of the following, in order to provide more than one type of response action for nontank vessels:

(1) a nontank vessel cleanup contractor;

(2) a nontank vessel incident management team;

(3) a response planning facilitator. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.510. General provisions. (a) The resources of a response action contractor listed in an oil discharge prevention and contingency plan to contain, control, or clean up an oil discharge and to demonstrate compliance with all or part of a response planning standard under 18 AAC 75.432 - 18 AAC 75.442 will not be considered by the department in its review of the plan unless

(1) that person is registered as an oil spill primary response action contractor under 18 AAC 75.500 - 18 AAC 75.580; and

(2) all other requirements of 18 AAC 75.425(e)(3)(H) and 18 AAC 75.445(i) are met.

(b) Registration of an oil spill primary response action contractor by the department does not

(1) constitute an assurance by the department of the qualifications or abilities of that contractor;

(2) constitute an assurance by the department that the contractor will adequately respond to a release or threatened release of oil; or

(3) provide a defense to liability under state law. (Eff. 9/25/93, Register 127; am 3/28/96, Register 137)

Authority: AS 46.03.020 AS 46.04.030 AS 46.04.070
AS 46.03.825 AS 46.04.035

Editor's note: As of Register 164 (January 2003), the regulations attorney made a technical revision under AS 44.62.125(b)(6), adding an authority citation for 18 AAC 75.510.

18 AAC 75.520. Application for oil spill primary response action contractor registration or renewal. (a) Oil spill primary response action contractor registration under this section is effective for three years after the date of issuance under 18 AAC 75.550.

(b) A person seeking registration or renewal of registration as an oil spill primary response action contractor must submit an application, on a form provided by the department, to the contractor registration program, division of spill prevention and response within the department.

(c) An applicant for renewal of registration must submit an application no less than 60 days before the registration expires. If the information required by 18 AAC 75.530 has not changed since the previous application, the renewal application may incorporate the previous application by reference. (Eff. 9/25/93, Register 127; am 3/28/96, Register 137; am 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: An application for registration or renewal of registration as an oil spill primary response action contractor should be sent to Contractor Registration Program, Department of Environmental Conservation, Division of Spill Prevention and Response, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801 - 1795.

18 AAC 75.521. Application for nontank vessel cleanup contractor registration. (a) Nontank vessel cleanup contractor registration is effective for as long as the contractor is in compliance with the applicable requirements of this chapter.

(b) A person seeking registration as a nontank vessel cleanup contractor must submit an application, on a form provided by the department, to the nontank vessel cleanup contractor registration program, division of spill prevention and response within the department. The application must be submitted at least 60 days before the start of operations.

(c) Repealed 9/4/2014. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: An application for registration as a nontank vessel cleanup contractor should be sent to Nontank Vessel Cleanup Contractor Registration Program, Department of Environmental Conservation, Division of Spill Prevention and Response, 555 Cordova Street, Anchorage, Alaska 99501-2617.

18 AAC 75.522. Application for nontank vessel incident management team registration. (a) Nontank vessel incident management team registration is effective for as long as the contractor is in compliance with the applicable requirements of this chapter.

(b) A person seeking registration as a nontank vessel incident management team must submit an application, on a form provided by the department, to the nontank vessel cleanup contractor registration program, division of spill prevention and response within the department. The application must be submitted at least 60 days before the start of operations.

(c) Repealed 9/4/2014. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: An application for registration as a nontank vessel incident management team should be sent to Nontank Vessel Cleanup Contractor Registration Program, Department of Environmental Conservation, Division of Spill Prevention and Response, 555 Cordova Street, Anchorage, Alaska 99501-2617.

18 AAC 75.523. Application for response planning facilitator registration. (a) A response planning facilitator registration is effective for as long as the contractor is in compliance with the applicable requirements of this chapter.

(b) A person seeking registration as a response planning facilitator must submit an application, on a form provided by the department, to the nontank vessel cleanup contractor registration program, division of spill prevention and response within the department. The application must be submitted at least 60 days before the start of operations.

(c) Repealed 9/4/2014. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: An application for registration as a response planning facilitator should be sent to Nontank Vessel Cleanup Contractor Registration Program, Department of Environmental Conservation, Division of Spill Prevention and Response, 555 Cordova Street, Anchorage, Alaska 99501-2617.

18 AAC 75.530. Registration application contents for oil spill primary response action contractors for oil discharge prevention and contingency plans. (a) An application required under 18 AAC 75.520(b) must

(1) include the applicant's name, address, telephone number, and facsimile machine number;

(2) identify each region described in 18 AAC 75.495 where the applicant’s oil spill response resources will be made available for use by a contingency plan holder;

(3) include a call-out list of appropriate response personnel or identify any

(A) labor subcontractor; and

(B) labor contract to supply response personnel;

(4) completely describe the most recent inventory of the applicant's oil spill response resources available for mobilization and deployment to each of the geographic regions identified in (2) of this subsection, including

(A) the number and location of trained personnel;

(B) a description of the applicant's minimum training requirements for response personnel and procedures for training additional personnel if needed; and

(C) the amount and location of

(i) oil containment equipment;

(ii) oil recovery equipment, including equipment nameplate ratings in barrels per hour;

(iii) transfer, storage, and disposal equipment;

(iv) dispersant or burning equipment; and

(v) significant ancillary resources and equipment; and

(5) describe the applicant's previous oil spill activities and history of compliance with state and federal environmental laws.

(b) Instead of submitting the information required under (a)(4) and (5) of this section, an applicant may submit a complete copy of an application for and a certified copy of the applicant's current Interim or Final Letter of Classification as an Oil Spill Removal Organization issued by the United States Coast Guard. If a letter of classification has not been issued at the time of application, the applicant shall submit a certified copy of the letter of classification upon its receipt. (Eff. 9/25/93, Register 127; am 3/28/96, Register 137)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030

18 AAC 75.531. Registration application contents for nontank vessel cleanup contractors. An application submitted under 18 AAC 75.521 must include the following information:

(1) the applicant's name, address, and telephone number, and any facsimile number;

(2) a current list of nontank vessel plans that rely on the contracted services of the applicant, the number of vessels covered by those plans, and the largest vessel response planning standard volume;

(3) the vessel fuel classification under 18 AAC 75.561(b)(1), Table F, for which application is made; the vessel fuel classification must correspond to the response planning standard volume specified under (2) of this subsection;

(4) each region of operation for which application is made; the applicant’s equipment required under 18 AAC 75.561(b)(1), Table F, must be available for use by a plan holder in each region of operation for which application is made;

(5) a current inventory of equipment, and description of personnel and other resources, demonstrating that the applicant meets or exceeds the requirements of 18 AAC 75.561 for each vessel fuel classification for which application is made;

(6) the location of personnel and equipment required under 18 AAC 75.561(b)(1), Table F;

(7) a description of previous oil spill response activities and a history of compliance with state and federal environmental laws;

(8) a statement, signed by the contractor, that each contract or membership agreement will obligate the contractor to

(A) respond upon notification by the plan holder or response planning facilitator, as applicable;

(B) notify the plan holder or response planning facilitator, as applicable, immediately if the contractor cannot carry out the services specified in the contract, membership agreement, or nontank vessel plan;

(C) give written notice at least 30 days before terminating the contract or membership agreement with the plan holder or the response planning facilitator, as applicable; and

(D) in accordance with industry standards, maintain the equipment and other spill response resources listed in the application in a state of readiness;

(9) a certification, under penalty of unsworn falsification in violation of AS 11.56.210, that the statements made in the application are correct to the best of the applicant's knowledge;

(10) an acknowledgment that knowingly providing false information, or a demonstrated inability to perform the services described in the application, may result in the revocation of registration. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: As of Register 221 (April 2017), the regulations attorney made technical corrections under AS 44.62.125(b)(6), to 18 AAC 75.531, changing cross-referenced table headers from "Table G" to "Table F" to reflect the agency's repeal of 18 AAC 75.446, including former Table F, as part of amendments that took effect March 23, 2017, Register 221.

18 AAC 75.532. Registration application contents for nontank vessel incident management teams. An application submitted under 18 AAC 75.522 must include the following information:

(1) the applicant's name, address, and telephone number, and any facsimile number;

(2) a current list of nontank vessel plans that rely on the contracted services of the applicant, the number of vessels covered by those plans, and the largest vessel response planning standard volume;

(3) the vessel fuel classification under 18 AAC 75.562(b), Table G, for which application is made; the vessel fuel classification must correspond to the response planning standard volume specified under (2) of this section;

(4) each region of operation for which application is made; the personnel required under 18 AAC 75.562(b), Table G, must be available for use by a plan holder in each region of operation for which application is made;

(5) a list of identified personnel required by 18 AAC 75.562(b), Table G, for each vessel fuel classification for which application is made; the list must

(A) provide the individual's name, emergency contact information, training, and experience; and

(B) demonstrate that the applicant meets or exceeds the requirements of 18 AAC 75.562 for each vessel fuel classification for which application is made;

(6) the location of identified personnel listed under (5) of this section, and the location of other resources;

(7) a description of previous oil spill response activities and a history of compliance with state and federal environmental laws;

(8) a list of the sources of available personnel required by 18 AAC 75.562(b), Table G, for each vessel fuel classification for which application is made; the list need not identify available personnel by name; however, the list must describe additional personnel resources available through contract or other means, and must describe the experience and training, location, and approximate timeframes for mobilization of those personnel resources, up to and including the maximum number of available personnel;

(9) a statement, signed by the contractor, that each contract will obligate the contractor to

(A) respond upon notification by the plan holder or response planning facilitator, as applicable;

(B) notify the plan holder or response planning facilitator, as applicable, immediately if the contractor cannot carry out the services specified in the contract or nontank vessel plan;

(C) give written notice at least 30 days before terminating the contract with the plan holder or the response planning facilitator, as applicable; and

(D) in accordance with industry standards, maintain the spill response resources listed in the application in a state of readiness;

(10) a certification, under penalty of unsworn falsification in violation of AS 11.56.210, that the statements made in the application are correct to the best of the applicant’s knowledge;

(11) an acknowledgment that knowingly providing false information, or a demonstrated inability to perform the services described in the application, may result in the revocation of registration. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: As of Register 221 (April 2017), the regulations attorney made technical corrections under AS 44.62.125(b)(6), to 18 AAC 75.532, changing cross-referenced table headers from "Table H" to "Table G" to reflect the agency's repeal of 18 AAC 75.446, including former Table F, as part of amendments that took effect March 23, 2017, Register 221.

18 AAC 75.533. Registration application contents for response planning facilitators. An application submitted under 18 AAC 75.523 must include the following information:

(1) the applicant's name, address, and telephone number, and any facsimile number;

(2) the role of the response planning facilitator, as described in 18 AAC 75.428(a)(1) or (2);

(3) as applicable under 18 AAC 75.428(a)(2), a current list of nontank vessel cleanup contractors with which the applicant has a contract, or of which the applicant is a member, and a statement, signed by the response planning facilitator and each nontank vessel cleanup contractor, that the nontank vessel cleanup contractor will respond on behalf of a plan holder who enters into a contract or membership agreement with the response planning facilitator to meet the requirements of 18 AAC 75.400 – 18 AAC 75.496;

(4) as applicable under 18 AAC 75.428(a)(2), a current list of each nontank vessel incident management team with which the applicant has a contract, and a statement, signed by the response planning facilitator and each nontank vessel incident management team, that the nontank vessel incident management team will respond on behalf of a plan holder who enters into a contract with the response planning facilitator to meet the requirements of 18 AAC 75.400 – 18 AAC 75.496;

(5) as applicable under 18 AAC 75.428(a)(2), a current list of each nontank vessel plan in which the applicant is identified as the contracted response planning facilitator, the number of vessels covered by each of those plans, each region of operation of each vessel covered by each plan, and the largest vessel response planning standard volume for each plan;

(6) as applicable under 18 AAC 75.428(a)(2), a statement, signed by the response planning facilitator, that each contract will obligate the response planning facilitator to

(A) activate the appropriate response resources if a discharge occurs;

(B) notify the plan holder immediately if the response planning facilitator cannot carry out the obligations specified in the contract; and

(C) give written notice at least 30 days before terminating the contract with the plan holder;

(7) a certification, under penalty of unsworn falsification in violation of AS 11.56.210, that the statements made in the application are correct to the best of the applicant's knowledge;

(8) an acknowledgment that knowingly providing false information, or a demonstrated inability to maintain the appropriate response planning facilitation services listed in the application, may result in the revocation of registration. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.540. Registration and renewal fees. (a) The following fees are established for registration of oil spill primary response action contractors, except as provided in (b) – (e) of this section, and must be submitted with the appropriate application:

(1) for initial application, $500;

(2) for renewal, $100.

(b) The department will charge a $500 fee for registration of nontank vessel cleanup contractors under 18 AAC 75.531.

(c) The department will charge a $500 fee for registration of nontank vessel incident management teams under 18 AAC 75.532.

(d) The department will charge a $100 fee for registration of response planning facilitators under 18 AAC 75.533.

(e) The department will not charge an additional fee for adding or deleting a region of operation to an existing registration under (b) or (c) of this section. (Eff. 9/25/93, Register 127; am 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.055 AS 46.04.070
AS 46.04.035

18 AAC 75.550. Application review procedures for oil spill primary response action contractors. (a) After receipt of an application for registration or renewal as an oil spill primary response action contractor, the department will determine whether the application is complete. If the department finds that an application is incomplete, the applicant will be notified of the need for additional information. The department will review each complete application and issue a decision.

(b) The department will approve an application for oil spill primary response action contractor registration or renewal of registration if the applicant meets the application requirements of 18 AAC 75.510 - 18 AAC 75.540 and the minimum registration standards of 18 AAC 75.560.

(c) After completing the review, the department will notify the applicant that the application for registration or renewal of registration has been approved or denied. If the application is approved, the department will include a registration certificate describing the conditions of approval, the date registration will expire, and each region of operation identified in 18 AAC 75.530(a)(2) for which the applicant is registered. If the application is denied, the department will explain the basis for the denial and include a list of corrective actions that would be required for the applicant to obtain approval of registration or renewal.

(d) Not later than 10 days after receiving an adverse decision under (c) of this section, the applicant may request an informal review of the decision by submitting a request to the division director under 18 AAC 15.185 or may request an adjudicatory hearing under AS 44.62 (Administrative Procedure Act) by submitting a request for hearing to the commissioner. Upon receipt of a timely request for an adjudicatory hearing, the commissioner will refer the matter to the office of administrative hearings (AS 44.64.010) for a hearing and a recommended decision under 2 AAC 64.100 – 2 AAC 64.990 to the commissioner or to the commissioner's designee if the designee is a person other than the person who issued the contested decision.

(e) Repealed 7/11/2002.

(f) Repealed 7/11/2002.

(g) Repealed 7/11/2002.

(h) Repealed 7/11/2002.

(i) Repealed 7/11/2002. (Eff. 9/25/93, Register 127; am 3/28/96, Register 137; am 7/11/2002, Register 163; am 11/7/2017, Register 224)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030

Editor's note: As of Register 164 (January 2003), the regulations attorney made a technical revision under AS 44.62.125(b)(6), adding an authority citation for 18 AAC 75.550.

18 AAC 75.551. Application review procedures for nontank vessel cleanup contractors. (a) After receipt of an application for registration as a nontank vessel cleanup contractor under 18 AAC 75.521, the department will determine whether the application is complete. If the department finds that an application is incomplete, the applicant will be notified of the need for additional information within 10 working days after receipt of the application. The department will review each complete application and issue a decision within 30 days after the department determines that the application is complete.

(b) The department will approve an application for a nontank vessel cleanup contractor registration if the applicant meets the application requirements of 18 AAC 75.521 and 18 AAC 75.531 and the minimum registration standards of 18 AAC 75.561.

(c) After completing the review, the department will notify the applicant that the application for registration has been approved or denied. If the application is approved, the department will include a registration certificate describing the conditions of approval, and listing the vessel fuel classifications identified in 18 AAC 75.531(a)(3) and regions of operation identified in 18 AAC 75.531(a)(4) for which the applicant is registered. If the application is denied, the department will explain the basis for the denial and include a list of corrective actions that would be required for the applicant to obtain approval of registration.

(d) Not later than 10 days after receiving an adverse decision under (c) of this section, the applicant may request an informal review of the decision under 18 AAC 15.185 by submitting a request to the director of the division assigned to spill prevention and response within the department or request an adjudicatory hearing under AS 44.62 (Administrative Procedure Act) by submitting a request to the commissioner. Upon receipt of a timely request for adjudicatory hearing, the commissioner will refer the matter to the office of administrative hearings (AS 44.64.010) for a hearing and recommended decision under 2 AAC 64.100 - 2 AAC 64.990 to the commissioner or to the commissioner's designee if the designee is a person other than the person who issued the contested decision.

(e) Repealed 11/7/2017. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211; am 11/7/2017, Register 224)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.552. Application review procedures for nontank vessel incident management teams. (a) After receipt of an application for registration as an incident management team under 18 AAC 75.522, the department will determine whether the application is complete. If the department finds that an application is incomplete, the applicant will be notified of the need for additional information within 10 working days after receipt of the application. The department will review each complete application and issue a decision within 30 days after the department determines that the application is complete.

(b) The department will approve an application for nontank incident management team registration if the applicant meets the application requirements of 18 AAC 75.522 and 18 AAC 75.532 and the minimum registration standards of 18 AAC 75.562.

(c) After completing the review, the department will notify the applicant that the application for registration has been approved or denied. If the application is approved, the department will include a registration certificate describing the conditions of approval, and listing the vessel fuel classifications identified in 18 AAC 75.532(a)(3) and regions of operation identified in 18 AAC 75.532(a)(4) for which the applicant is registered. If the application is

denied, the department will explain the basis for the denial and include a list of corrective actions that would be required for the applicant to obtain approval of registration.

(d) Not later than 10 days after receiving an adverse decision under (c) of this section, the applicant may request an informal review of the decision under 18 AAC 15.185 by submitting a request to the director of the division assigned to spill prevention and response within the department or request an adjudicatory hearing under AS 44.62 (Administrative Procedure Act) by submitting a request to the commissioner. Upon receipt of a timely request for adjudicatory hearing, the commissioner will refer the matter to the office of administrative hearings (AS 44.64.010) for a hearing and recommended decision under 2 AAC 64.100 - 2 AAC 64.990 to the commissioner or to the commissioner's designee if the designee is a person other than the person who issued the contested decision.

(e) Repealed 11/7/2017. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211; am 11/7/2017, Register 224)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.553. Application review procedures for response planning facilitators. (a) After receipt of an application for registration as a response planning facilitator under 18 AAC 75.523, the department will determine whether the application is complete. If the department finds that an application is incomplete, the applicant will be notified of the need for additional information within 10 working days after receipt of the application. The department will review each complete application and issue a decision within 30 days after the department determines that the application is complete.

(b) The department will approve an application for a response planning facilitator registration if the applicant meets the application requirements of 18 AAC 75.523 and 18 AAC 75.533, the minimum registration standards of 18 AAC 75.563, and, as applicable, the registration requirements of 18 AAC 75.428(a)(2).

(c) After completing the review, the department will notify the applicant that the application for registration has been approved or denied. If the application is approved, the department will include a registration certificate describing the conditions of approval. If the application is denied, the department will explain the basis for the denial and include a list of corrective actions that would be required for the applicant to obtain approval of registration.

(d) Not later 10 days after receiving an adverse decision under (c) of this section, the applicant may request an informal review of the decision under 18 AAC 15.185 by submitting a request to the director of the division assigned to spill prevention and response within the department or request an adjudicatory hearing under AS 44.62 (Administrative Procedure Act) by submitting a request to the commissioner. Upon receipt of a timely request for adjudicatory hearing, the commissioner will refer the matter to the office of administrative hearings

(AS 44.64.010) for a hearing and recommended decision under 2 AAC 64.100 - 2 AAC 64.990 to the commissioner or to the commissioner's designee if the designee is a person other than the person who issued the contested decision.

(e) Repealed 11/7/2017. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211; am 11/7/2017, Register 224)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.560. Minimum registration standards for oil spill primary response action contractors. (a) In addition to the requirements of (b) of this section, the minimum registration standards and verification requirements for an oil spill primary response action contractor listed in an approved oil discharge prevention and contingency plan are the oil discharge prevention and contingency plan requirements and the response planning standards set out in AS 46.04.030 and 18 AAC 75.425 - 18 AAC 75.495 that are applicable to a contractor listed in an approved oil discharge prevention and contingency plan.

(b) In addition to the requirements of (a) of this section, an oil spill primary response action contractor must be in compliance with the following minimum registration standards:

(1) repealed 3/28/96;

(2) the contractor shall maintain sufficient response preparedness to immediately initiate response efforts as described in the applicable contingency plan upon direction by the plan holder; response preparedness is subject to department verification through inspections and plan holder discharge exercises at any location for which the plan holder has listed the contractor in an approved oil discharge prevention and contingency plan as providing response resources;

(3) training of contractor personnel must comply with 18 AAC 75.445(j) and must include appropriate Occupational Safety and Health Administration Hazardous Operations training;

(4) professional response action standards and practices must be continuously maintained, and must include

(A) responding immediately upon direction by the plan holder;

(B) remaining in substantial compliance with applicable contracts;

(C) abiding by applicable permits and authorizations unless directed to proceed otherwise by the federal or state on-scene coordinator;

(D) maintaining a working knowledge of all applicable oil pollution statutes and regulations and pertinent provisions of each contingency plan in which that contractor is listed;

(E) maintaining a safe working environment and an acceptable safety history;

(F) notifying a plan holder within 24 hours after any significant change in the response preparedness referred to in (2) of this subsection, unless a 10-day pre-notice is required under 18 AAC 75.475(c); and

(G) notifying a plan holder and the department within five days after any change by the United States Coast Guard in classification as an Oil Spill Removal Organization under 18 AAC 75.530(b).

(c) No later than January 31 of each year, an oil spill primary response action contractor registered under this chapter shall provide to the department a complete list of oil discharge prevention and contingency plans in which that contractor has agreed in writing to be listed as a primary response action contractor. (Eff. 9/25/93, Register 127; am 3/28/96, Register 137)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030

18 AAC 75.561. Minimum registration standards for nontank vessel cleanup contractors. (a) The minimum registration standards for nontank vessel cleanup contractors are set out in (b) – (f) of this section.

(b) Response equipment maintained by, or available under contract to the contractor must meet the following conditions:

(1) at a minimum, response equipment must meet the requirements set out in Table F of this paragraph;

TABLE F. MINIMUM REGISTRATION STANDARDS FOR NONTANK VESSEL CLEANUP CONTRACTORS[1]

Classification A: Maximum Individual Vessel Fuel Capacity Or Fuel Volume To Be Carried, As Identified Under 18 AAC 75.441, Up To And Including 15,000 Barrels

Required Equipment Type	Minimum Equipment Requirement
boom[2]	3,000 feet or 3 times the length of the largest vessel, whichever is greater
skimmer[3]	2 or more skimmers, 900 barrels a day total
cleaning kit[4]	2 kits
storage capacity[5]	900 barrels of oil plus all associated water
personnel[6]	8 individuals
workboats[7]	4 workboats
hazing kit[8]	2 kits
radios[9]	5 radios

Classification B: Maximum Individual Vessel Fuel Capacity Or Fuel Volume To Be Carried, As Identified Under 18 AAC 75.441, Greater Than 15,000 Barrels, Up To And Including 30,000 Barrels

Required Equipment Type	Minimum Equipment Requirement
boom[2]	3,000 feet or 3 times the length of the largest vessel, whichever is greater
skimmer[3]	2 or more skimmers, 1,800 barrels a day total
cleaning kit[4]	2 kits
storage capacity[5]	1,800 barrels of oil plus all associated water
personnel[6]	8 individuals
workboats[7]	4 workboats
hazing kit[8]	2 kits
radios[9]	5 radios

Classification C: Maximum Individual Vessel Fuel Capacity Or Fuel Volume To Be Carried, As Identified Under 18 AAC 75.441, Greater Than 30,000 Barrels

Required Equipment Type	Minimum Equipment Requirement
boom[2]	3,000 feet or 3 times the length of the largest vessel, whichever is greater
skimmer[3]	2 or more skimmers, 2,700 barrels a day total, or 1/5 of the response planning standard oil volume of the largest vessel, whichever is greatest
cleaning kit[4]	2 kits
storage capacity[5]	2,700 barrels of oil plus all associated water, or 1/5 of the response planning standard oil volume of the largest vessel plus all associated water, whichever is greatest
personnel[6]	10 individuals
workboats[7]	4 workboats
hazing kit[8]	2 kits
radios[9]	5 radios

Notes to Table F:

[1]This table sets out minimum registration standards, not performance standards; during an incident, equipment must be mobilized in an amount and of a type appropriate to the actual circumstances of that incident.

[2]The type of boom must be based on an assumed maximum sea state of three feet; listed quantities of boom must be available in each region of operation.

[3]Skimmer capacity must meet or exceed the response planning standard volume for the predominant type of fuel, whether persistent product or nonpersistent product, carried by each vessel covered under a plan; skimmer capacity must be calculated based on a derated capacity corresponding to actual anticipated performance rather than manufacturer rated capacity, and may not include associated water; skimmers must be in the region of operation or capable of being deployed in the region of operation within 24 hours.

[4]Cleaning kits must be in the region of operation or available within 24 hours; cleaning kits must include, at a minimum,

a. 2,500 feet of sorbent boom and 1,000 nine-ounce minimum sorbent pads for recovery of nonpersistent product;

b. 2,500 feet of viscous, sweep, or similar material for recovery of persistent product;

c. 12 fence posts;

d. one fence post driver;

e. 500 feet of rope;

f. 10 anchor, buoy, and line systems sized to the containment boom and designed to work in 100 feet of water;

g. 12 pitchforks;

h. 12 rakes;

i. 12 pointed shovels;

j. 12 flat shovels;

k. two bundles of survey stakes or two rolls of survey tape;

l. 12 rolls of barrier tape;

m. 250 waste bags, each at least 6 mils thick;

n. 300 bag ties;

o. three rolls of 100-foot x 24-foot plastic sheeting, at least six mils thick; and

p. 12 rolls of duct tape.

[5]Storage capacity must be in the region of operation or available within 24 hours, and be capable of handling the specified amount of fuel and all associated water recovered in one day; the daily storage handling capacity must be calculated based on a five-day cleanup of the entire response planning standard volume; the amount of storage needed for associated water must be based on skimmer capacity; skimmer capacity must be calculated based on a derated capacity corresponding to actual anticipated performance rather than manufacturer rated capacity.

[6]Personnel numbers are based on the minimum number necessary to deploy boom using skiffs; personnel do not include incident management personnel.

[7]Workboats must be of appropriate size and horsepower for towing up to 500-foot sections of boom; listed quantities must be available in each region of operation.

[8]Hazing kits must be in the region of operation or available within 24 hours; hazing kits must include, at a minimum,

a. 10 rolls of mylar tape;
b. 20 mylar balloons;
c. 30 pounds of towels or rags;
d. gloves;
e. binoculars;
f. a field guide to birds of this state;
g. an air horn;
h. three predator silhouettes; and
i. strapping tape.

[9]Radios must be in the region of operation or available within 24 hours; a minimum of five radios is required unless the contractor has more than 10 personnel; if the contractor has more than 10 personnel, the number of radios must equal at least one-half of the number of personnel.

(2) types and amounts of recovery devices, boom, boom connectors, and anchoring systems must be of the appropriate design for the particular oil product and type of environment, and capable of operation in wave heights of up to three feet; and

(3) vessels used to deploy and tow boom must be of a number, size, and power adequate to deploy the types and amounts of boom addressed in (2) of this subsection, and must be capable of operating in the manner and at the speeds necessary for the effective use of boom.

(c) The nontank vessel cleanup contractor must demonstrate the ability to mobilize and deploy sufficient equipment to allow the commencement of containment, control, and cleanup activities in the region of operation within the shortest possible time, and the ability to deliver all equipment identified in Table F in (b)(1) of this section to the region of operation within 24 hours after notification of an incident.

(d) Nontank vessel cleanup contractor personnel must be trained and kept current in the specifics of equipment mobilization, deployment, and operation. Proof of training must be maintained for three years and made available to the department upon request.

(e) Professional response action standards and practices and a response action plan must be maintained, and must include

(1) responding immediately upon direction by the plan holder or incident management team;

(2) remaining in substantial compliance with each applicable contract;

(3) abiding by applicable permits and authorizations unless directed to proceed otherwise by the federal or state on-scene coordinator designated under 33 U.S.C. 1321 or AS 46.04.020;

(4) maintaining a working knowledge of all applicable oil pollution statutes and regulations and pertinent provisions of each nontank vessel plan in which that contractor is listed;

(5) maintaining a safe working environment and an acceptable safety history; and

(6) notifying the plan holder or response planning facilitator, as applicable, within 24 hours after any significant change in the contractor's

(A) equipment required by Table F in (b)(1) of this section; or

(B) response preparedness described in (c) of this section.

(f) No later than January 31 of each year, a nontank vessel cleanup contractor registered under this chapter shall provide to the department a complete list of each nontank vessel plan in which that contractor has agreed in writing to be listed as a nontank vessel cleanup contractor. (Eff. 11/27/2002, Register 164; am 9/4/2014, Register 211)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: As of Register 221 (April 2017), the regulations attorney made technical corrections under AS 44.62.125(b)(6), to 18 AAC 75.561, changing the table header from "TABLE G" to "TABLE F" and changing cross-referenced table headers from "Table G" to "Table F" to reflect the agency's repeal of 18 AAC 75.446, including former Table F, as part of amendments that took effect March 23, 2017, Register 221.

18 AAC 75.562. Minimum registration standards for nontank vessel incident management teams. (a) The minimum registration standards for nontank vessel incident management teams are set out in (b) – (i) of this section.

(b) The nontank vessel incident management team shall, at a minimum, meet the registration requirements set out in Table G of this subsection.

TABLE G. MINIMUM PERSONNEL REQUIREMENTS FOR NONTANK VESSEL INCIDENT MANAGEMENT TEAMS		
Classification	**Personnel Requirements**	
	Identified Personnel[1]	**Available Personnel[2]**
Classification A: Maximum individual vessel fuel capacity, or fuel volume to be carried, as identified under 18 AAC 75.441, up to and including 30,000 barrels	12 individuals, in the following capacities: 1 incident commander, and 1 alternate; 1 deputy incident commander, and 1 alternate; 1 planning section chief, and 1 alternate; 1 operations section chief, and 1 alternate; 1 logistics section chief, and 1 alternate; 1 finance section chief, and 1 alternate	10 additional responders
Classification B: Maximum individual vessel fuel capacity, or fuel volume to be carried, as identified under 18 AAC 75.441, greater than 30,000 barrels	12 individuals, in the following capacities: 1 incident commander, and 1 alternate; 1 deputy incident commander, and 1 alternate; 1 planning section chief, and 1 alternate; 1 operations section chief, and 1 alternate; 1 logistics section chief, and 1 alternate; 1 finance section chief, and 1 alternate	15 additional responders

Notes to Table G:

[1]"Identified personnel" means individuals who must be identified under 18 AAC 75.532(5) in the application for registration.

[2]"Available personnel" means individuals who need not be identified by name, but for whom the information required by 18 AAC 75.532(8) must be provided.

(c) The nontank vessel incident management team shall demonstrate the ability to mobilize and position the personnel required in Table G in (b) of this section according to the following schedule:

(1) the incident commander and that individual's alternate must be

(A) available at all times within two hours after initial notification of an incident to begin to establish, direct, and manage an incident command system organization; these functions may be performed by a qualified individual identified by the plan holder in accordance with 18 AAC 75.426(4); these functions may be performed other than in person at the outset;

(B) capable of arriving in each region for which application is made within six hours after initial notification of an incident to continue to direct and manage the incident response;

(2) the deputy incident commander and that individual's alternate must be capable of arriving in each region for which application is made within six hours after the incident commander’s initial notification of an incident to assist in directing and managing the incident response;

(3) the planning section chief, operations section chief, logistics section chief, and finance section chief, and the respective alternates for those individuals, must be capable of arriving in each region for which application is made within 12 hours after the incident commander’s initial notification of an incident to perform relevant functions for the incident response;

(4) within 24 hours after the incident commander's initial notification of an incident, at least

(A) five additional responders must be capable of arriving to assist in the incident response in each region of operation for which application is made, for a maximum individual vessel fuel capacity or fuel volume to be carried, as identified under 18 AAC 75.441, up to and including 30,000 barrels; and

(B) 10 additional responders must be capable of arriving to assist in the incident response in each region of operation for which application is made, for a maximum individual vessel fuel capacity or fuel volume to be carried, as identified under 18 AAC 75.441, greater than 30,000 barrels.

(d) The requirements of Table G in (b) of this section and of (c) of this section set out minimum registration standards, not performance standards. During an incident, personnel must be mobilized in a number appropriate to the actual circumstances of that incident.

(e) Each incident commander and section chief, and the alternates for those individuals, must satisfy the following minimum training requirements:

(1) incident command system training appropriate to expected duties and tasks;

(2) Hazardous Waste Operations and Emergency Response Standards (HAZWOPER) certification under 29 C.F.R. 1910.120 with annual refreshers, appropriate to expected duties and tasks;

(3) familiarity with the plans prepared under 33 U.S.C. 1321(j)(4) and AS 46.04.200 - 46.04.210;

(4) familiarity with the oil discharge prevention and contingency plans or nontank vessel plans for which services are to be provided;

(5) a working knowledge of the response organizations and capabilities in this state, including marine salvage, firefighting, wildlife rescue, and related logistical support capabilities.

(f) Proof of training required by (e) of this section must be maintained for three years and made available to the department upon request.

(g) The nontank vessel incident management team must be capable of establishing and equipping an incident command post appropriate to the needs of an incident response and capable of facilitating the effective organization and direction of response activities.

(h) Professional response action standards and practices must be maintained and must include

(1) immediate response upon direction by the plan holder or the federal or state on-scene coordinator designated under 33 U.S.C. 1321 or AS 46.04.020;

(2) remaining in substantial compliance with applicable contracts;

(3) abiding by applicable permits and authorizations unless directed to proceed otherwise by the federal or state on-scene coordinator designated under 33 U.S.C. 1321 or AS 46.04.020;

(4) maintaining a working knowledge of all applicable oil pollution statutes and regulations and pertinent provisions of each nontank vessel plan in which that contractor is listed;

(5) maintaining a safe working environment and an acceptable safety history; and

(6) notifying the plan holder or response planning facilitator, as applicable, within 24 hours after any significant change in the response preparedness described in Table G in (b) of this section and in (c) of this section.

(i) No later than January 31 of each year, a nontank vessel incident management team registered under this chapter shall provide to the department a complete list of nontank vessel plans in which that contractor has agreed in writing to be listed as a nontank vessel incident management team. (Eff. 11/27/2002, Register 164; am 12/13/2002, Register 164; am 3/23/2017, Register 221)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Editor's note: As of Register 221 (April 2017), the regulations attorney made technical corrections under AS 44.62.125(b)(6), to 18 AAC 75.562, changing the table header from "TABLE H" to TABLE G" and changing cross-referenced table headers from "Table H" to "Table G" to reflect the agency's repeal of 18 AAC 75.446, including former Table F, as part of amendments that took effect March 23, 2017, Register 221.

18 AAC 75.563. Minimum registration standards for response planning facilitators. (a) As applicable under 18 AAC 75.428(a)(2), a response planning facilitator shall maintain contracts with or membership in the nontank vessel cleanup contractors and nontank vessel incident management teams identified in 18 AAC 75.533(3) – (5).

(b) Professional response action standards and practices must be maintained, and must include

(1) remaining in substantial compliance with applicable contracts;

(2) maintaining a working knowledge of all applicable oil pollution statutes and regulations and pertinent provisions of each nontank vessel plan in which the response planning facilitator is listed;

(3) maintaining a safe working environment and an acceptable safety history; and

(4) notifying a plan holder and the department within 24 hours after any significant change in the response planning facilitator's ability to carry out its responsibilities under 18 AAC 75.428.

(c) No later than January 31 of each year, a response planning facilitator registered under this chapter shall provide to the department a complete list of nontank vessel plans in which that contractor has agreed in writing to be listed as a response planning facilitator, and shall identify on that list the role of the response planning facilitator with regard to each plan as described in 18 AAC 75.428(a)(1) or (2). (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.565. Discharge exercises for nontank vessel cleanup contractors and nontank vessel incident management teams. (a) The department may conduct announced and unannounced discharge exercises to assure that a nontank vessel cleanup contractor or a nontank vessel incident management team is adequately prepared to act in the event of a spill. No more than two exercises will be required for a nontank vessel cleanup contractor in each 12-month period. The department will consider other required discharge exercises conducted by the nontank vessel cleanup contractor in meeting this requirement. No more than two discharge exercises will be required for a nontank vessel incident management team in each 12-month period.

(b) The performance of a nontank vessel cleanup contractor or a nontank vessel incident management team during a discharge exercise will be considered inadequate if the nontank vessel cleanup contractor or nontank vessel incident management team does not respond in a

manner consistent with the minimum registration standards of 18 AAC 75.561 and 18 AAC 75.562, as applicable.

(c) If the performance of a nontank vessel cleanup contractor or a nontank vessel incident management team during a discharge exercise is considered inadequate under (b) in this section, the department may

(1) require additional exercises until the department is satisfied that the performance of the contractor is adequate; or

(2) take enforcement action as described in 18 AAC 75.570.

(d) The department will consider a regularly scheduled training exercise initiated by a nontank vessel cleanup contractor or nontank vessel incident management team as a discharge exercise if the department monitors, evaluates, or participates in the exercise and concurs that it is equivalent to a discharge exercise conducted by the department. A nontank vessel cleanup contractor or nontank vessel incident management team shall notify the department in advance of the exercise and shall provide an opportunity for a department representative to be present and participate.

(e) The department will conduct announced or unannounced discharge exercises appropriate to the current status of operations of the nontank vessel cleanup contractor or nontank vessel incident management team and the participation of the nontank vessel cleanup contractor or nontank vessel incident management team in other discharge exercises or response actions. (Eff. 11/27/2002, Register 164)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.570. Failure to comply. (a) If the department determines that an oil spill primary response action contractor, nontank vessel cleanup contractor, nontank vessel incident management team, or response planning facilitator has failed to meet or maintain a minimum registration standard identified in 18 AAC 75.560 – 18 AAC 75.570, the department may revoke, suspend, or modify the

(1) contractor's registration; and

(2) department’s approval of the oil discharge prevention and contingency plan in which that contractor is listed as an oil spill primary response action contractor or the nontank vessel plan in which that contractor is listed as a nontank vessel cleanup contractor, nontank vessel incident management team, or response planning facilitator.

(b) A person who is aggrieved by a department decision under (a) of this section may request an informal review of that decision under 18 AAC 15.185 by submitting a request to the director of the division assigned to spill prevention and response within the department, or may request an adjudicatory hearing under AS 44.62 (Administrative Procedure Act) by submitting a request to the commissioner. Upon receipt of a timely request for adjudicatory hearing, the commissioner will refer the matter to the office of administrative hearings (AS 44.64.010) for a

hearing and recommended decision under 2 AAC 64.100 - 2 AAC 64.990 to the commissioner or to the commissioner's designee if the designee is a person other than the person who issued the contested decision. (Eff. 9/25/93, Register 127; am 7/11/2002, Register 163; am 11/27/2002, Register 164; am 11/7/2017, Register 224)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

18 AAC 75.580. Voluntary termination of registration. Unless the department has taken action under 18 AAC 75.570 for failure to comply, a registered oil spill primary response action contractor, nontank vessel cleanup contractor, nontank vessel incident management team, or response planning facilitator may ask the department to terminate registration and to remove that contractor's name from the list required by AS 46.04.035(e). A request under this section must be in writing and must be sent to all affected plan holders by certified mail. After the receipt of proof that all affected plan holders have been notified, the request must be submitted to the department with the certificate of registration and proof that all affected plan holders were notified. A request under this section becomes effective on the 30th day after the department receives it as provided in 18 AAC 75.445(i)(1)(D), 18 AAC 75.531(8)(C), 18 AAC 75.532(9)(C), and 18 AAC 75.533(6)(C), as applicable. (Eff. 3/28/96, Register 137; am 11/27/2002, Register 164; am 3/23/2017, Register 221)

Authority: AS 46.03.020 AS 46.04.035 AS 46.04.070
AS 46.04.030 AS 46.04.055

Article 6. Civil Penalties for Discharge of Petroleum and Petroleum Products and Byproducts.

Section

605. Applicability
610. Freshwater environments
620. Marine environments
630. Public land environments
640. Toxicity of petroleum and petroleum products and byproducts
650. Degradability of petroleum and petroleum products and byproducts
660. Dispersibility of petroleum and petroleum products and byproducts
670. Schedule of civil penalties

18 AAC 75.605. Applicability. 18 AAC 75.605 - 18 AAC 75.670 establish a schedule of civil penalties under AS 46.03.758 for the discharge of petroleum and petroleum products and byproducts, other than crude oil. The schedule of civil penalties does not apply to a discharge that is specifically made subject to the provisions of AS 46.03.760(a). (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.758

18 AAC 75.610. Freshwater environments. (a) For the purposes of AS 46.03.758(b)(1)(A), freshwater environments with significant aquatic resources are classified as follows:

(1) **Critical freshwater environments** include

(A) surface and subsurface water supplies that are currently being used or may reasonably be expected to be used sometime in the future as a drinking water source based on

(i) water quality characteristics;

(ii) technical feasibility of utilizing the water source; and

(iii) population growth trends in the immediate area;

(B) rivers, lakes, and streams designated under AS 16.05.870(a) as important for the spawning, rearing, or migration of anadromous fish, and the water of lakes, streams, and rivers that flows or empties into those designated waters;

(C) lakes, streams, rivers, and freshwater wetlands within the boundaries of land administered under the National Wildlife Refuge System, and the water of lakes, streams, and rivers that flows or empties into those waters;

(D) lakes streams, rivers, and freshwater wetlands within the boundaries of game reserve areas, refuges, critical habitat areas, and sanctuaries established under AS 16.05.255(1) or AS 16.20, and the water of lakes, streams, and rivers that flows or empties into those waters; and

(E) lakes, streams, rivers, and freshwater wetlands within the boundaries of fish reserve areas, refuges, critical habitat areas, and sanctuaries established under AS 16.05.251(1) or AS 16.20, and the water of lakes, streams, and rivers that flows or empties into those waters; and

(2) **Sensitive freshwater environments** include

(A) lakes other than those classified in (1) of this subsection;

(B) freshwater wetlands other than those classified in (1) of this subsection; and

(C) subsurface freshwaters other than those classified in (1)(A) of this subsection.

(b) For purposes of AS 46.03.758(b)(1)(C), all freshwater of the state that is not classified in (a) of this section is classified as "without significant aquatic resources." (Eff. 5/14/92, Register 122; am 1/30/2003, Register 165)

Authority: AS 46.03.020 AS 46.03.758

Editor's note: As of Register 166 (July 2003), and acting under AS 44.62.125(b)(6), the regulations attorney made technical changes to 18 AAC 75.610(a)(1)(B), to reflect Executive Order 107 (2003). Executive Order 107 transferred functions related to protection of fish habitat in rivers, lakes, and streams from the Department of Fish and Game to the Department of Natural Resources.

As of Register 186 (July 2008), and acting under AS 44.62.125(b)(6), the regulations attorney made technical changes to 18 AAC 75.610(a)(1)(B), to reflect Executive Order 114 (2008). Executive Order 114 transferred functions related to protection of fish habitat in rivers, lakes, and streams from the Department of Natural Resources to the Department of Fish and Game.

18 AAC 75.620. Marine environments. (a) For the purposes of AS 46.03.758(b)(1)(B), estuarine, intertidal, and saltwater environments are classified as follows:

(1) Critical marine environments include

(A) marine water within the boundaries of state game refuges established under AS 16.05.255(1) or AS 16.20;

(B) marine water within the boundaries of fish and game critical habitats established under AS 16.20;

(C) marine water within the boundaries of marine sanctuaries established under 16 U.S.C. 1436 - 16 U.S.C. 1445, as amended through July 1, 1991;

(D) marine water within the boundaries of areas administered under the National Wildlife Refuge System;

(E) marine water within one statute mile of the mouth of waters designated under AS 16.05.870(a) as important for the spawning, rearing, or migration of anadromous fish;

(F) marine water within one statute mile of a seabird colony or marine mammal rookery or hauling ground identified by the Alaska Department of Fish and Game under AS 16.20;

(G) high density sea otter habitat identified by the Alaska Department of Fish and Game under AS 16.20; and

(H) marine water within the barrier island-lagoon ecosystems extending from the Colville River to Canning River, and seaward of the Copper River delta; and

(2) Sensitive marine environments include

(A) the inside waters of Southeast Alaska not otherwise classified in (1) of this subsection;

(B) saltwater wetlands and other intertidal and estuarine areas not otherwise classified in (1) of this subsection;

(C) Prince William Sound, and the bays, arms, fjords, ports, and other inside marine waters of Prince William Sound not otherwise classified in (1) of this subsection; and

(D) all marine water within 10 statute miles of any point of those waters designated in (1) of this subsection.

(b) For the purposes of AS 46.03.758(b)(1)(C), marine water that is not classified in (a) of this section is classified as "without significant aquatic resources." (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.758

Editor's note: Seabird colonies, marine mammal rookeries or hauling grounds, and high density sea otter habitats, referred to in 18 AAC 75.620(a)(1)(F) and (G) are described in the current edition of "Alaska Habitat Management Guides," published by, and available for review at the Alaska Department of Fish and Game.

As of Register 166 (July 2003), and acting under AS 44.62.125(b)(6), the regulations attorney made technical changes to 18 AAC 75.620(a)(1)(E), to reflect Executive Order 107 (2003). Executive Order 107 transferred functions related to protection of fish habitat in rivers, lakes, and streams from the Department of Fish and Game to the Department of Natural Resources.

As of Register 186 (July 2008), and acting under AS 44.62.125(b)(6), the regulations attorney made technical changes to 18 AAC 75.620(a)(1)(E), to reflect Executive Order 114 (2008). Executive Order 114 transferred functions related to protection of fish habitat in rivers, lakes, and streams from the Department of Natural Resources to the Department of Fish and Game.

18 AAC 75.630. Public land environments. (a) For the purposes of AS 46.03.758(b)(1)(C), public land is classified as follows:

(1) Critical terrestrial environments include

(A) state game reserve areas, refuges, and sanctuaries established under AS 16.05.255(1) or AS 16.20;

(B) state parks, campgrounds, and waysides;

(C) municipal parks and park reserves;

(D) national parks, preserves, wilderness areas, monuments, recreation areas or other National Park System units, and lands administered under the National Wildlife Refuge System;

(E) established campgrounds, scenic waysides, and picnic areas; and

(F) national historical landmarks;

(2) Very sensitive terrestrial environments include

(A) land administered under the National Forest System not otherwise classified in (1) of this subsection;

(B) land underlain with continuous permafrost not otherwise classified in (1) of this subsection; and

(C) land in state forests and research areas not otherwise classified in (1) of this subsection; and

(3) Sensitive terrestrial environments include land other than that classified in (1) or (2) of this subsection upon which continuous natural terrestrial vegetation cover is present.

(b) For the purposes of AS 46.03.758(b)(1)(C), all public land not classified in (a) of this section is classified as "without significant terrestrial environmental resources." (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.758

18 AAC 75.640. Toxicity of petroleum and petroleum products and byproducts. For the purposes of AS 46.03.758(d), the toxicity of petroleum and petroleum products and byproducts is as follows:

(1) highly toxic:

(A) numbers 1, 2, and Arctic diesel fuel and heating oil;

(B) jet aviation fuels A and B;

(C) motor gasoline, including aviation gasoline;

(D) kerosene; and

(E) stationary turbine fuels;

(2) moderately toxic:

(A) waste oil and waste oil mixtures;

(B) lubricating oil; and

(C) jet fuels other than those specified in (1)(B) of this section;

(3) less toxic:

(A) bunker and residual fuel oils; and

(B) hydraulic fluids; and

(4) relatively nontoxic:

(A) asphalts;

(B) tars; and

(C) other petroleum and petroleum products and byproducts not listed in (1) - (3) of this section. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.758

18 AAC 75.650. Degradability of petroleum and petroleum products and byproducts. For the purposes of AS 46.03.758(d), the degradability of petroleum and petroleum products and byproducts is as follows:

(1) low degradability:

(A) asphalt;

(B) tar;

(C) bunker and residual fuel oils; and

(D) other petroleum and petroleum products and byproducts not otherwise listed in (2) or (3) of this section;

(2) moderate degradability:

(A) hydraulic fluids;

(B) lubricating oil; and

(C) waste oils and waste oil mixtures; and

(3) high degradability:

(A) motor gasoline, including aviation gasoline;

(B) numbers 1, 2, and Arctic diesel fuel and heating oil;

(C) jet and stationary turbine fuels; and

(D) kerosene. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.758

18 AAC 75.660. Dispersibility of petroleum and petroleum products and byproducts. For the purposes of AS 46.03.758(d), the dispersibility of petroleum and petroleum products and byproducts is as follows:

(1) highly dispersible:

(A) motor gasoline, including aviation gasoline;

(B) all jet fuels;

(C) kerosene;

(D) numbers 1, 2, and Arctic diesel fuel and heating oil;

(E) hydraulic fluids; and

(F) stationary turbine fuels;

(2) moderately dispersible:

(A) emulsified oil mixtures;

(B) lubricating oils; and

(C) waste oil and waste oil mixtures; and

(3) low dispersibility:

(A) bunker and residual fuel oils;

(B) asphalts;

(C) tars; and

(D) other petroleum and petroleum products and byproducts not otherwise listed in (1) or (2) of this section. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.758

18 AAC 75.670. Schedule of civil penalties. The schedule of civil penalties for which a person may be held liable under AS 46.03.758(e) is established as follows:

(1) The base civil penalty for a discharge into a receiving environment is as follows:

Receiving Environment	Freshwater	Marine	Public Land
Critical environments	$10.00	$2.50	$1.00
Very sensitive environments	N/A	N/A	$0.95
Sensitive environments	$ 9.00	$2.25	$0.90
Environments without significant resources	$ 1.00	$1.00	$0.70

(2) Toxicity, degradability, and dispersibility factors are as follows:

	Factor
(A) **toxicity**	
(i) highly toxic	1.0
(ii) moderately toxic	0.75
(iii) less toxic	0.50
(iv) relatively nontoxic	0.25
(B) **degradability**	
(i) low degradability	1.0
(ii) moderate degradability	0.50
(iii) high degradability	0.25
(C) **dispersibility**	
(i) high dispersibility	0.15
(ii) moderate dispersibility	0.50
(iii) low dispersibility	1.0

(3) The net civil penalty that will be assessed per gallon of oil discharged is calculated by multiplying the base penalty established in (1) of this section by the arithmetic mean of the factors established in (2) of this section. If a portion of the oil enters more than one receiving environment, the civil penalty will be based upon the most sensitive receiving environment which that portion enters. (Eff. 5/14/92, Register 122; am 1/30/2003, Register 165)

Authority: AS 46.03.020 AS 46.03.758

Article 7. Surface Oiling.

Section

700. Surface oiling permit
710. Exemption from surface oiling permit
720. Prohibitions
730. Decision on application for surface oiling permit; permit terms and conditions

18 AAC 75.700. Surface oiling permit. (a) No person may discharge, cause to be discharged, or permit the discharge of oil, asphalt, bitumen, or a residuary product of petroleum onto the land of the state unless that person has been issued a surface oiling permit under 18 AAC 75.730.

(b) An application for a surface oiling permit

(1) is subject to the requirements of 18 AAC 15;

(2) must be made on forms supplied by the department; and

(3) must contain information considered necessary by the department.

(c) A person who proposes to stabilize soil with the application of asphalt emulsions, tars, asphaltic oils, cutback asphalts, oils, or other residuary petroleum product, without immediately applying a blotter or cover coat of aggregate, is not exempt from the surface oiling permit requirements of this chapter. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

18 AAC 75.710. Exemption from surface oiling permit. A person who proposes to construct one or more of the following types of surfaces is not required to obtain a surface oiling permit under this chapter, but shall ensure that construction of the surface does not result in pollution of land or waters of the state:

(1) a bituminous treatment surface that includes a surface constructed by sweeping the surface, applying a priming material, applying a bituminous body coat, and spreading a blotter or cover of mineral aggregate;

(2) a road-mix bituminous surface for which the mineral aggregate and the bituminous material are mixed directly in the surface;

(3) a plant-mixed bituminous surface for which the mineral aggregate and the bituminous material are thoroughly mixed at a suitable plant and then deposited on the surface;

(4) a bituminous macadam surface with a wearing course composed of broken stone aggregate of relatively coarse size and a bituminous material that is forced by penetration into the interstices of the stone after the stone has been compacted on the base; and

(5) a bituminous concrete or sheet asphalt surface with a wearing course composed of a bituminous mixture prepared in a stationary plant under close control of temperature, moisture content, and mixture composition. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

18 AAC 75.720. Prohibitions. (a) The use of oil for surface oiling or as a dust suppressant is prohibited if the oil contains any of the following components in the concentrations indicated:

(1) polychlorinated biphenyls (PCBs) in any detectable concentration;

(2) total volatile aromatics in 5000 parts per million by weight or greater;

(3) total halogenated volatile organics in 100 parts per million by weight or greater; or

(4) lead in 300 parts per million by weight or greater.

(b) The department will, in its discretion, require analysis of oil for a component listed in (a) of this section, using methods prescribed on the surface oiling permit application form. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.299 AS 46.03.740
AS 46.03.296

18 AAC 75.730. Decision on application for surface oiling permit; permit terms and conditions. (a) The department will, in its discretion, grant or deny an application submitted under 18 AAC 75.700. The department will consider the following criteria before issuing a decision under this section:

(1) the potential for pollution of adjacent waters, including groundwater;

(2) the potential for pollution of vegetation;

(3) the need for the oiling, including local public opinion, and considerations of air quality as addressed by 18 AAC 50;

(4) the predicted weather conditions for the time of the oiling; and

(5) effects on the environment.

(b) In addition to the specific terms and conditions set out in the permit, a surface oiling permit is subject to the following terms and conditions:

(1) oil or other petroleum-derived dust retardants may not be applied to wet surfaces, frozen surfaces, or snow-covered surfaces; however, oil or other petroleum-derived dust retardants may be applied to a damp surface if deliberate dampening of the surface is part of the normal oiling procedure;

(2) oil or other petroleum-derived dust retardants may be applied only in the minimum amounts necessary and may not be allowed to stand in ponds on the surface;

(3) there may be no run-off of oil or other petroleum-derived dust retardants from the surface receiving the application;

(4) oil or other petroleum-derived dust retardants may not be applied to any surface during precipitation or when precipitation is imminent;

(5) there must be equipment such as brooms and mops on the job to prevent oily run-off and to spread any ponded oil or other petroleum-derived dust retardants;

(6) unless specifically allowed in the permit, in order to avoid drifting of droplets to adjacent vegetation and property, oil or other petroleum-derived dust retardants may not be applied if local wind speed is 15 miles per hour or greater;

(7) the permittee shall inspect immediately the freshly-treated surface for oily run-off and ponding of oil or other petroleum-derived dust retardants;

(8) to avoid offensive odors, only nonodorous oils and other petroleum-derived dust retardants may be used on surfaces near residential areas or on surfaces that receive considerable pedestrian traffic; odorous oils may be used only on rural surfaces where the odor is less likely to be noticeable and pedestrian traffic is minimal; and

(9) no oil or other petroleum-derived dust retardants may be allowed to enter state waters or to enter upon private property. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

Article 8. Oil Discharge for Scientific Purposes.

Section

800. Permit for oil discharge for scientific purposes
810. Permit procedures
820. Modification of permit
830. Termination of permit

18 AAC 75.800. Permit for oil discharge for scientific purposes. Notwithstanding 18 AAC 70.020, 18 AAC 72.010, and 18 AAC 75.700 - 18 AAC 75.730, the department will, in its discretion, issue a permit for the discharge of oil, asphalt, bitumen, or a residuary product of petroleum onto the land or into state waters for research and scientific purposes. The department will issue a permit under this section only after it has evaluated the proposed project and found that

(1) the benefits from the information that will be developed outweigh the potential environmental damage that might result;

(2) the project has the written approval of all potentially affected landowners and persons with appropriated water rights for the water to be affected;

(3) the person proposing the project will, upon completion of the project, restore the environment affected by the project to a condition as near to the original condition as feasible;

(4) the person proposing the project has sufficient expertise and resources to conduct the project in a responsible manner; and

(5) the proposed project is otherwise in the public interest. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

18 AAC 75.810. Permit procedures. (a) An application for a permit under 18 AAC 75.800 must be made on forms supplied by the department. The application must be sent to the department at least 60 days before the proposed discharge is to begin. The application must include

(1) the name, address, and telephone number of the applicant;

(2) a detailed description of the proposed project, including plans for restoration;

(3) a description of the geographical area involved; and

(4) a description of the expected flow pattern of any water to be affected by the project.

(b) The department will

(1) send a copy of a completed application received under this section to the departments of fish and game, natural resources, commerce and economic development, and health and social services; and

(2) publish notice of the application as provided in 18 AAC 15.050.

(c) The department will attach terms and conditions to the permit which it finds are necessary to protect the environment and potentially affected property owners. A permit is further subject to the permittee's stipulation and agreement to

(1) modify activities if served with a notice under 18 AAC 75.820; or

(2) immediately cease all permitted activities if served with a notice to terminate under 18 AAC 75.830. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

18 AAC 75.820. Modification of permit. The department will, in its discretion, and after giving notice to the permittee, modify the terms and conditions of a permit issued under 18 AAC 75.810 if the department finds that modification is necessary to protect the environment. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

18 AAC 75.830. Termination of permit. The department will, in its discretion, and after giving notice to the permittee, terminate a permit issued under 18 AAC 75.810 if the department finds that

(1) the permit was obtained by misrepresentation of a material fact or by failure of the applicant to fully disclose the facts;

(2) there has been noncompliance with a term or condition of the permit; or

(3) based on information received after issuance of the permit, the permit should not have been granted. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.740

Article 9. Aboveground Storage Tanks; Class 2 Facilities

Section

835. Applicability of Class 2 facility regulations
840. Registration and notification requirements
849. Definitions for 18 AAC 75.835 – 18 AAC 75.849

18 AAC 75.835. Applicability of Class 2 facility regulations. (a) On or after August 23, 2017, the owner or operator of a Class 2 facility as defined in 18 AAC 75.849 shall meet the requirements of 18 AAC 75.835 – 18 AAC 75.849:

(b) An aboveground storage tank (AST) located at a Class 2 facility is not subject to the requirements of 18 AAC 75.835 – 18 AAC 75.849 if the AST:

(1) is used in a wastewater treatment works or wastewater collection system regulated under 18 AAC 72 or 18 AAC 83, including oil-water separators;

(2) is located at the facility for 90 consecutive days or less;

(3) contains liquefied petroleum gas or liquefied natural gas;

(4) has a storage capacity of less than 1,000 gallons;

(5) is a vehicle, including a tank truck or railroad tank car, unless it contains oil and remains at the facility for more than 90 consecutive days; or

(6) is oil-filled operational equipment. (Eff. 6/24/2017, Register 222)

Authority. AS 46.03.020 AS 46.04.070

18 AAC 75.840. Registration and notification requirements. (a) An owner or operator of a Class 2 facility shall register the facility with the department using the paper or electronic form supplied by the department not later than 30 days after the facility is placed in service. If the facility was placed in service before August 23, 2017, the owner or operator shall register the facility not later than September 22, 2017.

(b) An owner or operator of a Class 2 facility shall notify the department using the paper or electronic form supplied by the department no later than 30 days after

(1) an AST is placed in service;

(2) an AST is permanently closed;

(3) the facility is no longer a Class 2 facility as defined in 18 AAC 75.849, because of a change in storage capacity; or

(4) the owner, operator, or name of the owner or operator of the facility changes. (Eff. 6/24/2017, Register 222)

Authority. AS 46.03.020 AS 46.04.070

Editor's note: The forms referenced in 18 AAC 75.840 are available on the department's Internet website: http://dec.alaska.gov/spar/ppr/prevention-preparedness/class-2-facilities/.

18 AAC 75.849. Definitions for 18 AAC 75.835 – 18 AAC 75.849. In 18 AAC 75.835 – 18 AAC 75.849, unless the context requires otherwise,

(1) "aboveground storage tank" or "AST" means a container that

(A) is used to store noncrude oil, and

(B) is not an underground storage tank as defined in AS 46.03.450;

(2) "Class 2 facility"

(A) means an onshore facility that stores noncrude oil in ASTs, has a storage capacity of 1,000 gallons or greater, and is not subject to AS 46.04.030;

(B) does not include a residential structure with an AST used solely to store heating oil for consumptive use on the premises;

(3) "dwelling unit"

(A) means real or personal property inhabited as a primary or secondary residence;

(B) includes an individual unit within a multiple residential structure;

(4) "oil-filled operational equipment"

(A) means equipment that includes an oil storage container or multiple containers

(B) includes hydraulic systems, lubricating systems, machining coolant systems, and transformers;

(C) does not include oil-filled manufacturing equipment, such as flow-through process containers;

(5) "permanently closed" means

(A) all liquid and sludge has been removed from the AST;

(B) all connecting lines and piping have been disconnected from the AST and blanked off;

(C) all valves, except ventilation valves, have been closed and locked; and

(D) conspicuous signs have been posted on the AST stating that it is permanently closed and noting the date of closure;

(6) "placed in service" means

(A) for an AST, at the start of operational use after initial construction, installation or reactivation from being permanently closed;

(B) for a Class 2 facility, at the start of operational use of a facility after

(i) initial construction; or

(ii) an AST is placed in service or permanently closed that changes the facilities storage capacity causing the facility to become a Class 2 facility as defined in this section;

(7) "residential structure"

(A) means a structure used as a dwelling unit;

(B) does not include

(i) a structure with both residential and nonresidential uses and a common AST to store heating oil;

(ii) transient lodging;

(iii) a residential school or residence hall;

(iv) a state or local correctional facility;

(v) a nursing home;

(vi) a hospital; or

(vii) a place constructed primarily for recreational activities;

(8) "storage capacity"

(A) for an AST, means the full physical volume of tank;

(B) for a Class 2 facility,

(i) means the aggregate storage capacity of the ASTs subject to the requirements of 18 AAC 75.835 – 18 AAC 75.849;

(ii) does not include the aggregate storage capacity of ASTs that have been permanently closed;

(9) "transient lodging"

(A) means a room or suite of rooms

(i) that is occupied not as a primary or secondary residence by persons for periods of less than 30 consecutive days; or

(ii) that is occupied not as a primary or secondary residence and that has services normally offered by hotels, including housekeeping services, a front desk, or telephone switchboard, regardless of the length of occupancy of a person;

(B) includes hotels, motels, hostels, employer-provided housing; and resorts. (Eff. 6/24/2017, Register 222)

Authority. AS 46.03.020 AS 46.04.070

Article 10. General Provisions.

Section

905. Falsification prohibited
910. Cost Recovery
990. Definitions

18 AAC 75.905. Falsification prohibited. No person may falsely state information submitted under AS 46.03, AS 46.04, 46.09, or this chapter. (Eff. 5/14/92, Register 122)

Authority: AS 46.03.020 AS 46.03.790 AS 46.04.070

18 AAC 75.910. Cost recovery. (a) In order to implement the provisions of AS 46.03.760(d), AS 46.03.822, AS 46.04.010 and AS 46.08.070, the department will complete and maintain documentation to support its response actions and to form the basis for cost recovery.

(b) Each person who is liable under AS 46.03.760, AS 46.03.822, AS 46.04.020, or AS 46.09.020 is liable for response costs that the department or this state incurs. Response costs are costs reasonably attributable to the site or incident and may include costs of direct activities, support costs of direct activities, and interest charges for delayed payments. Response costs include the costs of direct investigation, containment and cleanup, removal, and remedial actions associated with the incident or site undertaken by the department or its contractors, as well as the costs of oversight by the department of those activities involving the incident or site undertaken by a person other than the department. Response costs include legal costs incurred by the department concerning a site or incident, and include potential responsible party searches, obtaining site access, causal investigations, cleanup orders and agreements, cost recovery actions, and enforcement actions.

(c) The department will charge an hourly rate based on direct staff costs plus support costs. The department will on a fiscal year basis use the following formula for computing hourly personnel rates by job class:

(1) Hourly rate = DSC + DSC(AICR), where DSC means direct staff costs described in (2) of this subsection and AICR means the agency indirect cost rate described in (3) of this subsection;

(2) direct staff costs (DSC) are the average cost of hours worked per job class directly on an incident or site, including salaries, retirement plan benefits, health care benefits, and leave and holiday benefits required by law to be paid to, or on behalf of employees; direct staff costs do not include costs associated with responding to a public records request, preparing or reviewing invoices or answering questions pertaining to invoices, responding to governor, media, or legislative requests for information, responding to public inquiries concerning the site or incident with the exception of inquiries during a large response, internal or external training presentations or case studies, prospective purchaser agreements, policy or regulatory interpretation or discussion, or activities completed for training purposes;

(3) agency direct costs are the costs of facilities, communications, personnel, fiscal, and other statewide and agency-wide services that re not directly attributable to a project; the agency indirect cost rate (AICR) used is the agency indirect rate expressed as a percentage, approved by the United States Environmental Protection Agency acting as the department's federal cognizant agency, or by a successor federal cognizant agency, for each fiscal year.

(d) The department will assign a unique code to each incident or site for the purposes of tracking all state costs incurred. When the department requests payment of response costs, it will provide an itemized statement documenting the costs incurred. The department will bill a liable party for response costs on a periodic basis as costs are incurred.

(e) The department will charge interest on past due costs incurred as the result of a release or threatened release. Interest for costs incurred in a calendar year accrues at a rate equal to three percentage points above the 12th Federal Reserve District discount rate in effect on January 2 of the year in which the cost is incurred. Unless otherwise agreed by the department and the responsible party, interest begins to accrue on the date a cost is billed. The department may agree to waive interest if payment of the costs is made not later than 60 days after the billing date for the costs.

(f) A person receiving a cost recovery invoice may seek informal review of a disputed invoice by contacting the commissioner's designee not later than 30 days after receiving an invoice. Failure to pay invoices presented by the department may result in the department filing cost recovery liens under AS 46.08.075 and referring the matter to an attorney general for collection of response costs, interest, and legal costs.

(g) In consultation with the Department of Law, the department will consider a person's ability to pay response costs if payment of the costs would cause an undue financial hardship to the person. The department may allow for payment of response costs over time. The department may reduce the amount of response costs to be paid by a person by the amount that would create an undue financial hardship. In order to establish an undue financial hardship, the person must provide and authorize release of sufficient financial information to the department to clearly demonstrate that, in the determination of the department, payment of the response costs would deprive the person of ordinary and necessary assets or cause the person to be unable to pay for ordinary and necessary business expenses or ordinary and necessary living expenses. Under AS 40.25.120, the department will maintain non-public financial information as confidential to the extent the information qualifies as confidential business information, trade secrets, or confidential personal information.

(h) In this section, unless the context requires otherwise,

(1) "costs"

(A) means any money expended by the department in response to a release or threatened release of oil or a hazardous substance; in this subparagraph, "hazardous substance," "oil," and "release" have the meanings given in AS 46.03.826;

(B) includes the cost of response personnel, response equipment, necessary support services, additional supplies, overhead, contractors, travel-related expenses, oversight, administrative support, and legal services;

(2) "incident" means a release or discharge of oil or a hazardous substance from a facility or vessel or the substantial threat of a release or discharge of oil or a hazardous substance from a facility or vessel; in this paragraph, "facility," "hazardous substance," "oil," "release," and "vessel" have the meaning given in AS 46.03.826;

(3) "site" means a contaminated site or leaking underground storage tank site subject to the site cleanup rules under 18 AAC 75.325 – 18 AAC 75.390 or to site assessment and corrective action under 18 AAC 78. (Eff. 5/8/2016, Register 218)

Authority: AS 40.25.120 AS 46.03.826 AS 46.08.070
AS 46.03.020 AS 46.04.010 AS 46.08.075
AS 46.03.760 AS 46.04.020 AS 46.09.020
AS 46.03.822 AS 46.04.070

18 AAC 75.990. Definitions. Unless the context indicates otherwise, in this chapter

(1) "accumulation" means the action or process that causes or results in the gradual increase in the quantity, concentration, or type of hazardous substance over time;

(2) "approval" means written approval by the department;

(3) "approved" means approved in writing by the department;

(4) "Arctic zone" means areas north of latitude 68° North; and area south of that latitude will be considered an "Arctic zone" on a site-specific basis, based on a demonstration that the site is underlain by continuous permafrost;

(5) "area of public concern" means a geographic area that, in the department's judgment, deserves special protection from an oil discharge, including

(A) an area of unique cultural value, historical significance, or scenic importance;

(B) an area of substantial residential or public recreational value or opportunity;

(C) an area where fish hatcheries or other facilities primarily dependent upon the use of potentially affected water are located;

(D) an area significantly used for commercial, sport, or subsistence hunting, fishing, and gathering; and

(E) an area where concentrations of terrestrial or marine mammals or bird populations primarily dependent on the marine environment are located;

(6) "background concentration" means the concentration of a hazardous substance that is consistently present in the environment or in the vicinity of a site and that is naturally present or is the result of human activities unrelated to a discharge or release at the site;

(7) "barge" means oil barge;

(8) "barrel" has the meaning given in AS 46.04.900;

(9) "best available technology" means the best proven technology that satisfies the provisions of 18 AAC 75.425(e)(4) and 18 AAC 75.445(k);

(10) "bioremediation" means a remediation method that decreases the concentration of a hazardous substance in soil through biological action;

(11) "capacity" means storage capacity;

(12) "carcinogen" means

(A) a substance that is expected to cause cancer in nonhuman life; or

(B) for human health purposes, a substance that meets the criteria of the descriptors "Carcinogenic to Humans" or "Likely to be Carcinogenic to Humans according to EPA's *Guidelines for Carcinogen Risk Assessment*, EPA/630/P-03/001F (March 2005), adopted by reference;

(13) "carcinogenic" means of or relating to a carcinogen;

(14) "cargo volume" means storage capacity;

(15) "catastrophic oil discharge" has the meaning given in AS 46.04.900;

(16) "catch tank" means the container that collects well fluids, muds, and oil from drilling;

(17) "cleanup" means efforts to mitigate environmental damage or a threat to human health, safety, or welfare resulting from a hazardous substance , and includes removal of a hazardous substance from the environment, restoration, and other measures that are necessary to mitigate or avoid further threat to human health, safety, or welfare, or to the environment;

(18) "cleanup level" means the concentration of a hazardous substance that may be present within a specified medium and under specified exposure conditions without posing a threat to human health, safety, or welfare, or to the environment;

(19) "commercial or industrial land use" means a use of real property or a portion of a property for other than human habitation or a purpose with a similar potential for human exposure; "commercial or industrial land use" includes manufacturing; industrial research and development; utilities; dry cleaning facilities; commercial warehouse operations; lumber yards; retail gas stations; auto service stations; auto dealerships; equipment repair and service stations; professional offices, such as for lawyers, architects, or engineers; real estate or insurance offices; medical or dental offices and clinics; financial institutions; publicly-owned office buildings; a retail business where the principal activity is the sale of food or merchandise; personal service establishments, such as health clubs, barbershops, beauty salons, mortuaries, and photographic studios; churches; motels or hotels; and property restricted to commercial or industrial use by a legally enforceable zoning ordinance or specific deed restriction; for purposes of this paragraph,

(A) “medical and dental offices and clinics” does not include hospitals;

(B) “churches” does not include churches that provide day care or school services other than during normal worship services; and

(C) “motels and hotels” does not include motels or hotels that allow month-by-month residence;

(20) “contain” means to surround a discharge or release of a hazardous substance with booms, berms, dikes, or other barriers to prevent the further spread of the discharge or release;

(21) “contaminant” means a hazardous substance;

(22) “contaminated groundwater” means groundwater containing a concentration of a hazardous substance that exceeds the applicable cleanup level determined under the site cleanup rules;

(23) “contaminated soil” means soil containing a concentration of a hazardous substance that exceeds the applicable cleanup level determined under the site cleanup rules;

(24) “control” means to stop, restrict, or deflect the movement of a discharge;

(25) “cuttings” means rock chips or soil produced during the process of drilling a well or boring;

(26) “degradation” means a process by which a chemical is reduced to a less complex form;

(27) “demonstrate” means to prove through documentation or other evidence to the department's satisfaction;

(28) “demonstration” means proof through documentation or other evidence to the department’s satisfaction;

(29) “department” means the Department of Environmental Conservation;

(30) “deposit” means to place, set down, or leave behind material;

(31) “deposition” means a placing, setting down, or leaving behind of material;

(32) “discharge” has the meaning given in AS 46.04.900, except that, as used in this chapter, “discharge” applies only to an unpermitted discharge into the environment;

(33) “dispersant” means a chemical agent used to enhance the breakup of discharged oil into droplets, promoting mixing of oil into the water column and accelerating dilution and degradation rates;

(34) “ecological receptor” means a

(A) member or local population of plant or animal species in the geographic area of the site; and

(B) habitat on or adjacent to the site;

(35) “environmentally sensitive area” means a geographic area that, in the department's determination, is especially sensitive to change or alteration, including

(A) an area of unique, scarce, fragile, or vulnerable natural habitat;

(B) an area of high natural productivity or essential habitat for living organisms;

(C) an area of unique geologic or topographic significance that is susceptible to a discharge;

(D) an area needed to protect, maintain, or replenish land or resources, including floodplains, aquifer recharge areas, beaches, and offshore sand deposits;

(E) a state or federal critical habitat, refuge, park, wilderness area, or other designated park, refuge, or preserve; and

(F) repealed 4/8/2012;

(36) “EPA” means the United States Environmental Protection Agency;

(37) “estuarine” means of or relating to an estuary;

(38) “estuary” means a semi-enclosed, waterbody with a free connection with the sea and within which seawater is measurably diluted with freshwater derived from land drainage;

(39) repealed 12/30/2006;

(40) “exploration facility” has the meaning given in AS 46.04.900;

(41) “ex-situ” means as applied to soil or groundwater moved from its original place, excavated, removed, or recovered from the ground;

(42) “facility” or “facility or operation” means any offshore or onshore structure, improvement, vessel, vehicle, land, enterprise, endeavor, or act; “facility” or “facility or operation” includes an oil terminal facility, tank vessel, oil barge, pipeline, railroad tank car, railroad, and an exploration or production facility;

(43) “free product” means a concentration of a hazardous substance that is present as a nonaqueous phase liquid; for purposes of this paragraph, a “nonaqueous phase liquid” is a liquid that is not dissolved in water;

(44) “freshwater wetlands” means environments characterized by rooted vegetation that is partially submerged either continuously or periodically by surface freshwater with less than .5 parts per thousand salt content and not exceeding three meters in depth;

(45) "fugitive dust" means particulate matter that has become airborne;

(46) "groundwater" means

(A) water in the zone of saturation; or

(B) water beneath the surface of the soil, for purposes of evaluating whether the water will act as a transport medium for hazardous substance migration;

(47) "hazard index" means the sum of the hazard quotients attributable to noncarcinogenic hazardous substances with similar critical endpoints;

(48) "hazardous substance" has the meaning given in AS 46.03.826;

(49) "hazardous waste" means waste within the scope of 18 AAC 62.020;

(50) "hazard quotient" means the ratio of the exposure point value to the reference dose for the hazardous substance;

(51) "impermeable" means using a layer of material that is of sufficient thickness, density, and composition to produce a maximum permeability for the substance being contained of 1×10^{-7} centimeters per second at the maximum anticipated hydrostatic pressure, and that is sufficient to contain a discharge or release until it is detected and cleaned up;

(52) "inside waters of Southeast Alaska" includes all those marine waters lying inside the boundary line established in 42 Federal Register 35791 (July 11, 1977);

(53) "in-situ" means as applied to soil or groundwater in its original place, unmoved, unexcavated, or remaining in the subsurface;

(54) "institutional control" means a measure taken to limit, prohibit, or protect against an activity that could

(A) interfere with the integrity of contaminated site cleanup activities or improvements designed to encapsulate or control residual contamination; or

(B) result in human or environmental exposure to a hazardous substance;

(55) "landfarming" means spreading contaminated soil in a thin layer on the surface of the ground so that biological activity can be enhanced by the addition of nutrients, mechanical aeration, the addition of water, adjustment of pH, and similar activities;

(56) "landspreading" means spreading contaminated soil in a thin layer on the surface of the ground, relying mainly on aeration and unenhanced biological action to perform remediation;

(57) "lightering" means the pumping or transferring of oil from the cargo compartment of a vessel, barge, storage tank, or container to a different vessel, barge, storage tank, or container;

(58) “liquefied petroleum gas” means natural gas converted to a liquid state by pressure and cooling, including butane, propane, and other light ends which at 70 degrees Fahrenheit and atmospheric pressure revert to the gaseous state;

(59) “local government” means any borough, city, town, village, or other political subdivision of the state or any Indian tribe or authorized tribal organization; "local government" includes any rural community or unincorporated town or village;

(60) “local population” means a group of plants, animals, or other organisms of the same species that live together and breed within a given habitat;

(61) “major discharge” means a discharge of oil

(A) over 10,000 gallons on inland waters;

(B) over 100,000 gallons on coastal waters; or

(C) in any amount that results in a release that

(i) might require evacuation or sheltering of nearby residents or businesses; or

(ii) causes a serious environmental threat;

(62) “marine waters” means all saltwater environments, including saltwater wetlands, estuaries, and the intertidal zone;

(63) “mean annual precipitation” means the measurement of average yearly rainfall and the water equivalent of snowfall; this measurement may be obtained from the nearest weather station;

(64) “mechanical response method” means the use of containment booms, skimmers, and other apparatus and equipment required for mechanical containment and removal of a discharge or release;

(65) “method detection limit” means the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the concentration is greater than zero, determined from an analysis of a sample in a given matrix containing the analyte;

(66) “mineral oil” means a highly-refined petroleum distillate used as an insulating and cooling media for electrical transformers and other electrical equipment;

(67) “mobility” means freedom of particles to move in random motion or under the influence of fields or forces;

(68) repealed 12/30/2006;

(69) “noncarcinogen” means a hazardous substance with adverse health effects on humans other than cancer;

(70) "noncarcinogenic" means of or relating to a noncarcinogen;

(71) "noncrude oil" means a petroleum product derived from crude oil;

(72) "oil" has the meaning given in AS 46.04.900;

(73) "oil barge" has the meaning given in AS 46.04.900;

(74) "oil spill primary response action contractor," for purposes of 18 AAC 75.425 and 18 AAC 75.445, has the meaning given in 18 AAC 75.500(a).

(75) repealed 12/30/2006;

(76) "oil terminal facility" has the meaning given in AS 46.04.900 and includes vessels classified as oil terminal facilities under 18 AAC 75.280;

(77) "oily waste" means any material, including water, that has been contaminated by or mixed with petroleum in other than naturally occurring circumstances;

(78) "open burning" means the burning of any material so that the products of combustion are emitted directly into the ambient air without passing through a stack or flare;

(79) "open water" means marine waters below mean low low water and freshwaters of the state, excluding wetlands and the wetland or shoreline perimeter of lakes, rivers, and streams;

(80) "operator" has the meaning given in AS 46.04.900;

(81) "owner or operator" means the owner or operator of a facility or operation that is subject to the requirements of AS 46.04.030, 46.04.040, 46.04.055, or this chapter;

(82) "permafrost" means soil or other earth material with a temperature that remains below 32 degrees Fahrenheit for two or more years;

(83) "persistence" means the length of time that a compound, once introduced into the environment, remains in the environment in a similar function or structure;

(84) "persistent product" has the meaning give in AS 46.04.900;

(85) "person" has the meaning given in AS 46.04.900;

(86) "person in charge," in addition to the person causing or permitting a discharge, includes

(A) for a vessel, the master;

(B) for a vehicle, the operator; and

(C) the owner or person exercising a possessory interest in the facility or operation at the time of the discharge or release, unless the possessory interest is being exercised solely for the purpose of providing a place of residence for the person;

(87) "physical barrier" means a concrete or asphalt surface that

(A) is impermeable to water;

(B) is designed, constructed, and placed in accordance with industry standards; and

(C) provides enough support thickness, layering, and life to prevent compromising the structural integrity of the material;

(88) "pipeline" has the meaning given in AS 46.04.900;

(89) "plan" means an oil discharge prevention and contingency plan approved under this chapter; this paragraph does not apply to 18 AAC 75.300 – 18 AAC 75.396;

(90) "plan holder" means an applicant who has received department approval for an oil discharge prevention and contingency plan or nontank vessel plan and who is responsible for compliance with the plan as approved;

(91) "plume" means a visible or measurable discharge or release of a hazardous substance from a given point of origin;

(92) "ppm" means parts per million;

(93) "practicable" means capable of being designed, constructed, and implemented in a reliable and cost-effective manner, taking into consideration existing technology, site location, and logistics in light of overall project purposes; "practicable" does not include an alternative if the incremental cost of the alternative is substantial and disproportionate to the incremental degree of protection provided by the alternative as compared to another lower cost alternative;

(94) repealed 9/29/2018;

(95) "Prince William Sound" includes all marine waters lying inside the boundary line established in 42 Federal Register 35791 (July 11, 1977);

(96) "Prince William Sound towing package" means a towing gear assembly that consists of

(A) 400 feet of 2-1/4 inch tow reaching wire;

(B) 720 feet of six-inch polypropylene floating pickup line;

(C) one floating pickup buoy; and

(D) a "D" shackle, 2-1/4 inches in diameter, with a 4-1/8 inch jaw opening, and a breaking strain of 55 tons, to connect the floating line to the tow reaching wire;

(97) "private drinking water system" has the meaning given "private water system" in 18 AAC 80.1990;

(98) "production facility" has the meaning given in AS 46.04.900;

(99) "public drinking water system" has the meaning given "public water system" in 18 AAC 80.1990;

(100) repealed 6/17/2015;

(101) "realistic maximum response operating limitation" means the upper limit of a combination of environmental factors that might occur at a facility or operation beyond which an operator would be unable to mount a mechanical response to a discharge event;

(102) "reference dose" means the concentration of a hazardous substance via daily exposure through a specified exposure route for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious noncarcinogenic effects over the period of exposure;

(103) "registered engineer" means a professional engineer who is registered under AS 08.48.171 - 08.48.265;

(104) "release" has the meaning given in AS 46.03.826;

(105) "residential land use" means the use of property for dwellings such as single-family homes, multi-family apartments, children's homes, and nursing homes; because of the similarity of exposure potential and the sensitive nature of the potentially exposed population, "residential land use" includes uses of property for day care facilities, educational facilities, hospitals, playgrounds, and similar facilities; "residential land use" includes property restricted to residential use by a legally enforceable zoning ordinance or specific deed restriction; vacant land that is not zoned or deed-restricted for commercial or industrial land use will be considered residential unless demonstrated otherwise;

(106) "resource agencies" means the Department of Environmental Conservation, the Department of Natural Resources, and the Department of Fish and Game;

(107) "response planning standard" means a planning standard against which the department evaluates the adequacy of an oil discharge prevention and contingency plan or nontank vessel plan as described in 18 AAC 75.400 - 18 AAC 75.496; a "response planning standard" does not mean a cleanup level that a plan holder is required to achieve under 18 AAC 75.300 - 18 AAC 75.396;

(108) "responsible person" means a person who is required under AS 46.04.020 or AS 46.09.020 to contain or perform a cleanup of a discharge or release of a hazardous substance;

(109) "risk assessment" mean a determination of potential health effects including effects of contaminant exposure through inhalation, ingestion, dermal absorption, and other means, and the assessment of risk to human health and the environment from contaminants remaining in the land, air or water as a result of a release;

(110) "saltwater wetlands" means coastal areas along sheltered shorelines characterized by halophytic hydrophytes and macroalgae extending from extreme low tide to an area above extreme high tide that is influenced by sea spray or tidally induced water table changes;

(111) repealed 6/17/2015;

(112) "sensitive gauging system" means the best demonstrated available gauging technology at the time of tank construction or substantial reconstruction, or initial gauging system installation;

(113) repealed 12/30/2006;

(114) "significant change" means

(A) a change in operational readiness or removal from designated storage of significant equipment or materials;

(B) a management or ownership change resulting in new chain-of-command or lead response personnel;

(C) a change in response contractors;

(D) a change in spill control or cleanup strategies; or

(E) any factor that significantly alters or reduces the ability of the plan holder to respond according to the provisions of the approved contingency plan or nontank vessel plan;

(115) "site" means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership;

(116) "site cleanup rules" means the provisions of 18 AAC 75.325 - 18 AAC 75.390;

(117) "soil" means an unconsolidated geologic material, including clay, loam, loess, silt, sand, gravel, tills, or a combination of these materials;

(118) "sole source aquifer" means an aquifer that is needed to supply 50 percent or more of the drinking water for that area for which there are no reasonably available alternative sources if the aquifer becomes contaminated;

(119) "solidification" means the mixing of an additive into contaminated soil to immobilize the hazardous substances in the soil;

(120) "state waters" means waters of the state;

(121) "storage capacity" means,

(A) for a tank vessel or oil barge, either

(i) the maximum amount of oil that the vessel can legally carry as cargo while in state waters;

(ii) the amount certified by the American Bureau of Shipping, by the United States Coast Guard under a Certificate of Inspection, or by an equivalent society or agency in a foreign country; or

(iii) a lesser amount than the amount in (i) or (ii) of this subparagraph, upon proof and verification to the department's satisfaction;

(B) for an oil storage tank, the full physical volume of the tank;

(C) for a facility, the full physical volume of the oil storage tanks with storage capacities of 1,000 gallons and greater and the piping at that facility;

(D) for a nontank vessel, the full physical volume of all fuel tanks, lube oil tanks, hydraulic oil tanks, day tanks, slop/sludge tanks, waste oil tanks, and bilge tanks on the vessel; and

(E) for a train, the totally physical volume of all railroad tank cars in the train;

(F) for piping, the full physical volume of the piping;

(122) "storativity" means the volume of water that a permeable aquifer unit will absorb or expel from storage per unit surface area per unit change in head;

(123) "subsurface soil" means soil that is more than two feet below the surface;

(124) "sufficiently impermeable" means, for a secondary containment system, that its design and construction has the impermeability necessary to protect groundwater from contamination and to contain a discharge or release until it can be detected and cleaned up; for design purposes for tanks constructed after May 1992, "sufficiently impermeable" means using a layer of natural or manufactured material of sufficient thickness, density, and composition to produce a maximum permeability for the substance being contained of 1×10^{-6} cm per second at a maximum anticipated hydrostatic pressure, unless the department determines that an alternate design standard protects groundwater from contamination and contains a discharge or release until detection and cleanup;

(125) "supervise" means to

(A) take direct responsibility for preparing reports or making interpretations regarding field data;

(B) exercise onsite control over all work that requires assessment, investigation, characterization, reporting, or interpretation, including

(i) selection of the number, location, or depth of sample points in soil, groundwater, surface water, or stockpiles;

(ii) location, placement, or supervision of construction or completion of monitoring or remediation wells;

(iii) description of site characteristics, soil characteristics, or geological characteristics in field notes that will be used in the report submitted by a responsible person;

(iv) duties required to be performed under the site cleanup rules other than those strictly limited to the physical act of sample collection and transport; and

(v) collection of final verification samples; and

(C) exercise onsite or offsite control over routine tasks associated with the physical act of sample collection and transportation;

(126) "surety" includes a surety bond;

(127) "surface soil" means soil that extends no more than two feet below the surface;

(128) "surface water" means waters of the state naturally open to the atmosphere, including rivers, lakes, reservoirs, streams, impoundments, and seas;

(129) "tank vessel" has the meaning given in AS 46.04.900;

(130) "technology" means equipment, supplies, other resources, and related practices;

(131) "total xylene isomers" means the sum of ortho-xylene, meta-xylene, and para-xylene concentrations;

(132) "toxicity index" means the number equal to the sum of the toxicity quotient numbers attributable to systemic toxic effects with similar critical endpoints for similarly responding ecological species;

(133) "toxicity quotient" means the ratio of the exposure point value to the ecological benchmark value;

(134) "transmission pipeline" means a pipeline through which crude oil moves in transportation, including line pipe, valves, and other appurtenances connected to line pipe, pumping units, and fabricated assemblies associated with pumping units; "transmission pipeline" does not include gathering lines, flow lines, or facility oil piping;

(135) "transmissivity" means the rate at which water is transmitted through a unit width of an aquifer or confining bed under a hydraulic gradient of one;

(136) "ultimate disposal" means disposal into or upon the waters or the surface or subsurface land of the state;

(137) "vessel" has the meaning given in AS 46.04.900; and

(138) "volatile organic" means an organic (carbon-containing) compound that evaporates or volatilizes readily at room temperature; in addition, for the purposes of 18 AAC 75.340 and 18 AAC 75.341, volatile organics are compounds that have a Henry's Law constant, unitless, greater than 0.0001, that are liquids at soil temperatures, and that have a molecular weight of less than 200;

(139) "waters of the state" has the meaning given in AS 46.04.900;

(140) "wellhead protection area" means a three dimensional land surface and subsurface zone surrounding a water supply well or wellfield that encompasses the volume of materials through which water will move to the well;

(141) "nonpersistent product" has the meaning given in AS 46.04.900;

(142) "nontank vessel" has the meaning given in AS 46.04.900; as used in the definition of "nontank vessel" in AS 46.04.900, "gross registered tons" means "applicable gross tons" or "gross tonnage" as determined by the United States Coast Guard under 33 C.F.R. 138.30

(143) "P&I club" means a protection and indemnity association;

(144) "railroad tank car" has the meaning given in AS 46.04.900;

(145) "train" has the meaning given in AS 46.04.900;

(146) "working day" means a day other than Saturday, Sunday, or a state holiday;

(147) repealed 4/8/2012;

(148) repealed 3/23/2017;

(149) "incident command system" means the incident management organization described in the National Interagency Incident Management System Incident Command System;

(150) "incident management team services" means those services described in the National Interagency Incident Management System Incident Command System;

(151) "National Interagency Incident Management System Incident Command System" means the command system followed by the National Interagency Incident Management System, as modified for oil spills, and set out in the

(A) United States Department of Homeland Security, United States Coast Guard's *Incident Management Handbook*, COMDTPUB P3120.17A, as revised as of August 2006 and adopted by reference; and

(B) *Alaska Incident Management System Guide for Oil and Hazardous Substance Response*, Revision 1 as revised as of November 2002 and adopted by reference;

(152) "nontank vessel cleanup contractor" means an oil spill primary response action contractor who is, or intends to be, obligated under contract or membership agreement to provide resources or equipment to contain, control, and perform cleanup of an oil discharge under an approved nontank vessel plan issued under AS 46.04.055;

(153) "nontank vessel incident management team" means an oil spill primary response action contractor who is, or intends to be, obligated under contract to provide incident management services under an approved nontank vessel plan issued under AS 46.04.055;

(154) "nontank vessel plan" means an oil discharge prevention and contingency plan covering a nontank vessel;

(155) "qualified individual"

(A) means an individual with the qualifications, duties, and authority of a qualified individual under 33 C.F.R. 155.1026; the provisions of 33 C.F.R. 155.1026, as revised as of July 1, 2001, are adopted by reference; and

(B) does not mean a

(i) qualified environmental professional described in 18 AAC 75.333(b) or

(ii) qualified sampler described in 18 AAC 75.333(c);

(156) "region of operation" means, with respect to

(A) an oil discharge prevention and contingency plan other than a nontank vessel plan, a region established under 18 AAC 75.495; and

(B) a nontank vessel plan, a region established under 18 AAC 75.496;

(157) "regional citizens' advisory council" means an entity established under 33 U.S.C. 2732(d);

(158) "response planning facilitator" means an oil spill primary response action contractor who provides services as described in 18 AAC 75.428 to the holder of an approved nontank vessel plan issued under AS 46.04.055;

(159) "streamlined plan" means a nontank vessel plan submitted under 18 AAC 75.421 and meeting the requirements of 18 AAC 75.426 and 18 AAC 75.456, as applicable;

(160) repealed 3/23/2017;

(161) "railroad" means a non-highway ground transportation system that runs on rails and transports railroad tank cars; "railroad" includes trains, locomotives, railroad tank cars, rolling stock, railroad tracks, and associated facilities and operations;

(162) "annual average daily oil production volume" means the average oil production volume from a common reservoir to a common production facility based on the highest annual volume produced by a well at the facility during the previous calendar year divided by the number of days in the year, expressed as barrels per day;

(163) "blowout contingency plan" means a written, site-specific description of the procedures, methods, equipment, personnel, logistics, and activities that will be employed to regain control of an uncontrolled flow of oil, gas, drilling mud, and other substances from an exploration or production well;

(164) "subarea contingency plan" means a regional master oil and hazardous substance discharge prevention and contingency plan approved under AS 46.04.210.

(165) “aboveground oil storage tank,” for the purposes of 18 AAC 75.065, 18 AAC 75.066, and 18 AAC 75.075, means a container, including a storage and surge tank, that is used to store bulk quantities of oil and that has a capacity of greater than 10,000 gallons; “aboveground oil storage tank” does not include a process pressure vessel or underground storage tank within the meaning of AS 46.03.450;

(166) “allision” means when a vessel comes into contact with a fixed object, including piers, rocks, platforms or other objects, whether manmade or naturally occurring, with sufficient force to incur damage to the vessel;

(167) “cathodic protection” means a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell through the application of either galvanic anodes or impressed current;

(168) “corrosion” means the deterioration of metal from the loss of positively charged metal ions from the metal surface into an electrolyte;

(169) “corrosion expert” means a person who

(A) by reason of thorough knowledge of the physical sciences and the principles of engineering and mathematics acquired through professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried metal piping and metal tanks, and

(B) is accredited or certified as being qualified by NACE International as a corrosion specialist, cathodic protection specialist, or is a registered engineer with education and experience in corrosion control of buried metal piping systems and metal tanks;

(170) “double-walled shop-fabricated aboveground oil storage tank” means a shop-fabricated aboveground oil storage tank with a surrounding containment tank fully enclosing a sealed interstitial space of a capacity less than 100 percent of the storage tank capacity and preventing visual inspection of the inner tank;

(171) "facility oil piping" means piping and associated fittings, including all valves, elbows, joints, flanges, pumps, and flexible connectors, originating from or terminating at

(A) an aboveground oil storage tank regulated under 18 AAC 75.065 or 18 AAC 75.066 up to the:

(i) union of the piping with a fuel dispensing system;

(ii) marine header;

(iii) fill cap or fill valve;

(iv) forwarding pump used to transfer oil between facilities, between adjacent pump stations, or between a pressure pump station and a terminal or breakout tank; or

(v) first flange or connection within a tank truck loading, loading rack containment area; or

(B) an exploration or production well, up to the:

(i) choke or valve interconnection with a flowline: or

(ii) first valve or flange inside a processing unit boundary**;**

(172) "field-constructed aboveground oil storage tank" means a welded metal aboveground oil storage tank erected on site where it will be placed in service;

(173) "flowline" means

(A) piping and associated fittings, including all valves, elbows, joints, flanges, pumps and flexible connectors,

(i) containing liquid oil;

(ii) located at a production facility; and

(iii) that is installed or used for the purpose of transporting oil between a well pad or marine structure used for oil production and the interconnection point with a transmission pipeline; and

(B) includes all piping between interconnections, including multi-phase lines and process piping, except

(i) facility oil piping; and

(ii) transmission pipelines;

(174) "installation" means an aboveground oil storage and surge tanks and associated operational appurtenances, including secondary containment systems, integral piping, overfill protection devices, and associated leak detection equipment;

(175) "marine structure"

(A) means an assembly that is

(i) permanently or temporarily attached to the seabed;

(ii) used by an exploration or production facility:

(B) includes mobile offshore drilling units, prefabricated offshore platforms, and artificial islands;

(176) "permanent unloading areas" means unloading areas routinely used for transfer operations; "permanent unloading areas" does not include areas used for short-term emergency response, seasonal usage, or short-term temporary usage to meet unusual operational demands:

(177) "pipe" or "piping" means any hollow cylinder or tube used to convey oil;

(178) "placed in service" means commencement of operational use, either after initial construction or installation or

(A) for field-constructed aboveground oil storage tanks, after the date of return to service after reconstruction as defined by American Petroleum Institute's (API) *Tank Inspection, Repair, Alteration, and Reconstruction*, 3rd Edition, December 2001, and Addendum 1, September 2003, (API 653) adopted by reference, or after the date of return to service after being removed from service in accordance with 18 AAC 75.065(o); or

(B) for facility oil piping, after the date of return to service after being removed from service in accordance with 18 AAC 75.080(o); or

(C) for flow lines, after the date of return to service after being removed from service in accordance with 18 AAC 75.047(f).

(179) "qualified cathodic protection tester" means a person who is accredited or certified as being qualified as, at a minimum, CP1-CP Tester by NACE international.

(180) "self-diked aboveground oil storage tank" mean a shop-fabricated aboveground oil storage tank with integral secondary containment of a minimum capacity of at least 100 percent of the capacity of the tank.

(181) "shop-fabricated aboveground oil storage tank" means an oil storage tank that is constructed at a tank manufacturer's plant and transported to a facility for installation.

(182) "vaulted shop-fabricated aboveground oil storage tank" means a shop-fabricated aboveground oil storage tank that is placed within a discrete secondary containment vault system at or below grade.

(183) "DRO" or "diesel range organics" means mid-range petroleum products, including diesel fuel, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of n-decane (C_{10}) to the beginning of n-pentacosane (C_{25}) and with a boiling point range between approximately 170 – 400 degrees Celsius;

(184) "GRO" or "gasoline range organics" means light range petroleum products; including gasoline, with petroleum hydrocarbon compounds corresponding to the alkane range from the beginning of n-hexane (C_6) to the beginning of n-decane (C_{10}) and with a boiling point range between approximately 60 – 170 degrees Celsius;

(185) "PCBs" means polychlorinated biphenyls;

(186) "RRO" or "residual range organics" means heavy range petroleum products, including lubricating oils, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of n-pentacosane (C_{25}) to the beginning of n-hextriacontaine (C_{36}) and a boiling point range between approximately 400 – 500 degrees Celsius;

(187) "qualified environmental professional" means an individual described in 18 AAC 75.333(b);

(188) "qualified sampler" means an individual described in 18 AAC 75.333(c);

(189) "zone of saturation" means the zone

(A) that is below the water table; and

(B) where permanently or seasonally all interstices are filled with water.

(190) "application package" means the documents required by 18 AAC 75.408(a)(1) – (3) to be included in the application submittal;

(191) "application package is complete" means that the applicant has provided the information necessary for the department to review and evaluate the plan using the criteria established under 18 AAC 75.445 for oil discharge prevention and contingency plans;

(192) "major amendment" means a proposed change to a plan that the department has determined will be reviewed under 18 AAC 75.455 after considering the factors under 18 AAC 75.415(a);

(193) "minor amendment" means a proposed change to a plan that the department has determined will not be reviewed under 18 AAC 75.455 after considering the factors under 18 AAC 75.415(a) and that is not a routine plan update under 18 AAC 75.415(b);

(194) "request for additional information" means a request for an applicant by the department for additional information necessary for an application package to be complete;

(195) "sufficient for review" means that the application package contains the information necessary to begin the public review of the plan including the information identified in

(A) 18 AAC 75.408;

(B) 18 AAC 75.425(e)(1) – (5) for oil discharge prevention and contingency plans; and

(C) supporting documentation as requested by the department.

(196) "mutagen" means a hazardous substance capable of inducing change to genetic material;

(197) "mutagenic" means of or relating to a mutagen;

(198) "sensitive subpopulation" means a group of individuals that is at increased risk of some adverse health even or outcome after exposure to a contaminant.

(199) "limit of detection" is the smallest concentration of a substance that must be present in a sample in order to be detected at the detection limit with 99% confidence.

(200) "limit of quantitation"

(A) means the smallest concentration that produces a quantitative result with known and recorded precision and bias; and

(B) is set at or above the concentration of the lowest initial calibration standard and within the calibration range. (Eff. 5/14/92, Register 122; am 9/25/93, Register 127; am 4/4/97, Register 142; am 4/11/97, Register 142; am 1/22/99, Register 149; am 8/27/2000, Register 155; am 10/28/2000, Register 156; am 11/27/2002, Register 164; am 12/14/2002, Register 164; am 1/30/2003, Register 165; am 8/8/2003, Register 167; am 5/26/2004, Register 170; am 12/30/2006, Register 180; am 10/9/2008, Register 188; am 4/8/2012, Register 202; am 9/4/2014, Register 211; am 6/17/2015, Register 214; am 4/16/2016, Register 218; am 11/6/2016, Register 220; 3/23/2017, Register 221; am 7/1/2017, Register 222; am 9/29/2018, Register 227)

Authority: AS 46.03.020 AS 46.03.755 AS 46.04.055
AS 46.03.050 AS 46.03.822 AS 46.04.070
AS 46.03.710 AS 46.04.020 AS 46.08.140
AS 46.03.740 AS 46.04.030 AS 46.09.010
AS 46.03.745 AS 46.04.035 AS 46.09.020

Editor's Note: The publications adopted by reference in 18 AAC 75.990 may be reviewed at the department's offices in Anchorage, Fairbanks, or Juneau, or may be obtained directly from the appropriate publisher. The mailing address, telephone number, facsimile number, and website, if available, for each publisher are as follows: American Petroleum Institute (API), 1220 L Street NW, Washington, DC 20005-4070; telephone (202) 682-8000; fax (303) 397-2740; website: http://www.api.org.

Back Island

FACILITY NAME	ADDRESS	CITY	ZIP CODE
Back Island	SEAFAC facility, Back Is.	Ketchikan	99901

FACILITY TYPE
Other
Vessel

SPILL NUMBER	SPILL NAME	SPILL DATE
11119920102	SEAFAC fuel pipe leak	7/20/2011
12119923202	Naval station skiff gas spill	8/19/2012

State of Alaska Department of Environmental Conservation
P.O. Box 111800
Juneau, AK 99811-1800
Phone: 907-465-5066
Fax: 907-465-5070
TDD: 800-770-8973
Physical Location: 410 Willoughby

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GOVERNOR BILL WALKER

Department of
Health and Social Services

DIVISION OF PUBLIC HEALTH
Section of Epidemiology

3601 C Street, Suite 540
Anchorage, Alaska 99503
Main: 907.269.8000
Fax: 907.562.7802

August 31, 2017

Perfluoroalkyl Substances — Imikpuk Lake in Utqiaġvik, Alaska

Introduction

Recently, chemicals called perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) were found in Imikpuk Lake near the Naval Arctic Research Laboratory (NARL) in Utqiaġvik, Alaska. Ingestion of these chemicals — such as drinking and cooking with contaminated water — may cause health problems. Below you will find information you need to know about PFOS and PFOA.

Summary

- PFOS and PFOA are chemicals that may harm your health.
- Levels of PFOS and PFOA in Imikpuk Lake are higher than the health advisory (0.07 micrograms per liter).
- If you use water from Imikpuk Lake as a temporary water source, such as during subsistence hunting or fishing activities, you should use another water source for your drinking water.

About PFOS and PFOA

What are PFOS and PFOA?

PFOS and PFOA are perfluoroalkyl substances (PFAS) — human-made chemicals that have been used for both residential and industrial purposes. PFAS have been found in some products that resist fire, stains, grease, and water such as:

- Furniture
- Carpeting
- Clothing
- Firefighting foams
- Food Packaging

In Imikpuk Lake, the source(s) of PFAS may be certain firefighting foams that contained PFAS.

How could I come into contact with PFAS?
Because PFAS were used worldwide, stay in the environment for a long time, and travel long distances in water and air, there are small amounts in many water and some food sources. Most people have come into contact with low levels of PFAS. PFAS are also found in the blood or tissue of wildlife, like fish and marine mammals such as seals and sea lions.

Usually, people come into contact with PFAS by eating or drinking them in food and water. Additionally:

- Women who are exposed to PFAS pass it to their unborn babies during pregnancy — and to their infants through breastfeeding.
- Children may come into contact with small amounts of PFAS in the home by touching products (such as carpet) with PFAS and then putting their hands in their mouths.

How can PFAS affect my health?
Some, but not all, scientific literature suggests that certain PFAS may affect a variety of systems in the body. Additional research is needed to better understand possible human health effects from exposure to PFAS in water and food.

Scientists are not yet certain about the possible health effects resulting from human exposure to PFAS levels typically found in our food and water. Some, but not all studies in humans have suggested that certain PFAS may affect the developing fetus and child. Potential health effects from exposure to PFAS may include:

- Affect the development of unborn babies and breastfeeding infants — including possible changes in growth, learning, and behavior
- Decrease fertility and interfere with the body's natural hormones
- Increase cholesterol
- Affect the immune system
- Increase the risk of cancer

More research is needed to confirm or rule out possible links between health effects of potential concern and exposure to PFAS. At this time, we cannot tell if drinking water from Imikpuk Lake could be causing any current health problems — or if it will cause problems in the future.

How can I tell if I have come into contact with PFAS?
PFAS can be measured in the blood, however, there are some limitations on blood tests to consider. Individuals who feel they may have been exposed to high levels of PFOA or PFOS and would like to have their blood levels measured should keep in mind that this is not a routine test that health care providers offer. The test results will not provide clear answers for existing or possible health effects. Individuals who feel the need to be tested should consult with their health care provider, local and state health department or other health professionals on how to

move forward. The body's natural elimination processes are the only way to remove PFAS from the body.

What is the health advisory for PFOS and PFOA?
The U.S. Environmental Protection Agency (EPA) has set a lifetime health advisory level for PFOS and PFOA — individually or combined— of no more than 0.07 micrograms per liter of water (µg/L or ppb-parts per billion). This amount is the same as 70 nanograms of PFOS or PFOA (or the 2 combined) per liter of water (ng/L or ppt-parts per trillion). The health advisory is designed to protect people from contact with PFOS and PFOA in drinking water — particularly unborn babies and infants (the populations most likely to be affected by exposure to PFOS and PFOA).

Safety Information for Imikpuk Lake Water Use

Can I drink water from the lake?
Because levels of PFOS or PFOA (or the 2 combined) are above the health advisory level (0.07 micrograms per liter) in Imikpuk Lake, do **not** drink the water from the lake.

Is it safe to cook with water from the lake?
Because levels of PFOS or PFOA (or the 2 combined) are above the health advisory, do **not** use water from the lake to cook — even if you heat or boil it first. Boiling water does not remove PFOS and PFOA.

Can I breastfeed my child if I have been drinking water from the lake?
Breastfeeding is linked with numerous health benefits for both infants and mothers. At this time, it is recommended that nursing mothers continue to breastfeed. The science on the health effects of PFAS for mothers and babies is evolving. However, given the scientific understanding at this time, the benefits of breastfeeding outweigh any known risk. To better weigh the risks and benefits of breastfeeding, please talk to your doctor.

Is the fish from Imikpuk Lake safe to eat?
Though it appears that people do not fish in Imikpuk Lake, people may still have questions about potential contamination of fish. The Section of Epidemiology (SOE) does not currently know the extent of PFAS contamination in fish in the lake. If additional information becomes available, SOE will work with Navy officials and other agencies to develop and disseminate guidance and recommendations for fish consumption. If you do fish from the lake and have questions, please contact SOE at 907-269-8000.

Is there a safe alternative source of drinking water?
Barrow Utilities and Electric Cooperative, Inc. (BUECI) sampled water from Isatkoak Reservoir and the post-treatment water in August, 2017. PFAS were not detected in post-treatment water samples. As such, water provided by BUECI is currently not a source of PFAS exposure.

Next Steps

What is being done to address the PFAS contamination of Imikpuk Lake?

The Navy is currently developing a plan of action. The Navy will conduct a survey of the community's current use of Imikpuk Lake and will install warning signs near the lake recommending the community not consume the lake water. The Navy will also complete an investigation to determine and assess the extent of contamination, evaluate the potential for risk, and develop appropriate response actions following federal and state environmental regulations and guidance. The Navy will provide additional information to the community as it becomes available. In the meantime, we recommend you use an alternate source of drinking water for subsistence hunting and fishing activities.

What is the Alaska Section of Epidemiology doing to address concerns about PFAS in drinking water?

The Section of Epidemiology is taking steps to protect Utqiaġvik residents, including:

- Working with the Navy, the Alaska Department of Environmental Conservation (ADEC), and the Agency for Toxic Substances and Disease Registry (ATSDR) to understand how PFAS from Imikpuk Lake may affect people living in the community, and
- Finding more information about PFAS and updating our recommendations as data become available.

Where can I get more information?

- To learn more about potential health effects of PFAS, contact the Alaska Section of Epidemiology at **907-269-8000.**
- If you have specific questions for the Navy, please call **(360) 396-1030** or send an email to PAO_feedback@navy.mil
- If you have health concerns about PFAS, please talk with your health care provider.

You can also find additional information in the following resources:

- ATSDR's PFAS web page: https://www.atsdr.cdc.gov/pfc/index.html
- PFOS and PFOA Drinking Water Health Advisories (EPA) https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf
- Alaska Environmental Public Health Program http://dhss.alaska.gov/dph/Epi/eph/Pages/default.aspx
- Naval Facilities Engineering Command (NAVFAC) Northwest https://navfac.navy.mil/PFASBARROW

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Last updated: 1 March 2019

languages:

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Status: Final
Date: **Friday 13 October 1978**
Time: 16:44



Type: de Havilland Canada DHC-6 Twin Otter 200
Operator: Arctic Guide
Registration: N4048B
C/n / msn: 125
First flight: 1968
Engines: 2 Pratt & Whitney Canada PT6A-20
Crew: Fatalities: 1 / Occupants: 1
Passengers: Fatalities: 0 / Occupants: 1
Total: Fatalities: 1 / Occupants: 2
Aircraft damage: Damaged beyond repair
Location: Barrow, AK (United States of America)
Phase: Approach (APR)
Nature: Domestic Non Scheduled Passenger
Departure airport: Anaktuvuk Pass Airport, AK (AKP/PAKP), United States of America
Destination airport: Barrow-Point Barrow Airport, AK (PBA), United States of America

Narrative:

It was snowing at Barrow as Twin Otter N4048B approached the airport. Ice probably started to accumulate on the aircraft until the airplane stalled and crashed short of the runway. It appeared that the de-ice boots on the horizontal stabilizer were installed improperly.

Probable Cause:

PROBABLE CAUSE:
pilot in command - continued VFR flight into adverse weather conditions

personnel - maintenance,servicing,inspection: inadequate maintenance and inspection
airframe - flight control surfaces: other
miscellaneous acts,conditions - improperly installed
pilot in command - failed to use or incorrectly used misc.equipment
miscellaneous acts,conditions - anti-icing/deicing equipment-improper operation of/or failed to use
pilot in command - misused or failed to use flaps
FACTORS:
personnel - operational supervisory personnel: inadequate flight training-procedures
personnel - operational supervisory personnel: deficiency,company maintained eqpmt,services,regulation
weather - icing conditions-includes sleet,freezing rain,etc.

Classification:

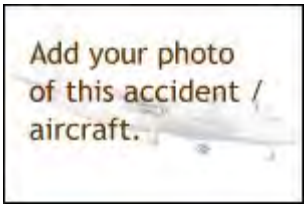
Icing
VFR flight in IMC
Loss of control

Sources:

» NTSB

Photos


N7661 was later re-registered N4048B



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Last updated: 1 March 2019

languages:

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Status:
Date: **Tuesday 5 May 1970**
Time: 03:40



Type: Lockheed L-1049H Super Constellation
Operator: North Slope Supply Comp
Registration: N174W
C/n / msn: 4636
First flight: 1956
Crew: Fatalities: 0 / Occupants: 3
Passengers: Fatalities: 0 / Occupants: 0
Total: Fatalities: 0 / Occupants: 3
Aircraft damage: Damaged beyond repair
Location: Barrow-Point Barrow Airport, AK (PBA) (United States of America)
Phase: Approach (APR)
Nature: Cargo
Departure airport: Fairbanks International Airport, AK (FAI/PAFA), United States of America
Destination airport: Barrow-Point Barrow Airport, AK (PBA), United States of America

Narrative:
The Constellation undershot the runway on landing and collided with a snow bank. This caused the left main gear to collapse and the left wing and tail to fail. Weather was poor: blowing snow and poor visibility.

Probable Cause:

PROBABLE CAUSE(S)
pilot in command - misjudged distance,speed,and altitude
terrain - snow-covered
FACTOR(S)

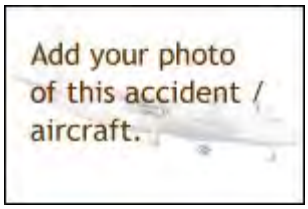
weather - snow
airports/airways/facilities - airport conditions: snow on runway

Classification:

Sources:

» NTSB File 3-1076

Photos



> This information is not presented as the Flight Safety Foundation or the Aviation Safety Network's opinion as to the cause of the accident. It is preliminary and is based on the facts as they are known at this time.

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Crash of a De Havilland DHC-6 Twin Otter in Barrow: 1 killed

Date & Time: Oct 13, 1978 at 1644 LT
Type of aircraft:
De Havilland DHC-6 Twin Otter
Operator:
Arctic Guide
Registration:
N4048B
Flight Phase:
Landing (descent or approach)
Flight Type:
Scheduled Revenue Flight
Survivors:
Yes
Site:
Airport (less than 10 km from airport)
Schedule:
Barrow-Anaktuvuk Pass-Barrow
MSN:
125
YOM:
1968
Location:
Barrow
Alaska
Country:
United States of America
Region:
North America
Crew on board:

1
Crew fatalities:
0
Pax on board:
1
Pax fatalities:
0
Other fatalities:
0
Total fatalities:
1
Captain / Total flying hours:
4302
Captain / Total hours on type:
892

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Barrow AK Aerials

Barrow, AK 99723

Inquiry Number: 5381269.1

August 17, 2018

The EDR Aerial Photo Decade Package

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Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

08/17/18

Site Name:

Barrow AK Aerials
Barrow AK Aerials
Barrow, AK 99723
EDR Inquiry # 5381269.1

Client Name:

CH2M Hill, Inc.
5701 Cleveland Street, Suite 200
Virginia Beach, VA 23462
Contact: Katie Tippin

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Search Results:

Year	*Scale*	*Details*	*Source*
2005	1"=500'	Flight Date: January 01, 2005	USGS
1981	1"=500'	Flight Date: January 01, 1981	NOAA
1975	1"=300'	Flight Date: January 01, 1975	USGS
1973	1"=750'	Flight Date: January 01, 1973	USGS
1966	1"=500'	Flight Date: January 01, 1966	NOAA
1955	1"=500'	Flight Date: January 01, 1955	USGS

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YEAR: 2005
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N
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INQUIRY #: 5381269.1
YEAR: 1981
= 500'
N
EDR



INQUIRY #: 5381269.1

YEAR: 1975

= 300'

N

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INQUIRY #: 5381269.1

YEAR: 1973

= 750'

N

EDR


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YEAR: 1966
= 500'
N
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INQUIRY #: 5381269.1

YEAR: 1955

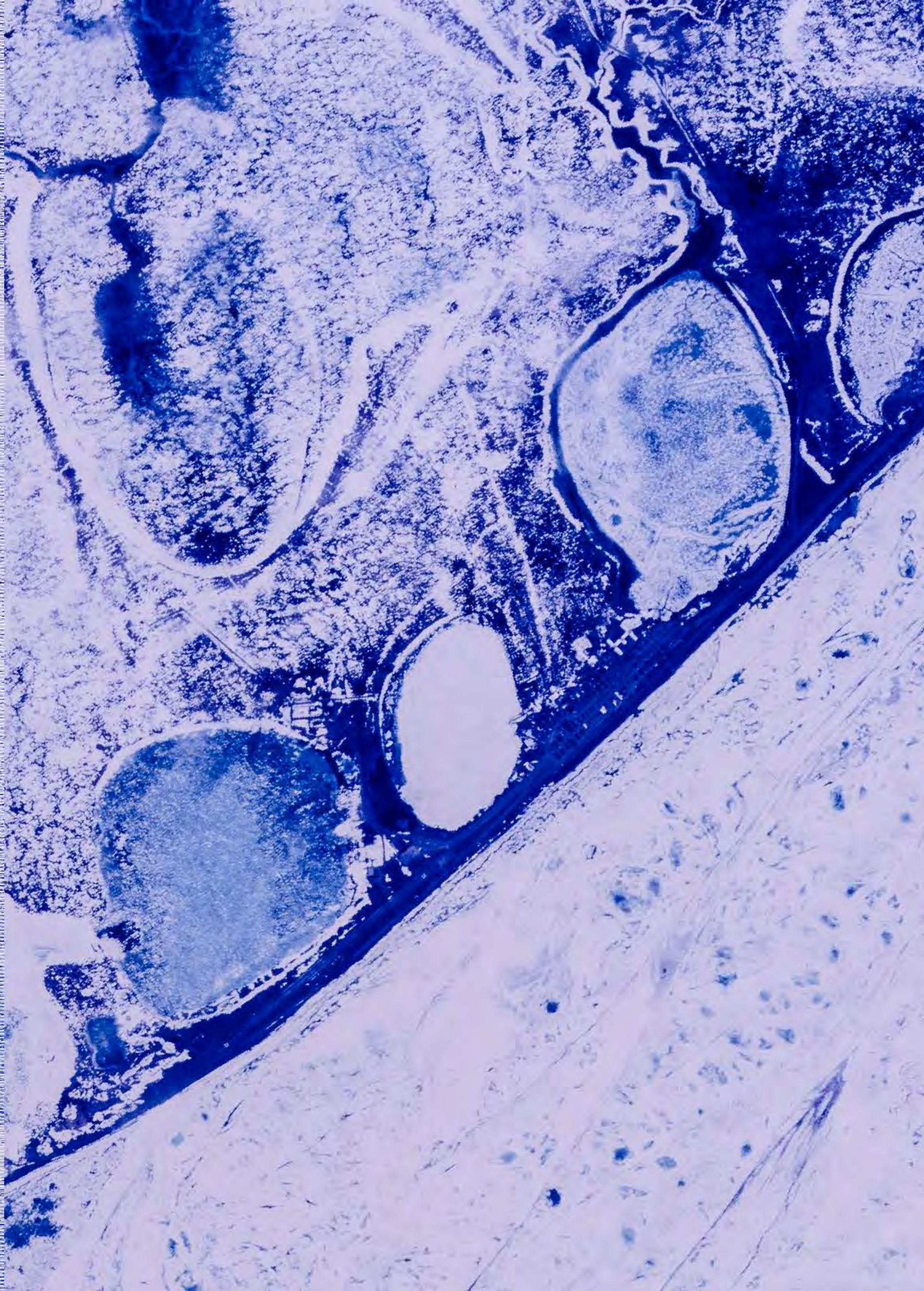
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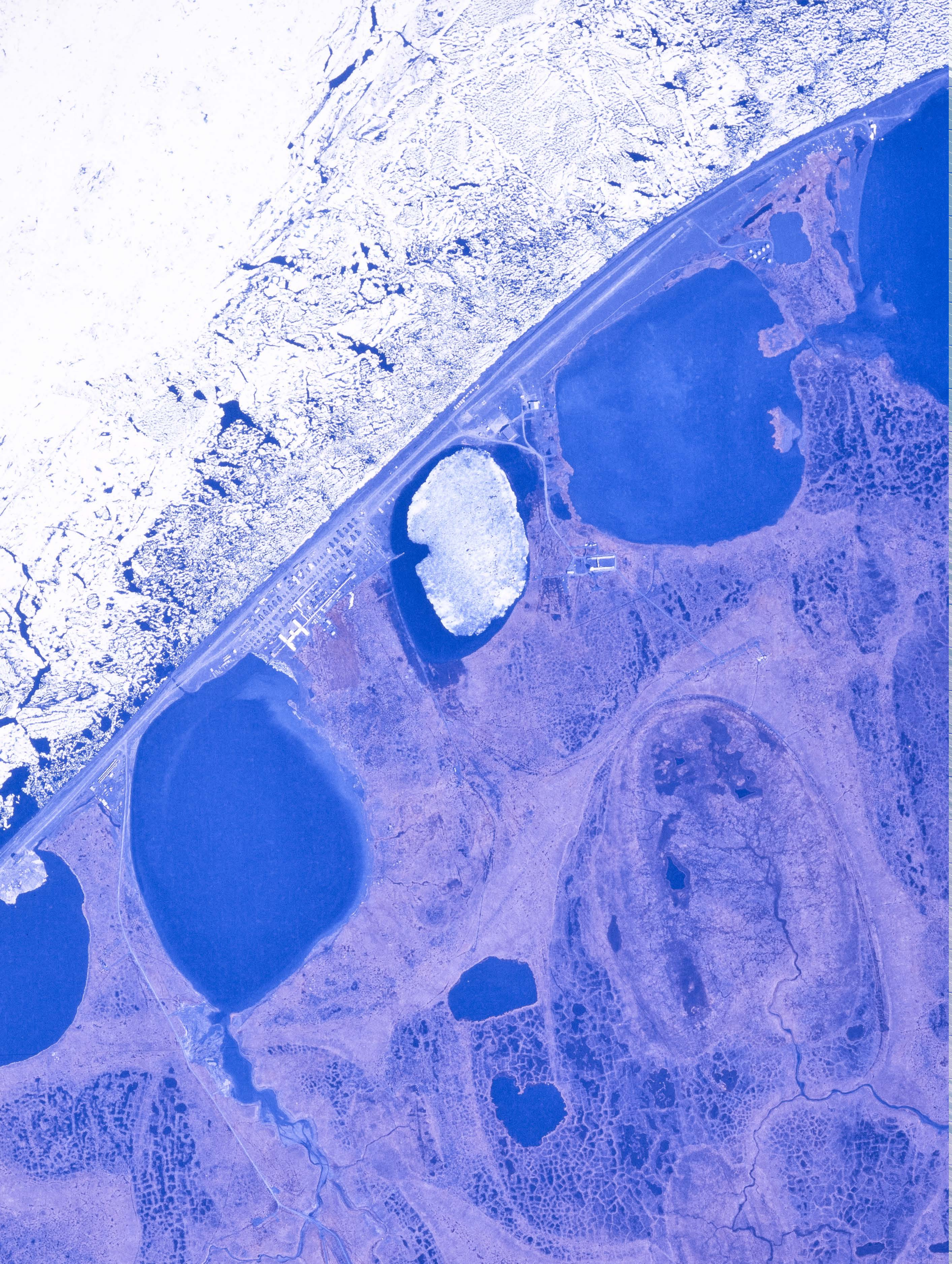
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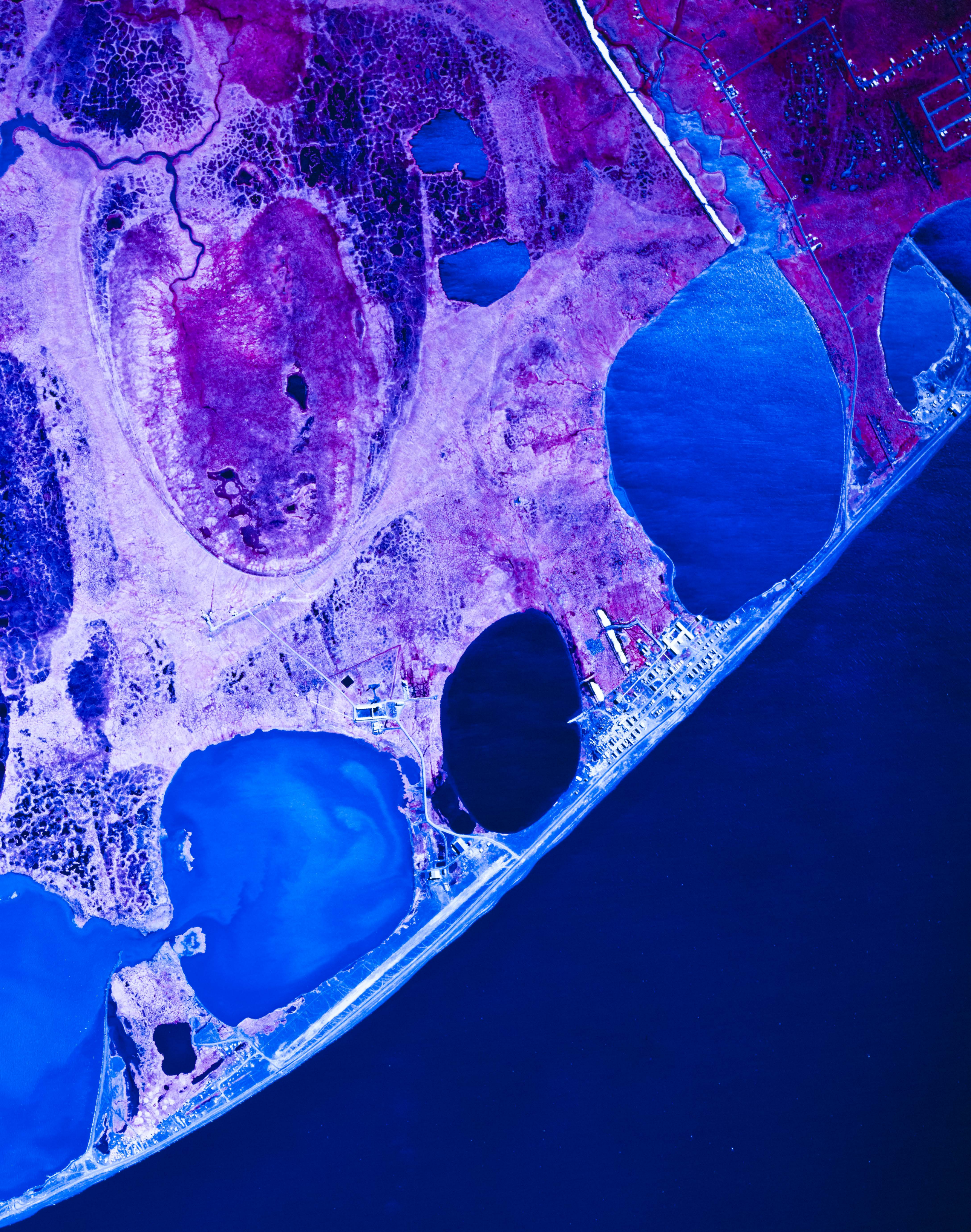
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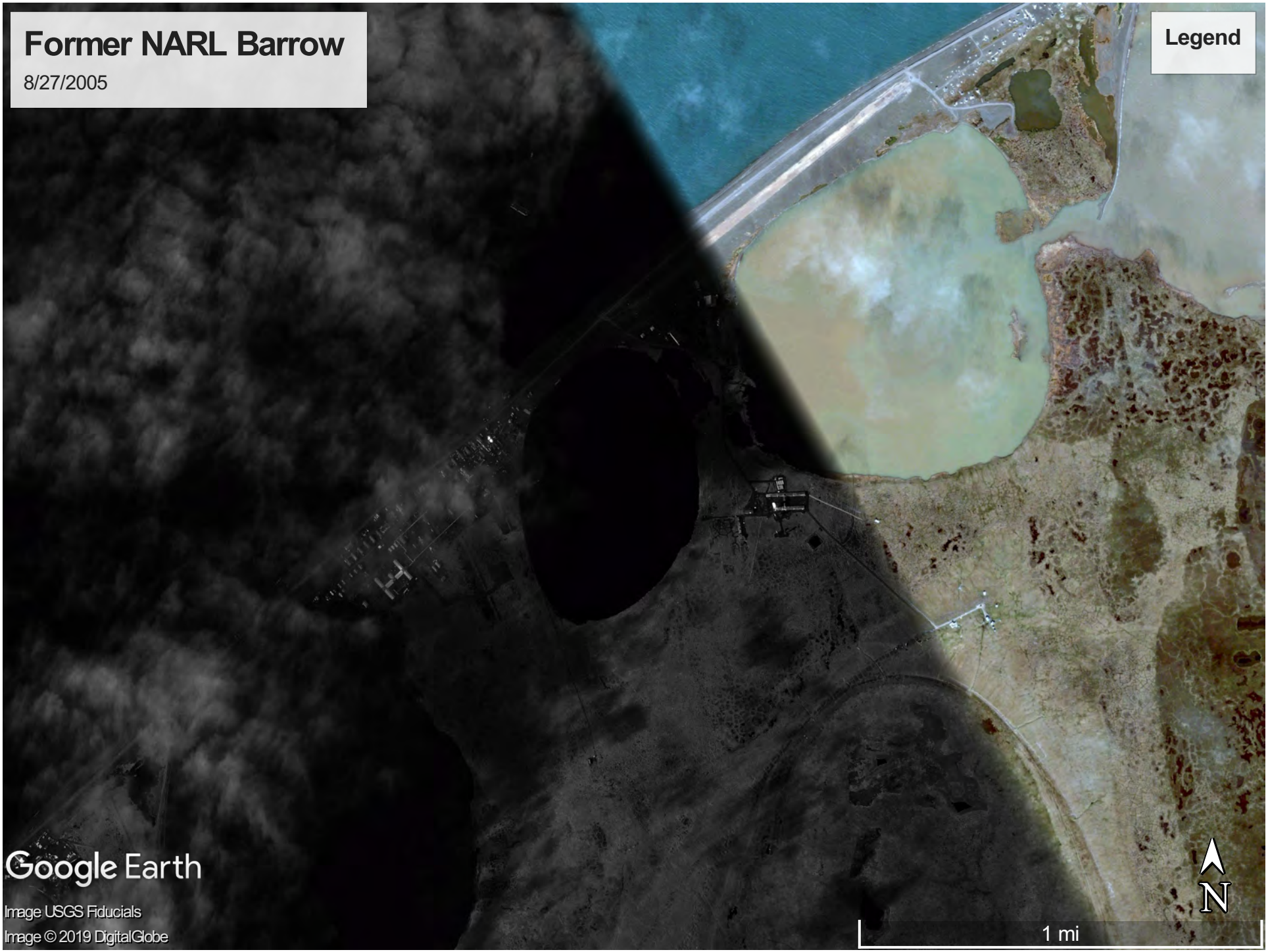


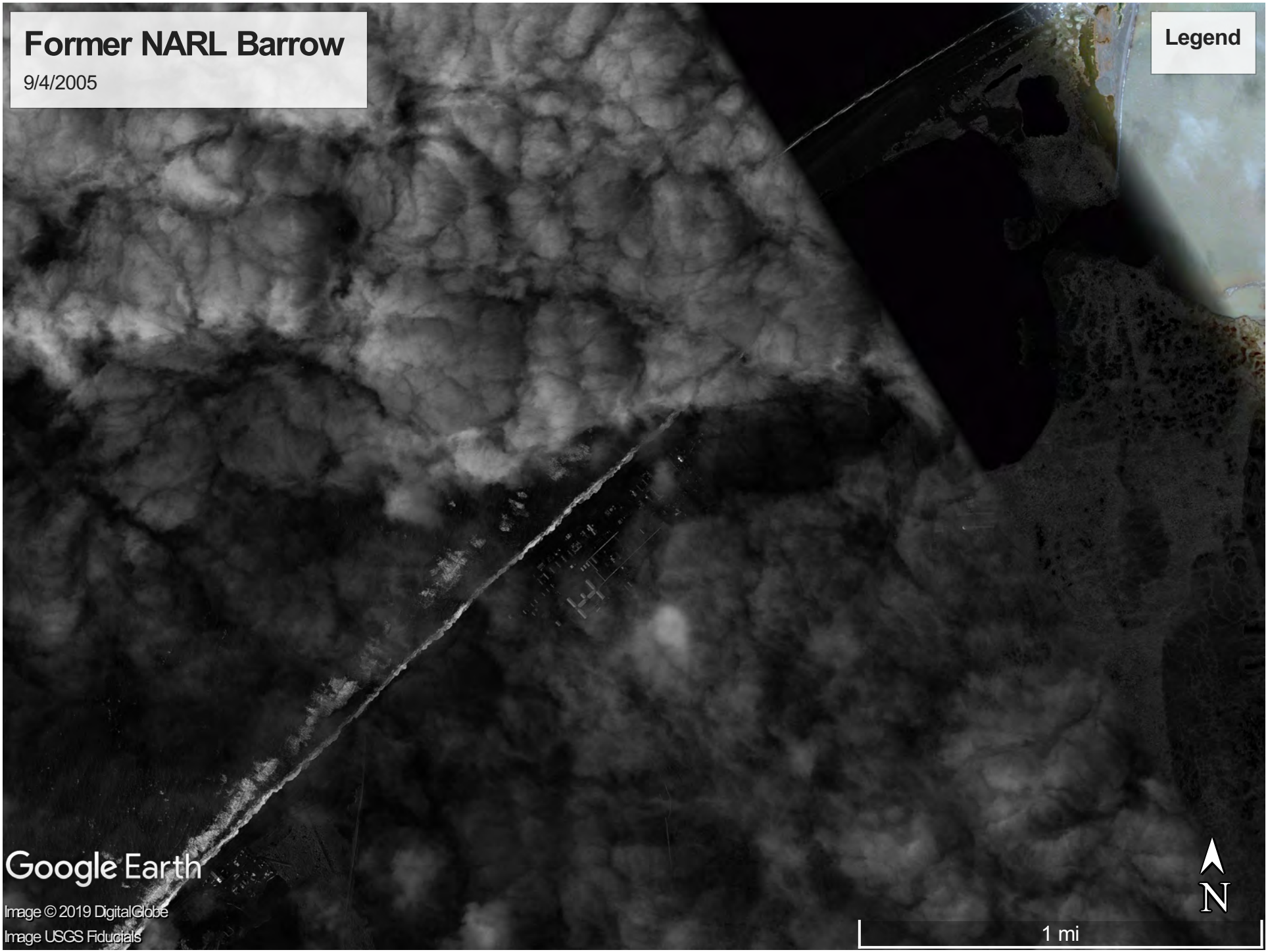


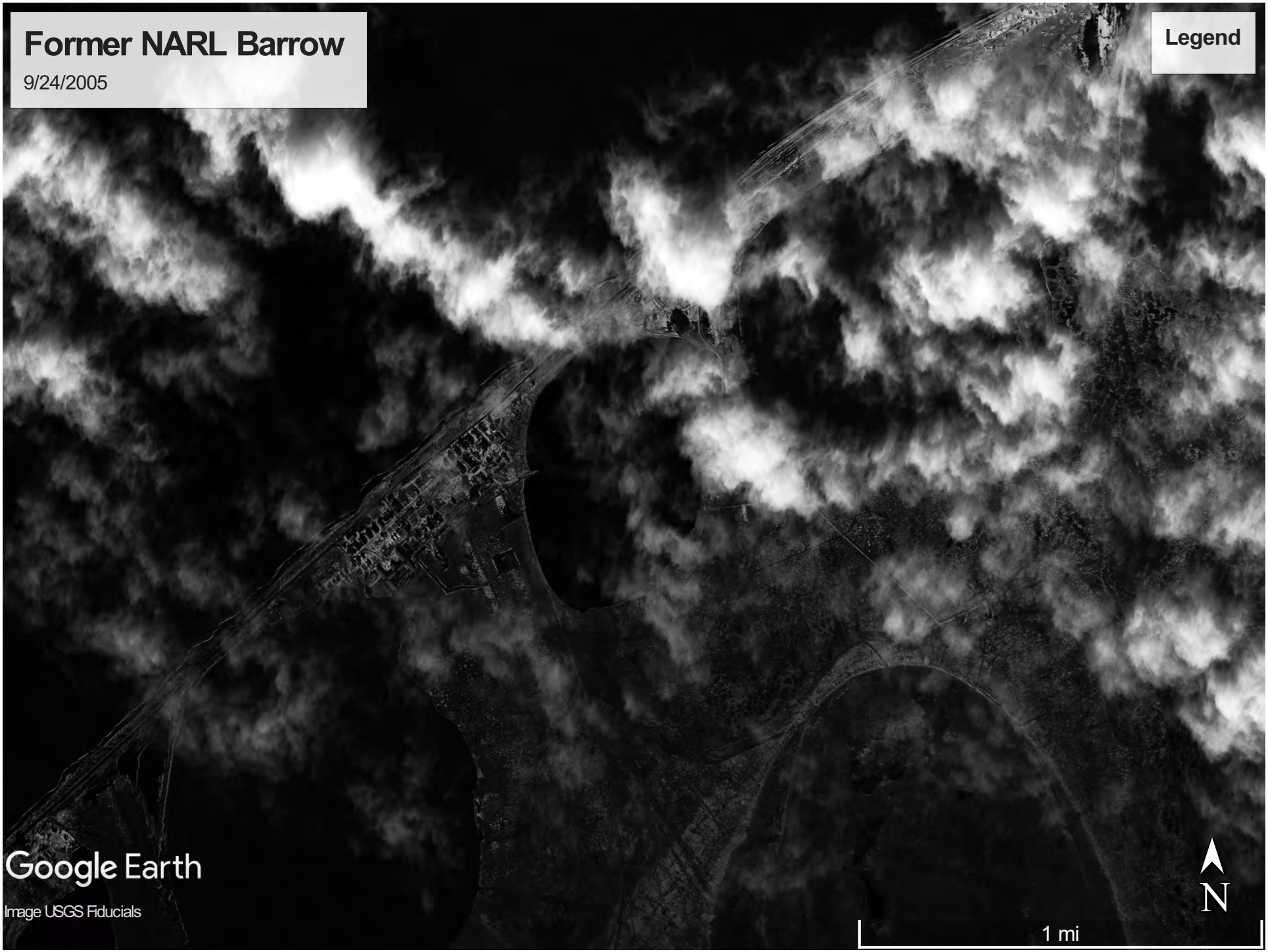


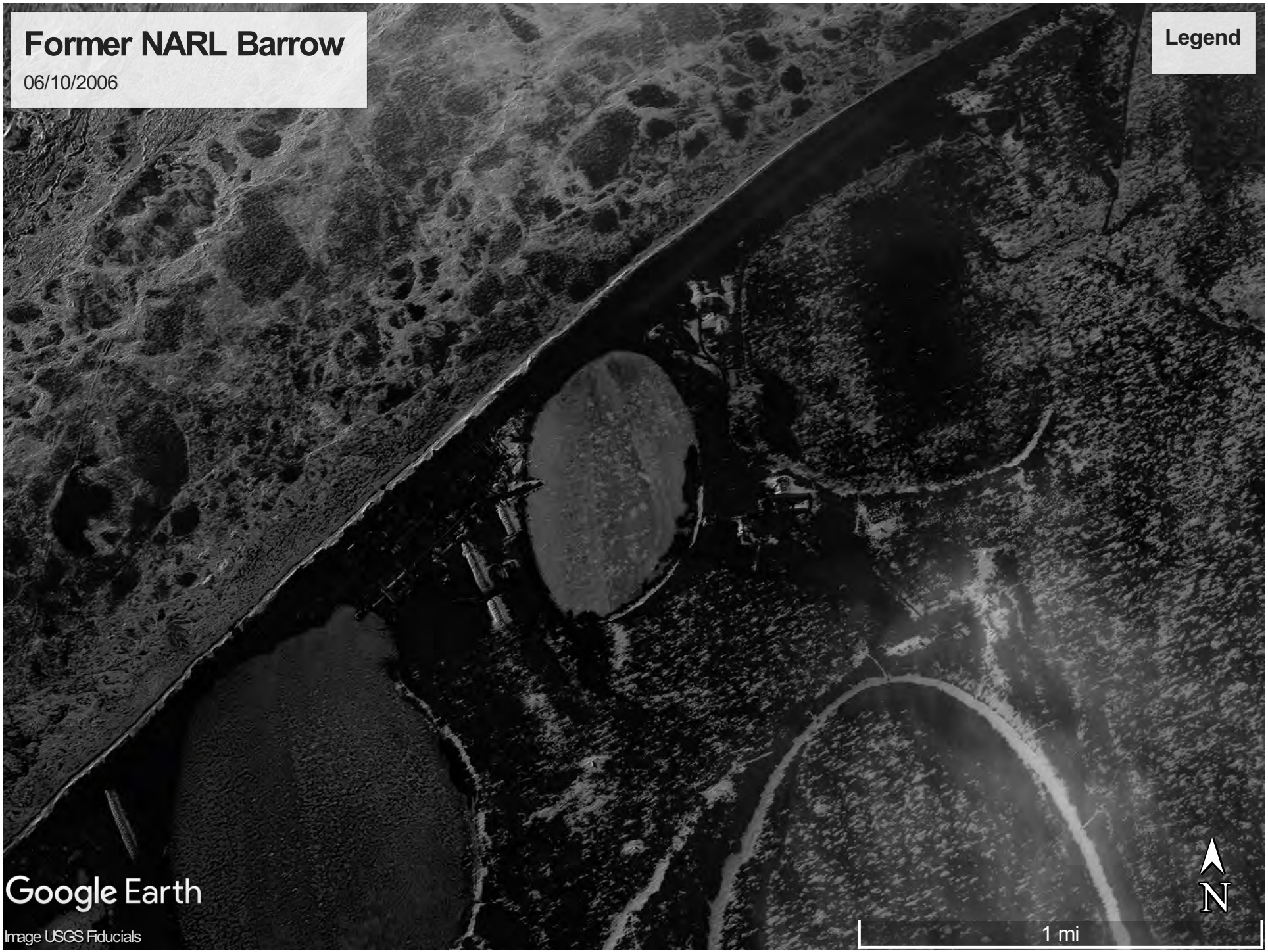

Former NARL Barrow
8/13/2004
Legend
Google Earth
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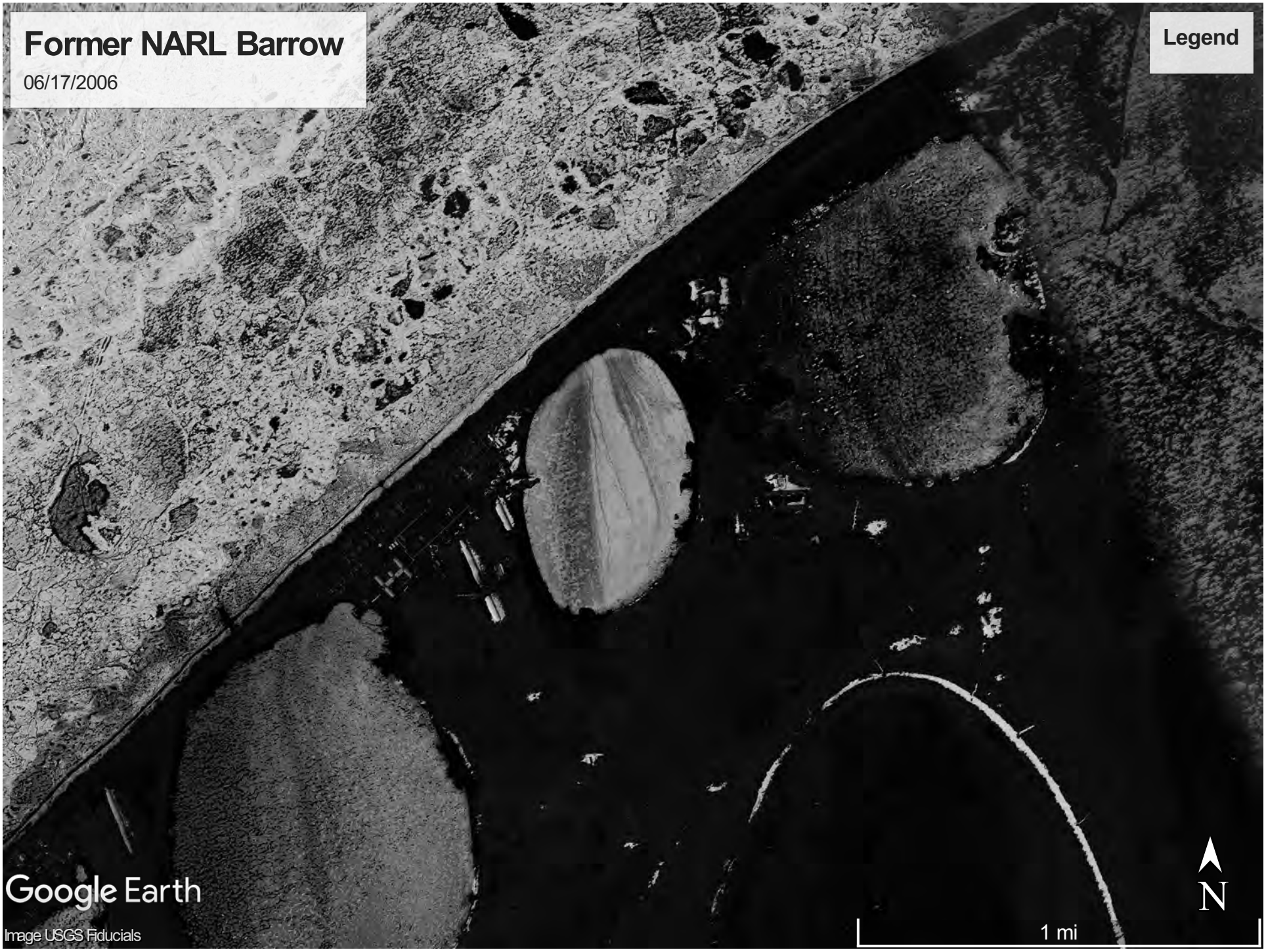

Former NARL Barrow
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Google Earth
Image © 2019 DigitalGlobe
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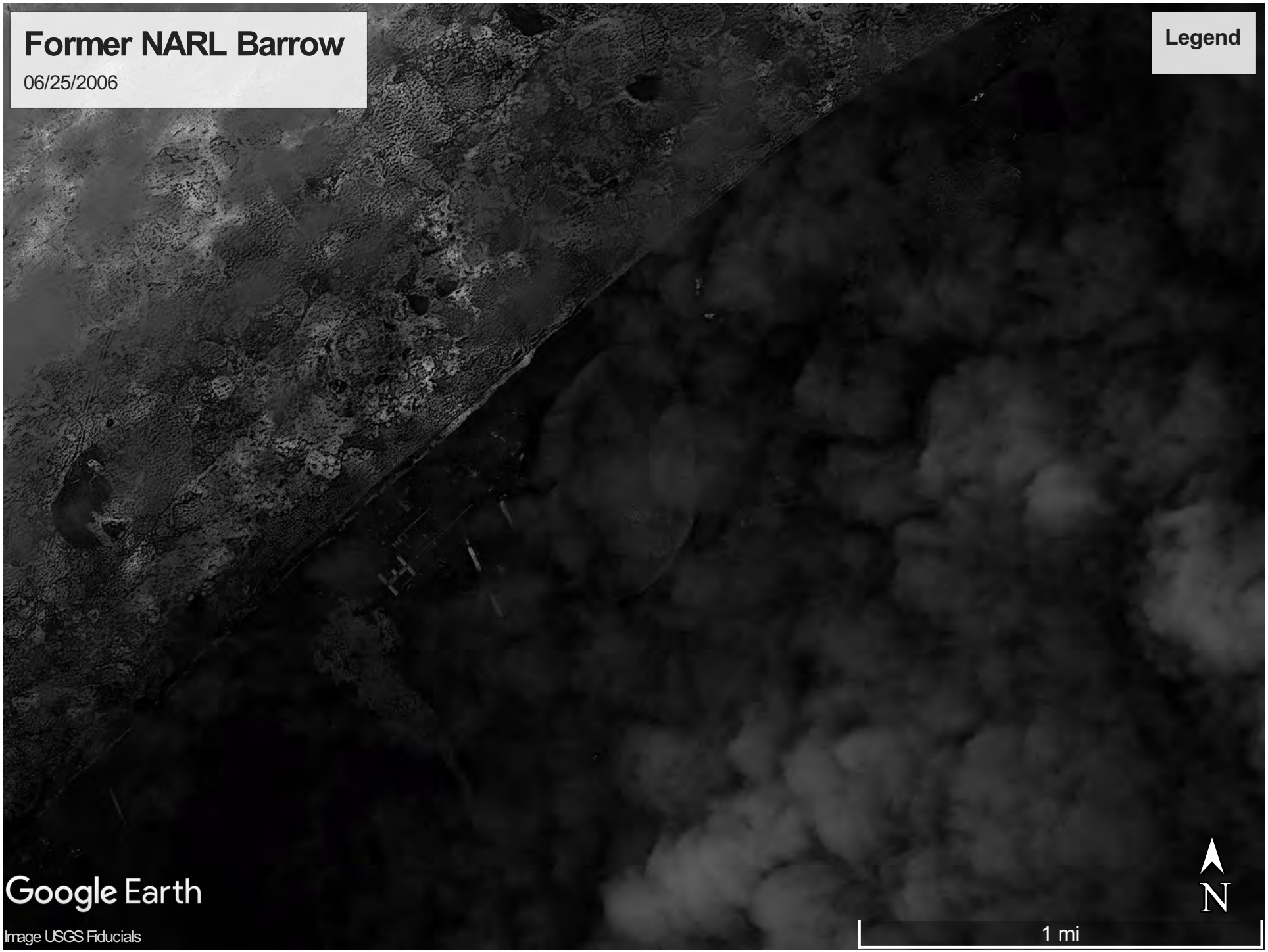

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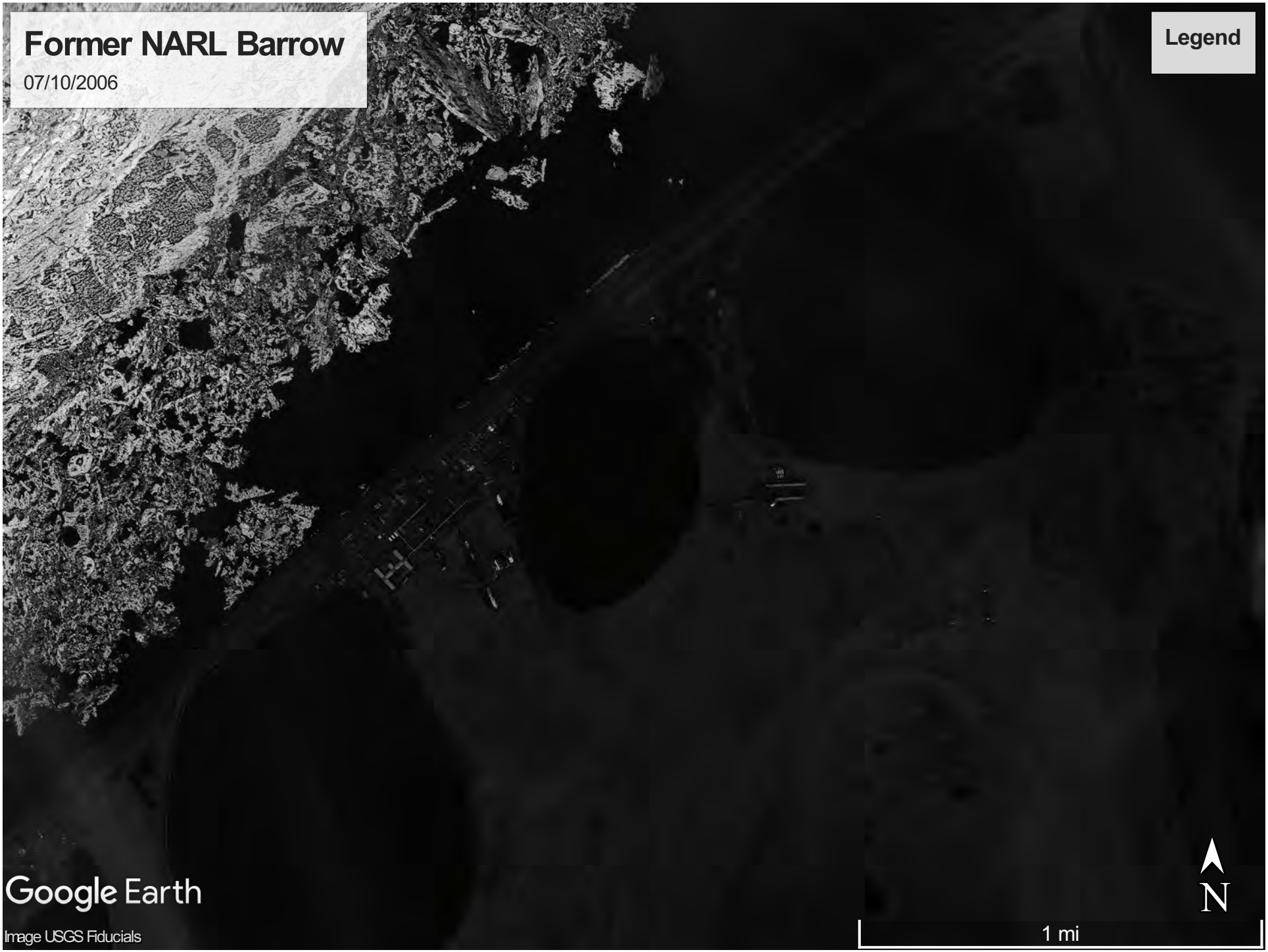

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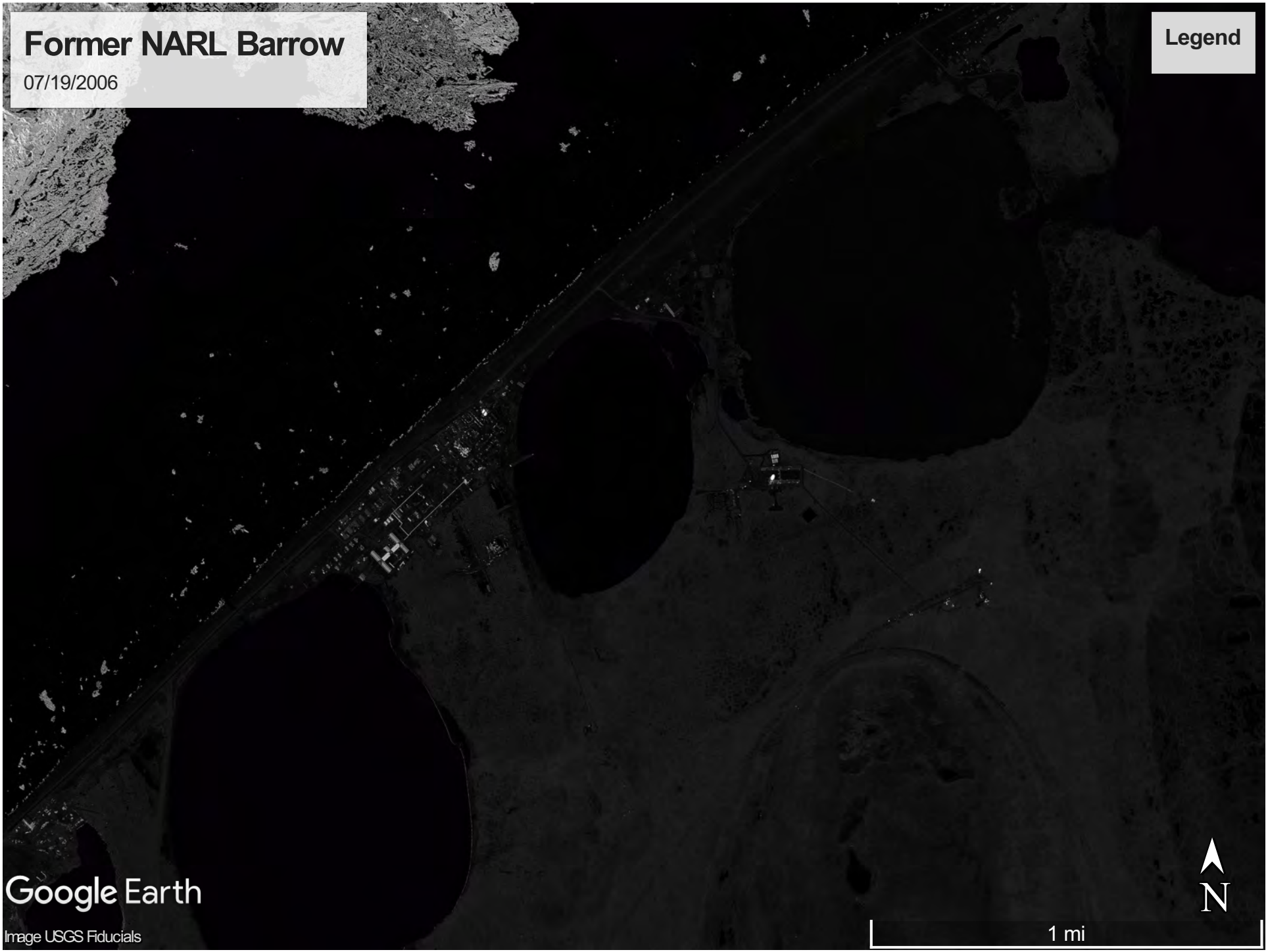

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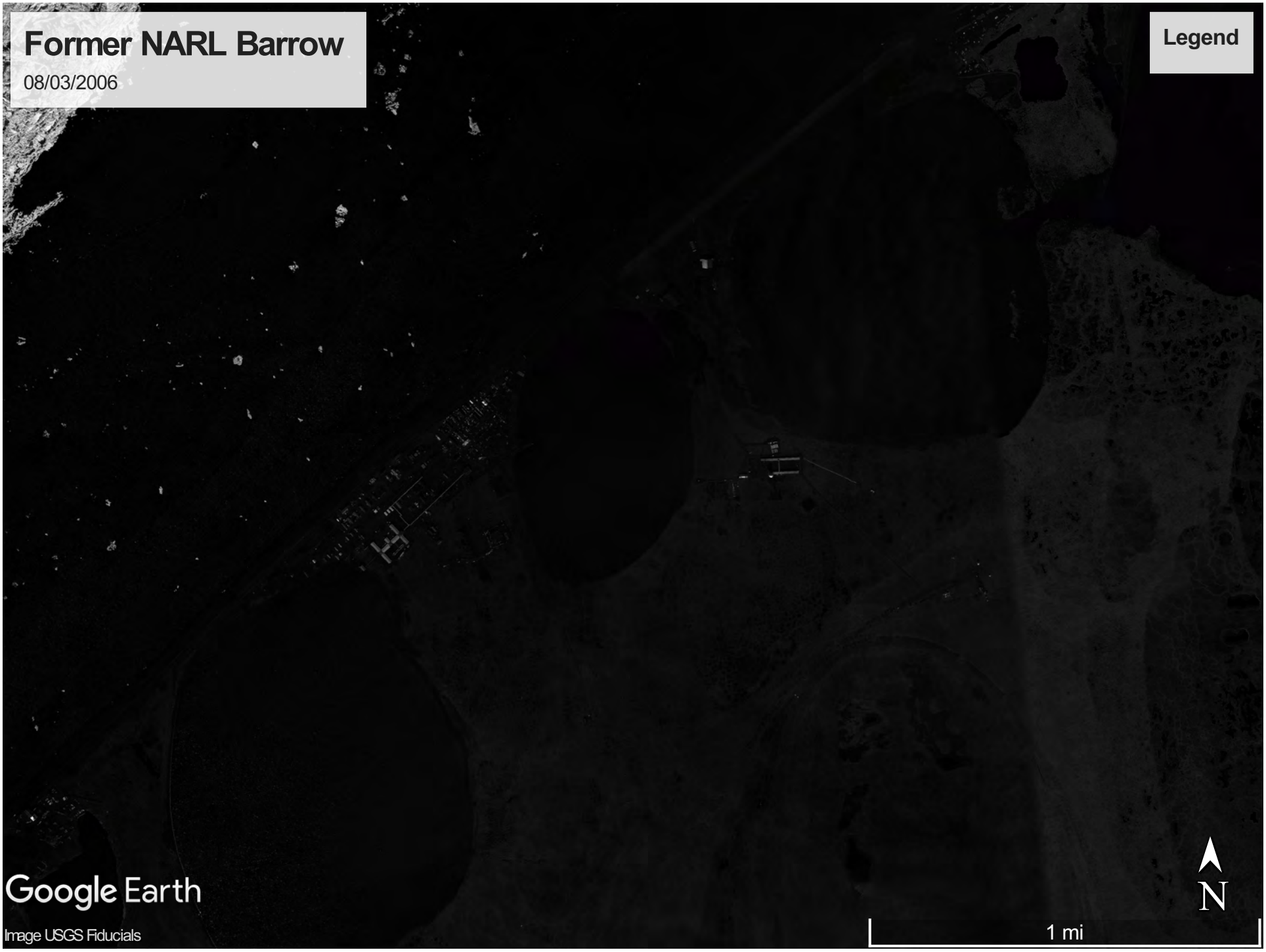

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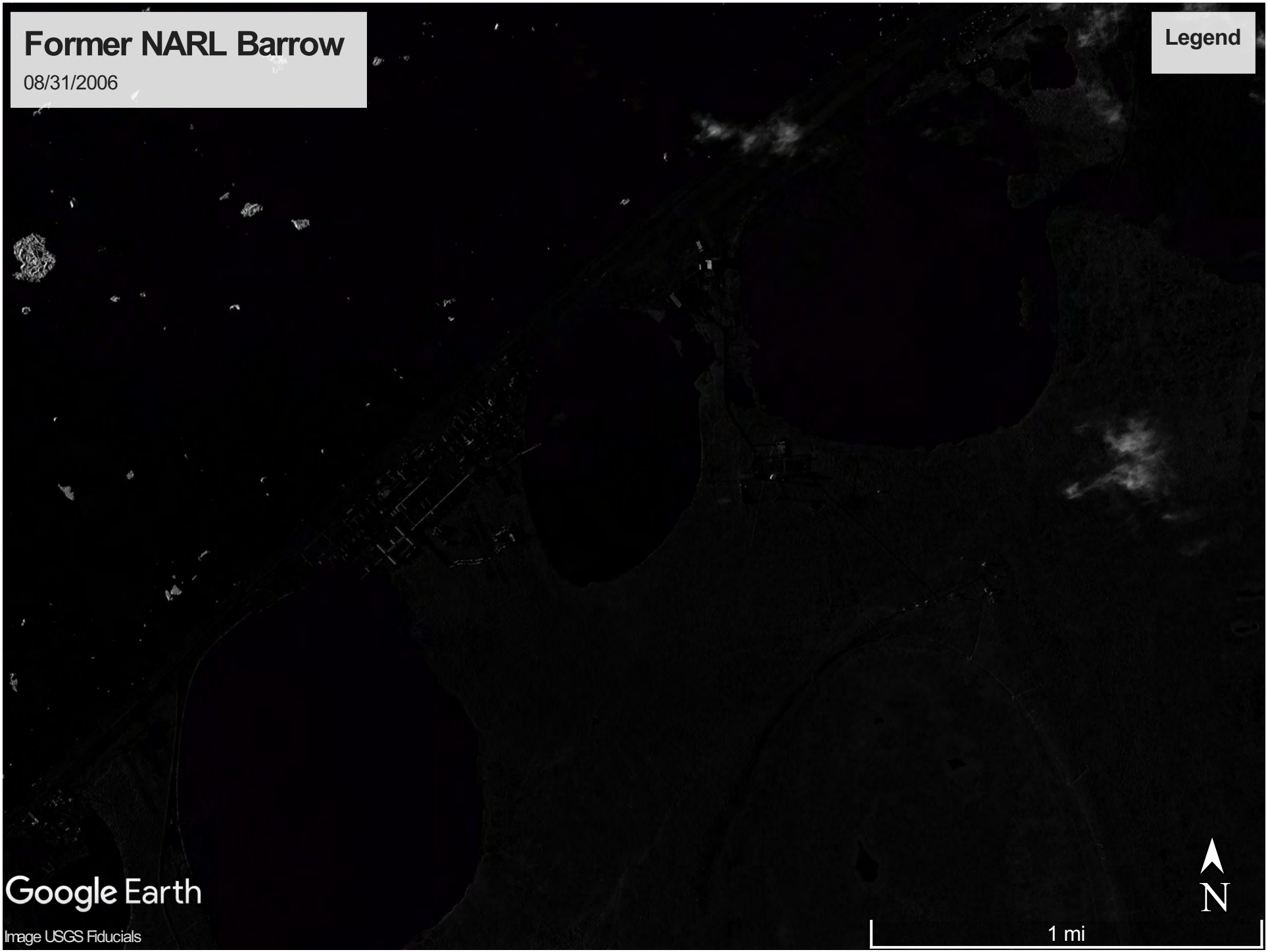

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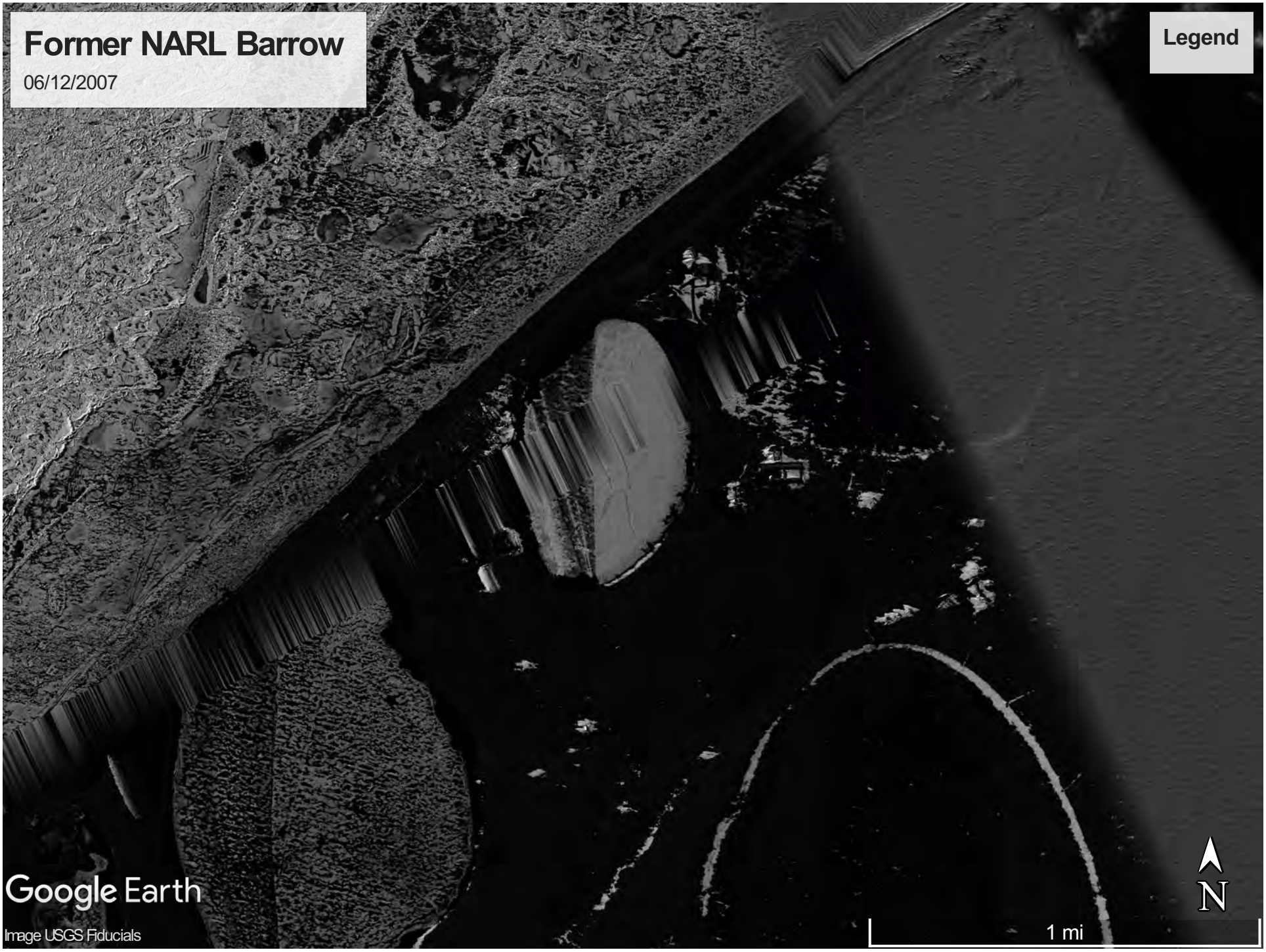

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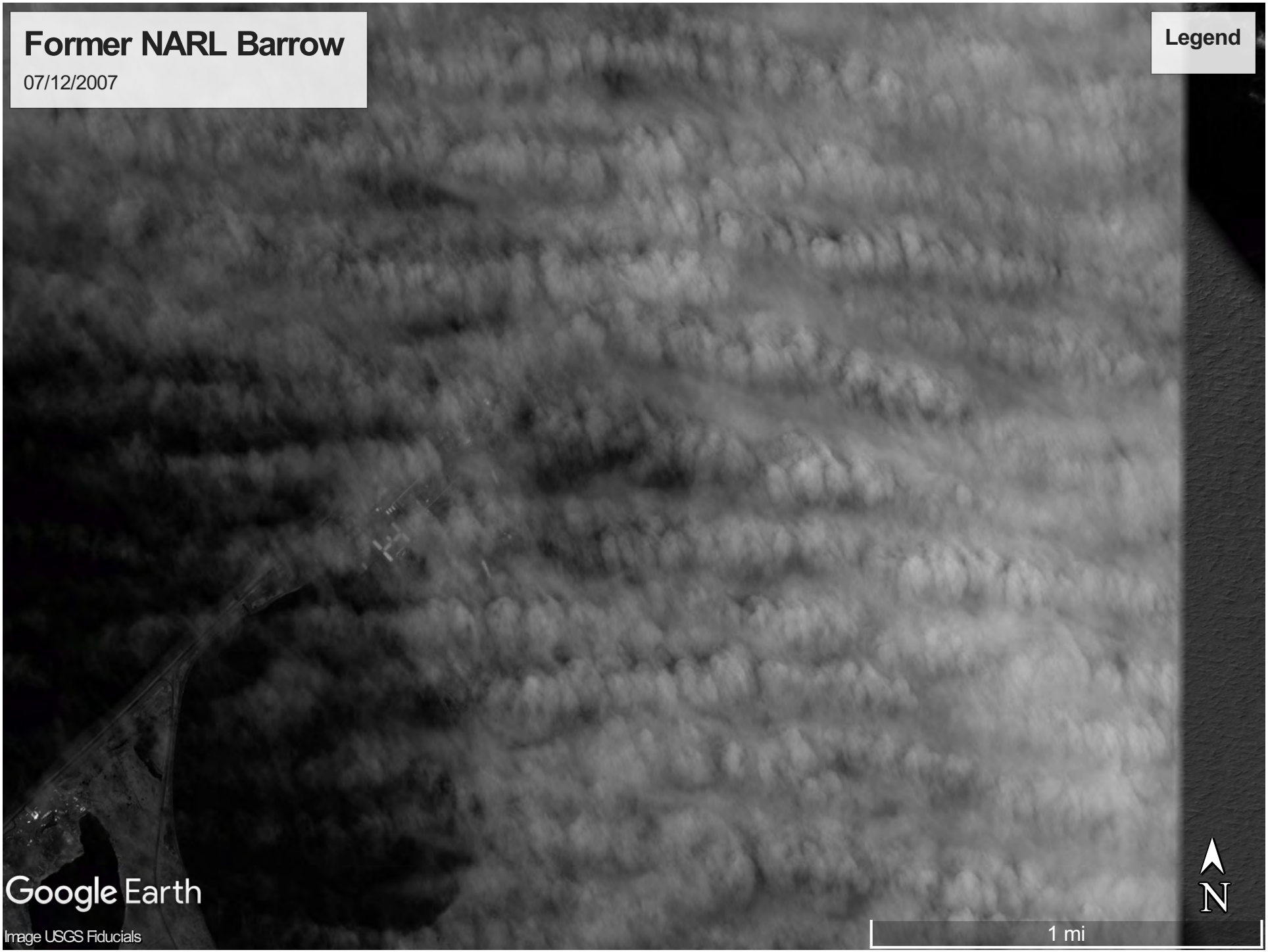

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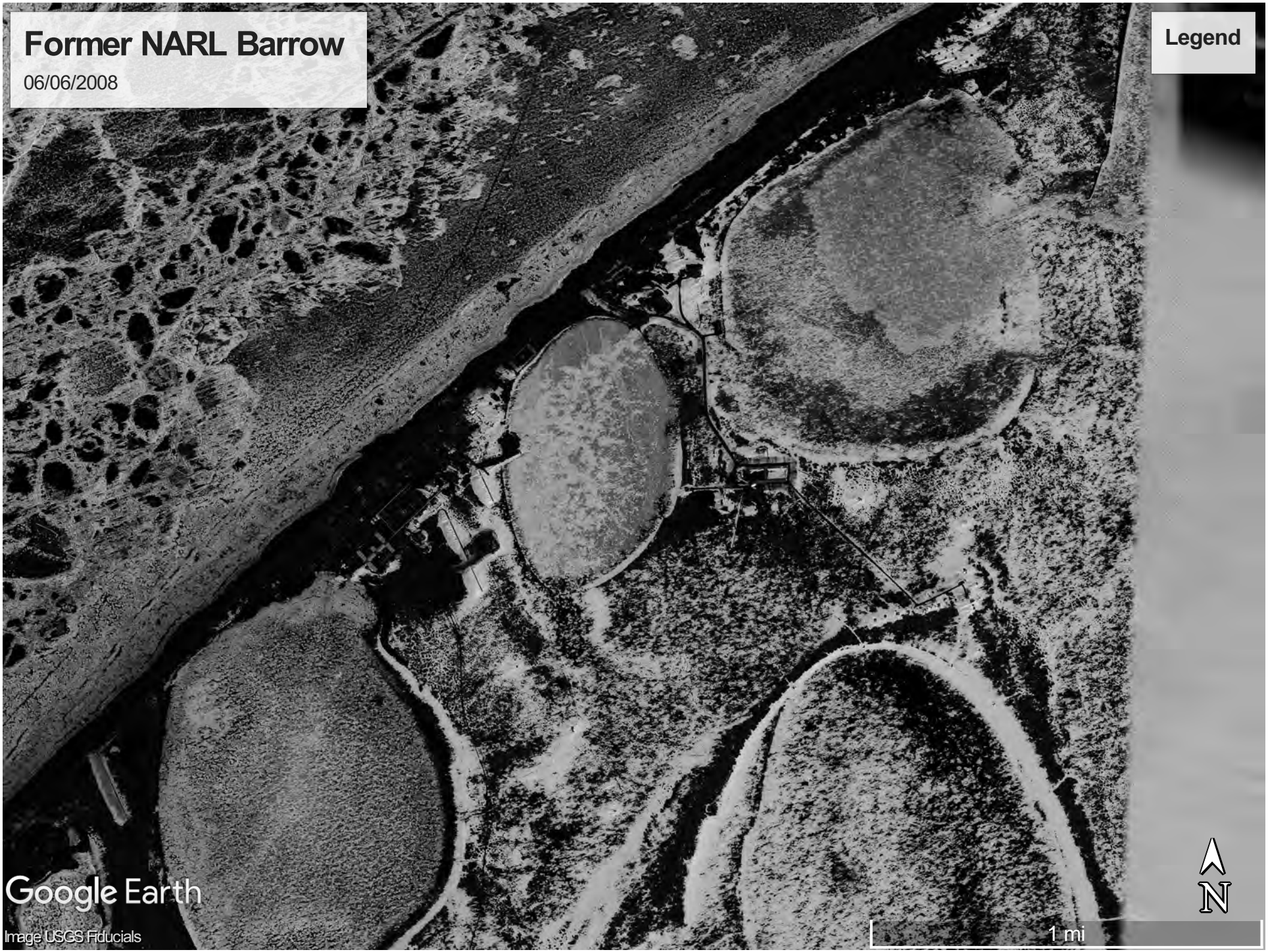

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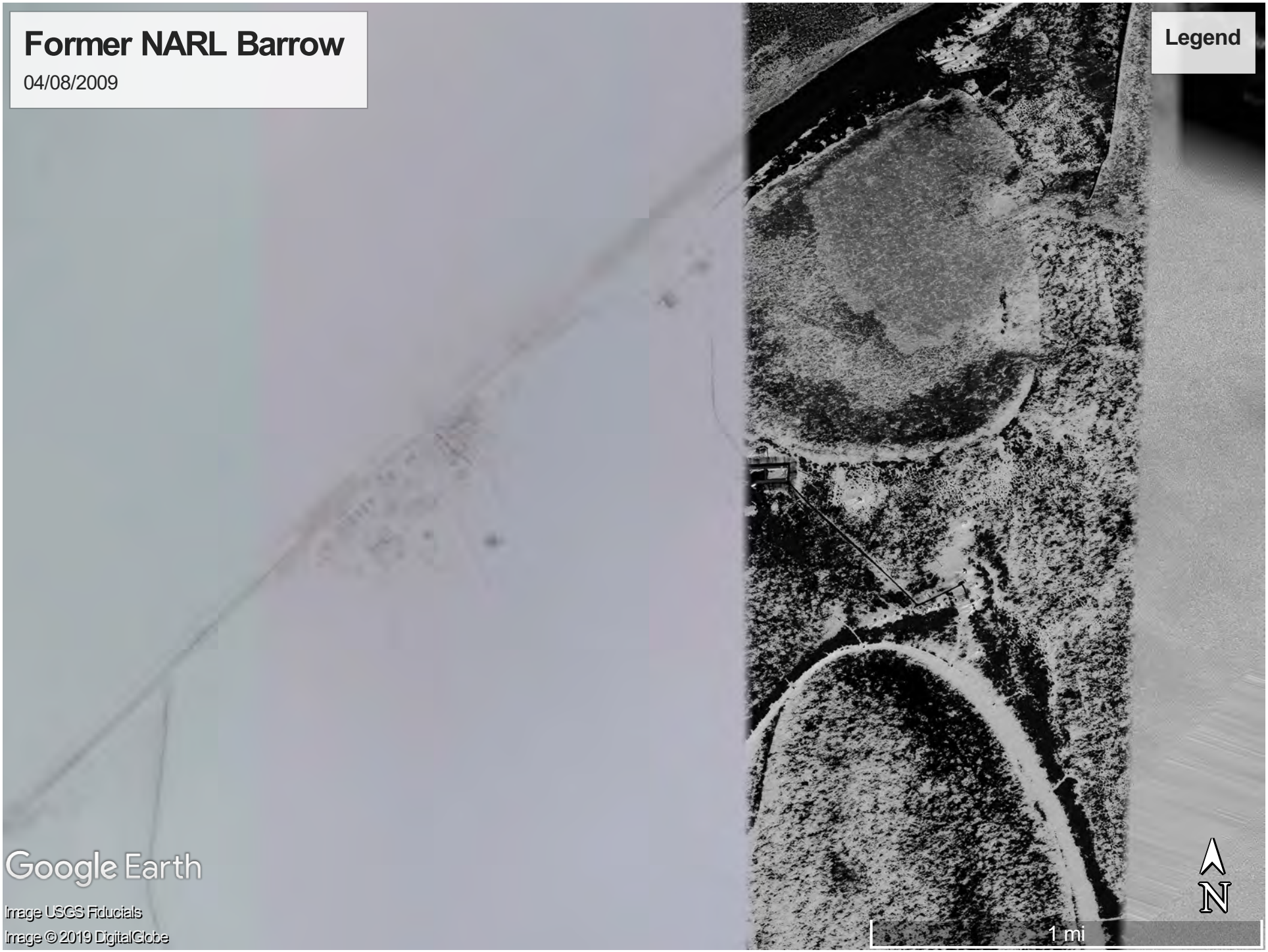

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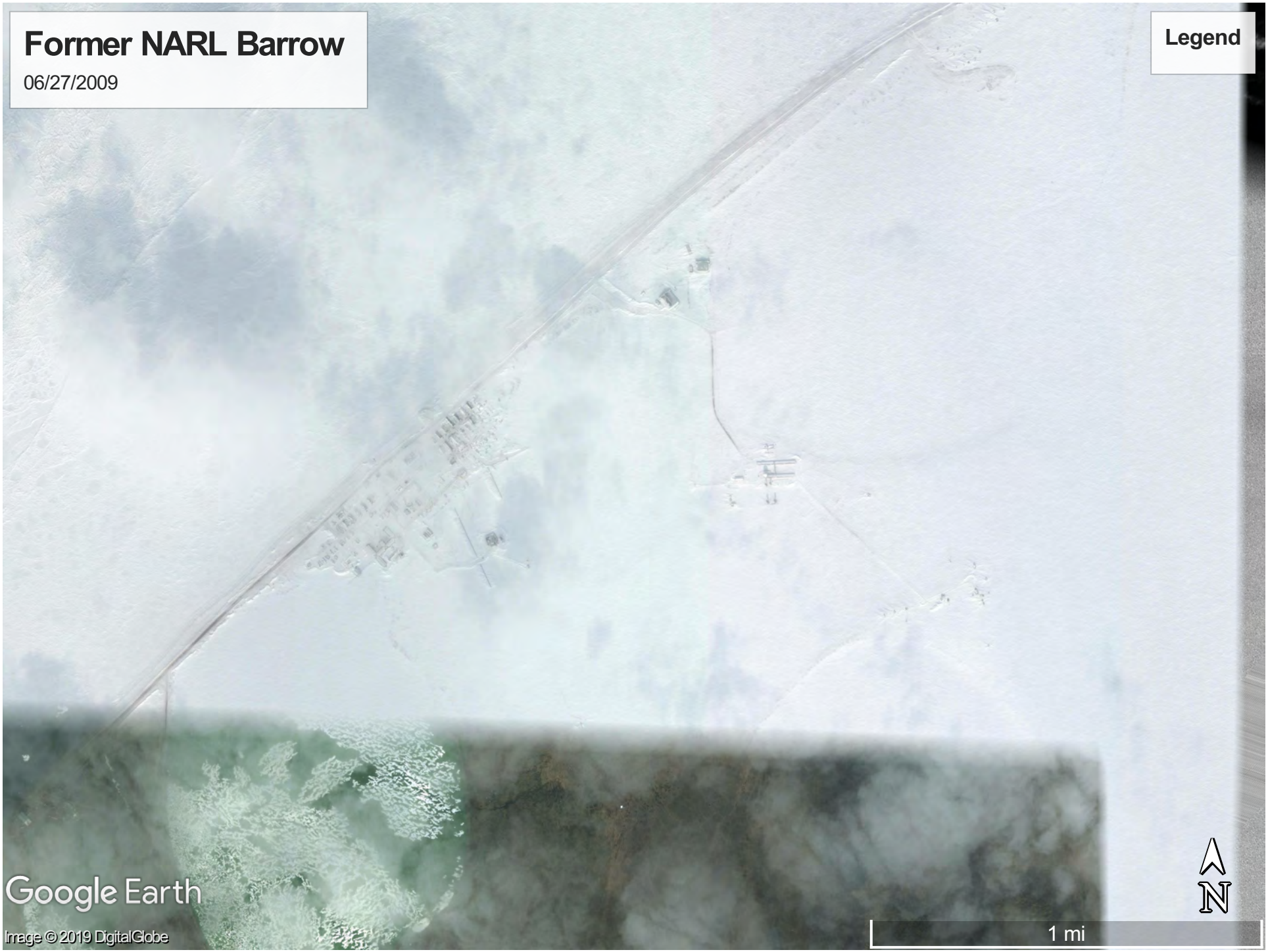

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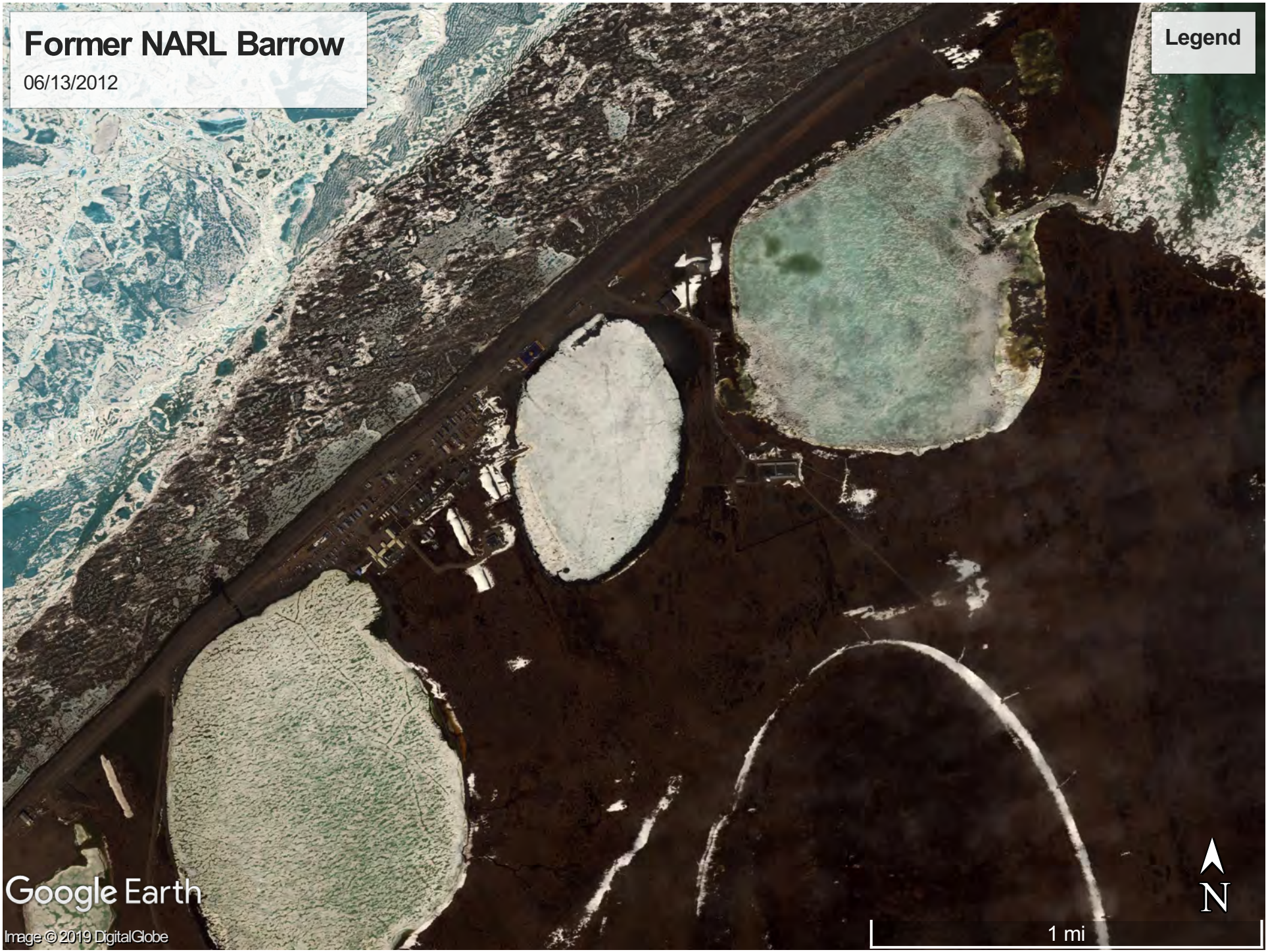

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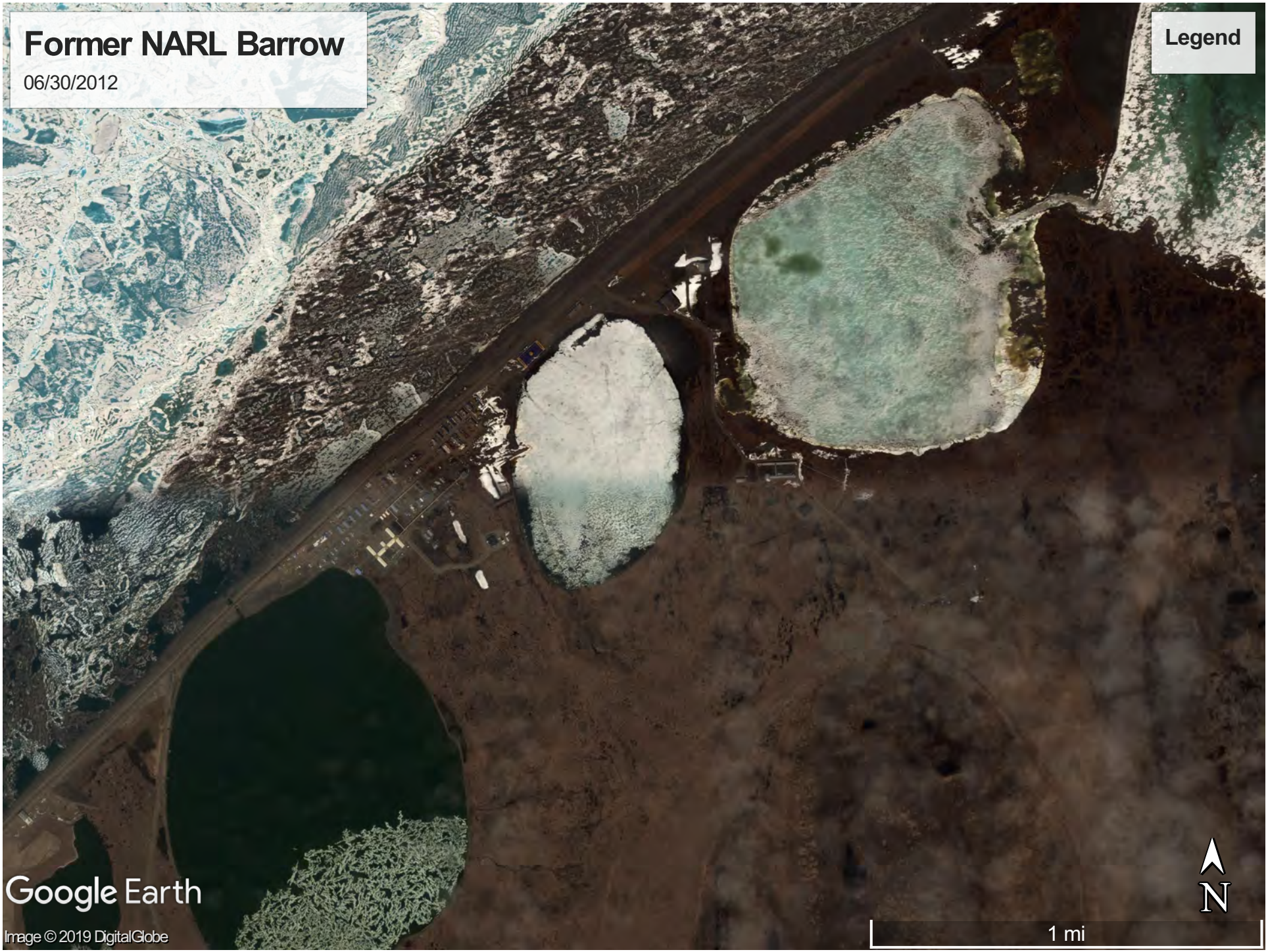

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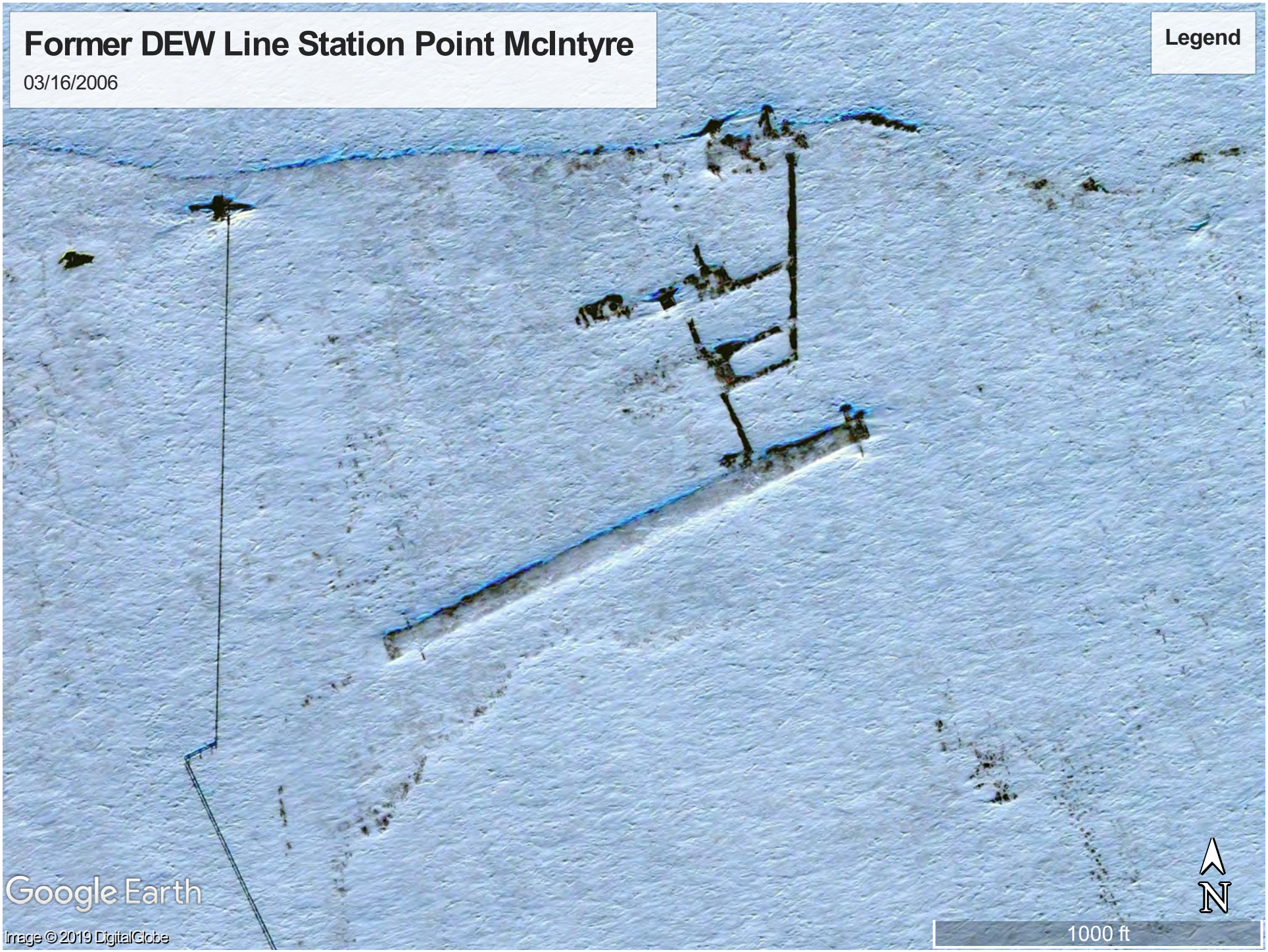

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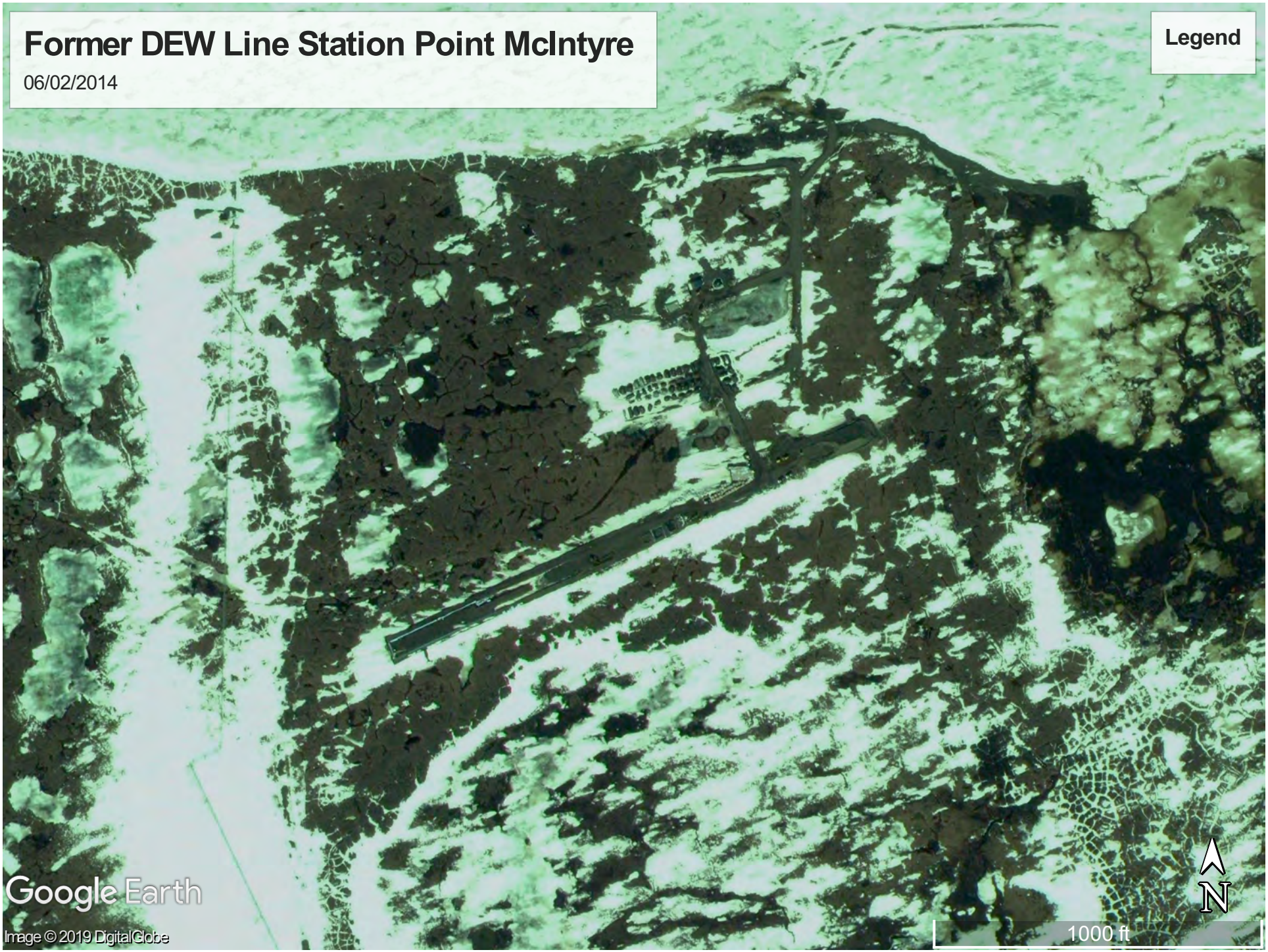

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History and Use of Per- and Polyfluoroalkyl Substances (PFAS)

1 Introduction

The unique physical and chemical properties of per- and polyfluoroalkyl substances (PFAS) impart oil and water repellency, temperature resistance, and friction reduction to a wide range of products used by consumers and industry. For example, PFAS, have been used in coatings for textiles, paper products, and cookware and to formulate some firefighting foams, and have a range of applications in the aerospace, photographic imaging, semiconductor, automotive, construction, electronics, and aviation industries (KEMI 2015; USEPA 2017b). USEPA has compiled a web-based resource for PFAS information. The information includes topics such as Policy and Guidance, Chemistry and Behavior, Occurrence, Toxicology, Site Characterization and Remediation Technologies (USEPA 2017h).

The scientific community is rapidly recognizing and evolving its understanding of the environmental and health impacts associated with the release of PFAS. Certain PFAS, most notably some of the perfluoroalkyl acids (PFAAs), such as perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS), are mobile, persistent, and bioaccumulative, and are not known to degrade in the environment (USEPA 2003b; ATSDR 2015; NTP 2016; Concawe 2016).

ITRC has developed a series of six fact sheets to summarize the latest science and emerging technologies regarding PFAS. The purpose of this fact sheet is to:

- provide an overview of the discovery and development of PFAS and the subsequent detection of PFAS in the environment
- describe emerging concerns of potential adverse human health effects, and efforts to reduce use or replace with alternate formulations, or both
- identify the major sources of PFAS in the environment, as well as other sources of PFAS to the environment that may be of interest

Understanding the manufacturing history of PFAS, as well as past and current uses, allows for the identification of potential environmental sources of PFAS, possible release mechanisms, and associated pathway-receptor relationships.

2 Discovery and Manufacturing History

PFAS are a complex family of more than 3,000 manmade fluorinated organic chemicals (Wang et al. 2017) that have been produced since the mid-20th century, although not all of these may be currently in use or production. Table 2-1 provides a general timeline of initial synthesis and commercial production of some of the more well-known PFAS, along with some of the more frequently associated products.

PFAS are produced using several different processes. Two major processes have been used to manufacture fluorosurfactants (includes PFAAs) and side-chain fluorinated polymers: electrochemical fluorination (ECF) and telomerization (KEMI 2015). ECF was licensed by 3M in the 1940s (Banks, Smart, and Tatlow 1994), and used by 3M until 2001. ECF produces a mixture of even- and odd- numbered carbon chain lengths of approximately 70% linear and 30% branched substances (Concawe 2016). Telomerization was developed in the 1970s (Benskin 2011), and yields mainly even numbered, straight carbon chain isomers (Kissa 2001; Parsons et al. 2008).

Table 2-1. Discovery and manufacturing history of select PFAS

PFAS[1]	Development Time Period							
	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s
PTFE	Invented	Non-Stick Coatings			Waterproof Fabrics			
PFOS		Initial Production	Stain & Water Resistant Products	Firefighting foam				U.S. Reduction of PFOS, PFOA, PFNA (and other select PFAS[2])
PFOA		Initial Production		Protective Coatings				
PFNA					Initial Production	Architectural Resins		
Fluoro-telomers					Initial Production	Firefighting Foams		Predominant form of firefighting foam
Dominant Process[3]		Electrochemical Fluorination (ECF)						Fluoro-telomerization (shorter chain ECF)
Pre-Invention of Chemistry /			Initial Chemical Synthesis / Production			Commercial Products Introduced and Used		

Notes:
1. This table includes fluoropolymers, PFAAs, and fluorotelomers. PTFE (polytetrafluoroethylene) is a fluoropolymer. PFOS, PFOA, and PFNA (perfluorononanoic acid) are PFAAs.
2. Refer to Section 3.4.
3. The dominant manufacturing process is shown in the table; note, however, that ECF and fluorotelomerization have both been, and continue to be, used for the production of select PFAS.

Sources: Prevedouros et al. 2006; Concawe 2016; Chemours 2017; Gore-Tex 2017; US Naval Research Academy 2017

3 Health and Environmental Investigations

3.1 Initial Studies

Studies that found some PFAS in the blood of occupationally exposed workers in the 1970s and reported detections in the blood of the general human population in the 1990s (Buck et al. 2011) led to increased awareness of PFAAs in the environment, associated human exposure, and the potential for health effects. PFAAs (such as PFOS and PFOA) are found in the blood and serum of most people whether exposed in the workplace or not. This is attributed to widespread use, ability to bind to blood proteins and long half-lives in humans (Kannan et al. 2004; Karrman et al. 2006; Olsen et al. 2003). Laboratory studies using animals and epidemiological studies of human populations show that exposure to some PFAS may be associated with a wide range of adverse human health effects (USEPA 2016b, c; ATSDR 2017).

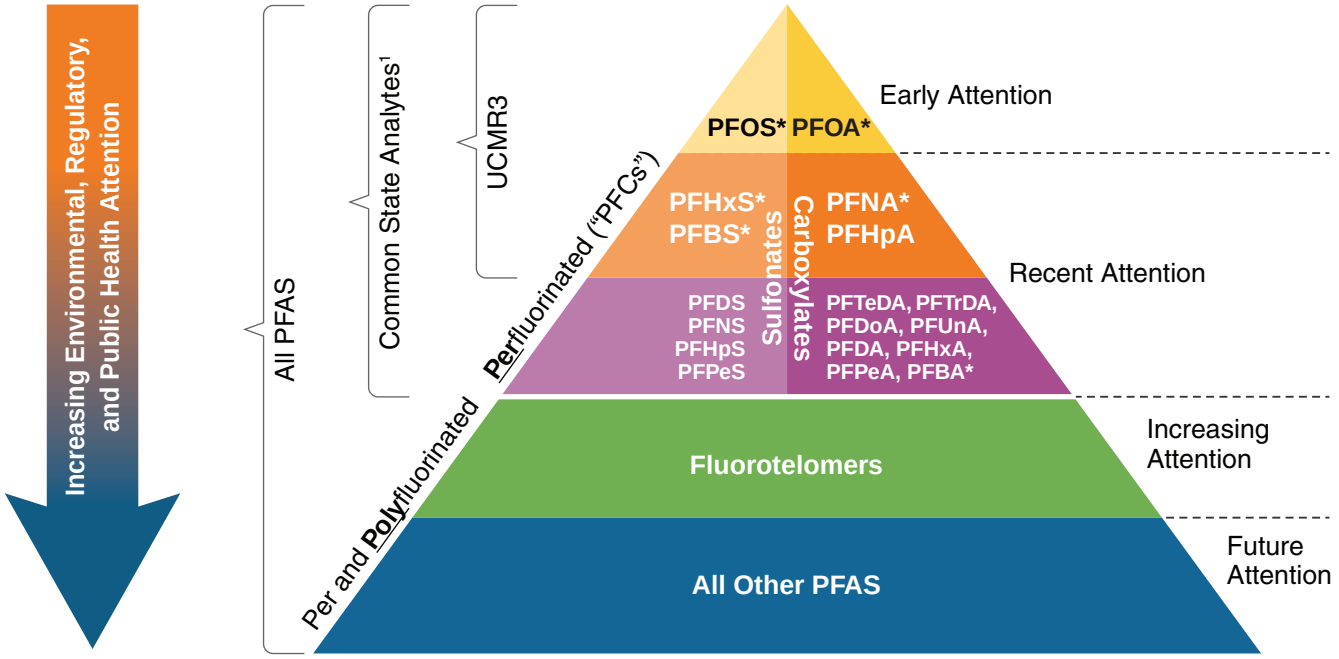
Although some PFAS have been manufactured for more than 50 years, PFAS were not widely documented in environmental samples until the early 2000s. Early detection at low reporting limits was hindered due to analytical capability challenges arising from the unique surface-active properties of PFAS (Giesy and Kannan 2001; 3M 2000). Many manuscripts have since been published showing widespread distribution of certain PFAS, such as PFAAs, in various matrices including sediments, surface and groundwater, wildlife, and human blood (whole, plasma, and serum) (Kannan et al. 2004; Yamashita et al. 2005; Higgins et al. 2005; Rankin et al. 2016). Some PFAS (such as PFAAs) are found in many places throughout the globe, even in areas well beyond where they were initially used or manufactured (Houde et al. 2011).

3.2 Emerging Awareness

The awareness and emphasis on various PFAS have evolved. Early focus was on the longer-chain (see Section 3.4), perfluoroalkyl acids (PFAAs). In 2016, USEPA issued a Lifetime Health Advisory (LHA) for two of the most widely detected PFAAs, PFOA and PFOS. Set at 70 nanograms per liter (ng/L, equivalent to parts per trillion [ppt]), the LHA applies for each PFAA, as well as in combination, in drinking water (USEPA 2016d).

Six additional PFAAs have recently gained attention after their inclusion in the USEPA Unregulated Contaminant Monitoring Rule (UCMR). The third round of monitoring, or UCMR3, was promulgated in 2012 for tracking chemicals suspected to be present in drinking water, but do not have health-based standards set by the Safe Drinking Water Act. A summary of the occurrence data is included in the *Regulations, Guidance, and Advisories Fact Sheet*.

Many state regulatory agencies now request or require an expanded list of perfluoroalkyl substances (short and long chain), and fluorotelomers and polyfluoroalkyl substances are also receiving increased attention. This progression is illustrated in Figure 3-1.



*Common regulatory criteria or health advisories
[1]Sum of informal poll (NJ, NH, MN)

Thematic and not proportional.
Bottom of triangle indicates additional number of compounds; not a greater quantity by mass, concentration, or frequency of detection.

Figure 3-1. Emerging awareness and emphasis on PFAS occurrence in the environment
(Source: J. Hale, Kleinfelder, used with permission)

3.3 Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants (POPs) is a United Nations treaty signed in 2001 aimed at reducing or eliminating the production, use, and release of key POPs. POPs are defined as synthetic, organic compounds that, to varying degrees, resist photolytic, biological, and chemical degradation (KEMI 2004 and 2005; USEPA 2017k).

In 2009, *Annex B of the Stockholm Convention* was amended to include PFOS, because it is persistent in the environment and is not known to degrade at any environmental condition. At this time, the U.S. has not ratified the amendment (KEMI 2017). According to the Stockholm Convention website, PFOA and PFHxS (perfluorohexane sulfonic acid) are currently proposed for listing.

3.4 Phase-out of Long-Chain PFAS

Due to industry and regulatory concerns about the potential health and environmental impacts, there has been a reduction in the manufacture and use of long-chain PFAAs. Long-chain PFAAs include perfluorinated carboxylates (PFCAs) with eight or more fully fluorinated carbons (for example, PFOA) and perfluorinated sulfonates (PFSAs) with six or more fully fluorinated carbons (for example, PFHxS and PFOS), their salts, and precursor compounds capable of forming long-chain PFAAs (USEPA 2009a; Buck et al. 2011; OECD 2013; Wang et al. 2015).

- In May 2000, 3M, the principal worldwide manufacturer and sole U.S. manufacturer of PFOS, announced a voluntary phase-out of perfluorooctanyl chemistries, which included PFOS, PFHxS, PFOA, and related precursors. 3M reportedly completed most of the phase-out by the end of 2002, with the remaining phase-out completed by 2008 (USEPA 2003b; USEPA 2017e; 3M 2017b).
- USEPA issued Significant New Use Rules (SNURs) under the Toxic Substances Control Act (TSCA) to restrict any future use or production of 183 PFAS, which include 88 of the PFOS-related chemicals phased-out by 3M. However, the SNURs allowed for continued, low-volume use of some of these PFAS in the photographic/imaging, semiconductor, etching, metal plating, and aviation industries. Also, due to the long shelf-life of PFOS-based fire-fighting foams, they may still be stored and in use at various facilities (see Section 4.2) (USEPA 2007). SNURs for some long-chain PFCAs and PFSAs have been proposed (USEPA 2015b).
- In January 2006, USEPA initiated the PFOA Stewardship Program (USEPA 2006b). The eight major manufacturing companies committed to reducing PFOA, other longer-chain PFCAs (such as perfluorononanoic acid [PFNA] and perfluoroundecanoic acid [PFUnA]), and related precursors (for example, 8:2 fluorotelomer alcohol [FTOH]) that could be converted to these PFCAs from their global facility emissions and product content. USEPA indicates all eight companies successfully satisfied the program goals, meeting a 95% reduction by 2010, and elimination by 2015 (USEPA 2017e). Even though the program goals were met, materials imported to the United States may contain these PFCAs and related precursors.

PFAS are manufactured globally. Recently increased production of PFOA and related PFAS in China, India, and Russia have potentially offset the global reduction anticipated with the U.S. phase-out (OECD 2015b). PFAS manufacture began in China in the 1980s (World Bank 2017a, b), and PFOS production in China increased with the long-chain PFAA phase-out in the United States (Concawe 2016). In 2016, PFOS and its derivatives were still being produced in Germany, Italy, and China (Witteveen+Bos and TTE 2016), but by early 2017, China was the only known producer of PFOS. China has ratified the Stockholm Convention on POPs and a grant from Global Environment Facility (GEF) was approved in 2017 to support the reduction of PFOS in China (World Bank 2017a).

3.5 Replacement Chemistry

Manufacturers have been developing replacement technologies, including reformulating or substituting longer-chain substances with shorter-chain perfluoroalkyl or polyfluorinated substances that include, but are not limited to, compounds produced with ECF and fluorotelomerization, such as: FTOH, perfluorobutane sulfonyl fluoride (PBSF)-based derivatives (for example, perfluorobutane sulfonate [PFBS] in lieu of PFOS), polyfluoroethers (for example, GenX and ADONA used in the manufacture of fluoropolymers) and other types of PFAS (Hori et al. 2006; OECD 2007; Herzke, Olson, and Posner 2012; Wang et al. 2013; Wang et al. 2015; Holmquist et al. 2016).

Many long-chain PFAS alternatives are structurally similar to their predecessors and manufactured by the same companies (Concawe 2016; Wang et al. 2015). However, it is not yet clear if some of these chemicals can achieve the same performance effectiveness of some of their predecessors. For example, a 2015 study concluded that there are no non-fluorinated alternatives that provide equivalent technical performance in textiles (Danish EPA 2015).

Several studies suggest some of the replacement PFAS may or may not be less hazardous than the long-chain predecessors, although publicly available information on most replacement chemicals is limited (Wang et al. 2015; RIVM 2016). Documentation regarding the USEPA's review of hundreds of "shorter chain-length PFAS telomeric" substitutes for long-chain PFAS is available under the TSCA New Chemicals Program (OECD 2013; USEPA 2017g). Other documentation regarding replacement chemistries is available from the FluoroCouncil (2017).

Information on environmental contamination by replacement PFAS is limited, and most are not detected by standard analytical methods (Wang et al. 2013). Treatment processes used to remove these chemicals from waste streams may not be as effective as with longer-chain PFAS (Sun et al. 2016).

4 Major Sources of PFAS in the Environment

PFAS are used in many industrial and consumer applications. Major sources may have released PFAS into the environment and impacted drinking water supplies in many areas of the United States (Environmental Working Group and Northeastern University Social Science Environmental Health Research Institute 2017).

4.1 Production and Manufacturing Facilities

Both in the United States and abroad, primary manufacturing facilities produce PFAS and secondary manufacturing facilities use PFAS to produce goods. Due to the solubility and persistence of many PFAS, environmental release mechanisms associated with these facilities include air emission and dispersion, spills, and disposal of manufacturing wastes and wastewater. Potential impacts to air, soil, surface water, stormwater, and groundwater are present not only at release areas but potentially over the surrounding area (Shin et al. 2011). Table 4-1 summarizes potential major sources of PFAS releases to the environment based on the manufacturing sector. Manufacturing of commercial products and consumer goods summarized in Section 5 may also be environmental sources but are not included in this table.

Table 4-1. Potential major manufacturing sources of PFAS releases to the environment

Sector	Example Uses	References
Textiles & Leather	Factory- or consumer-applied coating to repel water, oil, and stains. Applications include protective clothing and outerwear, umbrellas, tents, sails, architectural materials, carpets, and upholstery.	Rao and Baker 1994; Hekster, Laane, and de Voogt 2003; Brooke, Footitt, and Nwaogu 2004; Poulsen et al. 2005; Prevedouros et al. 2006; Walters and Santillo 2006; Trudel et al. 2008; Guo et al. 2009; USEPA 2009a; Ahrens 2011; Buck et al. 2011; UNEP 2011; Herzke, Olsson, and Posner 2012; Patagonia 2015; Kotthoff et al. 2015; ATSDR 2015
Paper Products	Surface coatings to repel grease and moisture. Uses include non-food paper packaging (for example, cardboard, carbonless forms, masking papers) and food-contact materials (for example, pizza boxes, fast food wrappers, microwave popcorn bags, baking papers, pet food bags).	Rao and Baker 1994; Kissa 2001; Hekster, Laane, and de Voogt 2003; Poulsen et al. 2005; Trudel et al. 2008; Buck et al. 2011; UNEP 2011; Kotthoff et al. 2015; Schaider et al. 2017
Metal Plating & Etching	Corrosion prevention, mechanical wear reduction, aesthetic enhancement, surfactant, wetting agent/fume suppressant for chrome, copper, nickel and tin electroplating, and post-plating cleaner.	USEPA 1996; USEPA 1998; Kissa 2001; Prevedouros et al. 2006; USEPA 2009b; UNEP 2011; OSHA 2013; KEMI 2015; Danish EPA 2015
Wire Manufacturing	Coating and insulation.	Kissa 2001; van der Putte et al. 2010; ASTSWMO 2015
Industrial Surfactants, Resins, Molds, Plastics	Manufacture of plastics and fluoropolymers, rubber, and compression mold release coatings; plumbing fluxing agents; fluoroplastic coatings, composite resins, and flame retardant for polycarbonate.	Kissa 2001; Renner 2001; Poulsen et al. 2005; Fricke and Lahl 2005; Prevedouros et al. 2006; Skutlarek, Exner, and Farber 2006; van der Putte et al. 2010; Buck et al. 2011; Herzke, Olsson, and Posner 2012; Kotthoff et al. 2015; Miteni 2016; Chemours 2017
Photolithography, Semiconductor Industry	Photoresists, top anti-reflective coatings, bottom anti-reflective coatings, and etchants, with other uses including surfactants, wetting agents, and photo-acid generation.	SIA 2008; Choi et al. 2005; Rolland et al. 2004; Brooke, Footitt, and Nwaogu 2004; van der Putte et al. 2010; UNEP 2011; Herzke, Olsson, and Posner 2012

4.2 Class B Fluorine-Containing Firefighting Foams

Class B fluorine-containing firefighting foams (firefighting foam) for extinguishing flammable liquid fires include aqueous film forming foam (AFFF), fluoroprotein (FP), and film forming fluoroprotein foam (FFFP) (Concawe 2016). These foams have been stored and used for fire suppression, fire training, and flammable vapor suppression at hundreds of military installations and civilian airports (Hu et al. 2016), as well as at petroleum refineries and storage facilities, and chemical manufacturing plants throughout the United States. Additionally, local fire departments in communities have used and maintained quantities of firefighting foam in their inventories. Despite the phase-out of longer-chain PFAAs, these products still have long-chain PFAA constituents in firefighting foam due to the long shelf-life of these products. Facilities that manufactured firefighting foams are also potential sources.

Firefighting foams are a complex mixture of both known and unidentified PFAS of differing molecular structures present in varying proportions. Foams were produced to meet firefighting specifications, rather than formulated to contain a specified mixture of PFAS. These types of firefighting foams have been in use since the 1960s. The United States Naval Research Laboratory began research on the development of firefighting foams in the 1960s, which led to advancements in performance and increased safety (U.S. Naval Research Laboratory 2017). Fluorotelomer foams have been in use since the 1970s and became the predominant foam after 2001 when long-chain ECF-based foams were discontinued.

Firefighting foams are released into the environment through a variety of practices and mechanisms (Anderson et al. 2016; Hale 2016):

- low volume releases of foam concentrate during storage, transfer or equipment calibration
- moderate volume discharge of foam solution for apparatus testing
- occasional, high-volume, broadcast discharge of foam solution for firefighting and fire suppression/prevention
- periodic, high volume, broadcast discharge for fire training
- leaks from foam distribution piping between storage and pumping locations

Firefighting foam is applied by mixing foam concentrate and water to make foam solution. When applied to a fire, the foam solution is aerated at the nozzle, yielding finished foam. Thousands of gallons of foam solution may be applied during a given event. Figure 4-1 illustrates the use of firefighting foam, how it may be released to the environment, and potentially affected media.

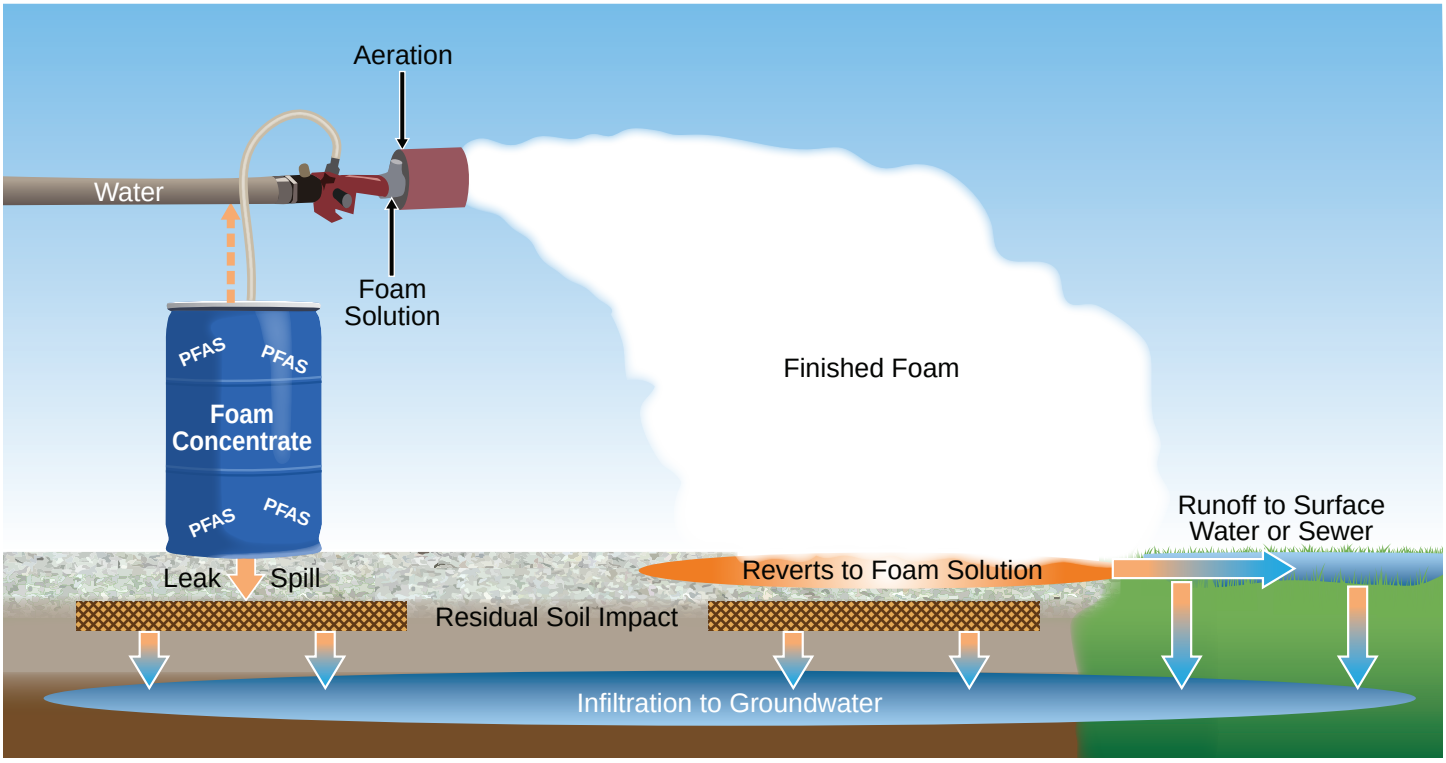


Figure 4-1. Release of firefighting foam
(Source: Adapted from figure by J. Hale, Kleinfelder, used with permission)

The U.S. Department of Defense (USDOD) has undertaken an evaluation of potential firefighting foam contamination at its facilities nationwide (Anderson et al. 2016). Similar efforts have been undertaken by some states. For example, the Minnesota Pollution Control Agency (MPCA) conducted a state-wide survey of firefighting foam use at training sites. Working with the State Fire Chief Association, the MPCA identified more than two dozen locations where Class B foams were likely used in firefighting training (Antea Group 2011).

4.3 Waste Disposal

Disposal of wastes generated during primary PFAS production and secondary manufacturing using PFAS can be sources of PFAS environmental contamination. As PFAS manufacturing processes change with time, the resulting type and composition of waste streams also change. Given that PFAS production and use began several decades before the enactment of federal and state regulations governing waste disposal (for example, Resource Conservation and Recovery Act [RCRA] in 1976 [USEPA 2017d]), environmental impacts, including impacted drinking water supplies, from disposal of legacy PFAS industrial waste have been documented (Shin et al. 2011; MPCA 2017).

Leachate from some municipal solid waste landfills has been shown to be a source of PFAS release to the environment, with the presence of some PFAS reportedly due to the disposal of consumer goods treated with hydrophobic, stain-resistant coatings (Busch et al. 2010; Eggen, Moeder, and Arukwe 2010). PFAS composition and concentration in leachates vary depending on waste age, climate, and waste composition (Allred et al. 2015; Lang et al. 2017).

The evolution of waste reduction and landfill technology has provided significant protection to human health and the environment (Hickman 1999). Leachate collection systems are essential to providing systematic transport of leachate to a central location for recirculation, treatment, or offsite treatment (Arabi and Lugowski 2015). Leachate treatment by wastewater treatment plants (WWTPs) is common prior to discharge to surface water, or distribution for agricultural or commercial use (Lang 2016). Standard WWTP technologies may do little to reduce or remove PFAS and discharge of landfill leachate treated at WWTPs represents a secondary source of certain PFAS release to the environment (Ahrens et al. 2015; CRC Care 2017).

4.4 Wastewater Treatment

Consumer and industrial use of PFAS-containing materials, including disposal of landfill leachate and firefighting foam, results in the discharge of PFAS to WWTPs. WWTPs, particularly those that receive industrial wastewater, are possible sources of PFAS release. (Lin, Panchangam, and Lo 2009; Ahrens et al. 2009).

4.4.1 WWTP Operations

Conventional sewage treatment methods do not efficiently remove PFAAs (Ahrens et al. 2011; Schultz et al. 2006). Evaluation of full-scale WWTPs has indicated that conventional primary (sedimentation and clarification) and secondary (aerobic biodegradation of organic matter) treatment processes, can result in changes in PFAS concentrations and classes (for example, an increase in the concentrations of PFAAs in effluent, presumably from degradation of precursor PFAS) (Schultz et al. 2006).

Some PFAS are frequently detected in WWTP effluent (for example, PFOA and PFBS), with concentrations of some PFAS ranging up to hundreds of ng/L; effluents are believed to be major point sources of these chemicals in surface water (Ahrens 2011). Hu et al. (2016) demonstrated that the presence of WWTPs in an area was predictive of the presence of PFOS and PFOA in drinking water. PFOS and PFOA are two of the most frequently detected PFAS in wastewater. (Hamid and Li 2016). Using WWTP effluent-impacted surface water as a source of tap water can, in turn, recycle the PFAS back to the WWTP, recirculating PFAS in the water cycle (Hamid and Li 2016).

At some WWTPs, studies have shown concentrations of PFAS in ambient air to be 1.5 to 15 times greater than reference sites (Ahrens et al. 2011). PFAS distribution (primarily PFAAs and FTOH, with higher concentrations of FTOH) changes based on the specific PFAS sources in the effluent and the type of treatment methods employed at the WWTP. Lagoon systems contain a greater fraction of PFAAs.

4.4.2 Biosolids

PFAS (measured as PFCAs and PFSAs) have been found in domestic sewage sludge (Higgins et al. 2005). USEPA states that more than half of the sludge produced in the United States is applied to agricultural land as biosolids, therefore biosolids application can be a source of PFAS to the environment (USEPA 2017n). The most abundant PFAS found in biosolids (PFOS and PFOA) are the same as in WWTP effluent; however, biosolids may also contain other long-chain PFAS (Hamid and Li 2016). Application of biosolids as a soil amendment can result in a transfer of PFAS to soil

(Sepulvado et al. 2011). These PFAS can then be available for uptake by plants and soil organisms. There are indications that PFAAs can enter the food chain through the use of biosolids-amended soil (Lindstrom et al. 2011; Blaine et al. 2013; Blaine et al. 2014; Navarro et al. 2017). Further studies show that PFAS concentrations can be elevated in surface and groundwater in the vicinity of agricultural fields that received PFAS contaminated biosolids for an extended period of time (Washington et al. 2010).

5 Other Sources of PFAS–Use of Commercial and Consumer Products

PFAS are widely used in consumer products and household applications, with a diverse mixture of PFAS found in daily use in varying concentrations (Clara et al. 2008; Trier, Granby, and Christensen 2011; Fujii, Harada, and Koizumi 2013; OECD 2013; ATSDR 2015; Kotthoff et al. 2015; KEMI 2015; USEPA 2016b, c).

Environmental releases associated with the use of commercial and consumer products are primarily related to management of solid waste (for example, disposal of used items in a municipal solid waste [MSW] landfill), and wastewater disposal (for example, discharge to WWTPs, private septic systems, or other subsurface disposal systems).

As increased environmental sampling for PFAS occurs, it is likely that additional sources may emerge. Studies have shown that physical degradation of some consumer products (such as PFAS-treated paper, textiles, and carpets) may be a source of PFAS in house dust (Bjorklund, Thuresson, and de Wit 2009). Additionally, studies have also shown that professional ski wax technicians may have significant inhalation exposures to PFAS (Nilsson et al. 2013) and snowmelt and surface waters near ski areas may have measurable PFAS impacts (Kwok et al. 2013).

Commercial and Consumer Products Containing PFAS:

- paper and packaging
- clothing and carpets
- outdoor textiles and sporting equipment
- ski and snowboard waxes
- non-stick cookware
- cleaning agents and fabric softeners
- polishes and waxes, and latex paints
- pesticides and herbicides
- hydraulic fluids
- windshield wipers
- paints, varnishes, dyes, and inks
- adhesives
- medical products
- personal care products (for example, shampoo, hair conditioners, sunscreen, cosmetics, toothpaste, dental floss)

6 References and Acronyms

The references cited in this fact sheet, and the other ITRC PFAS fact sheets, are included in one combined list that is available on the ITRC web site. The combined acronyms list is also available on the ITRC web site.



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November 2017

From:	Leibman, Kendra R CIV NAVFAC NW, EV32
To:	Salter-Blanc, Alexandra/PDX
Cc:	Radford, Maggie/SEA; Saepoff, Steve A CIV NAVFAC NW, EV32
Subject:	[EXTERNAL] NW Back Island DW Results
Date:	Wednesday, October 17, 2018 9:28:47 AM
Attachments:	PFC results_December2016_NW.xlsx Navy Region NW_Overview of Expanded Drinking Water Testing Results for P....pdf

Good morning Ali,

Attached is a spreadsheet pertaining to on-base drinking water sampling conducted by the installation at Back Island (see yellow highlighted row). All results ND.

The second attachment is a factsheet that provides an overview of sampling conducted at all installations listed. Note that Back Island results were not available at the time this factsheet was finalized.

Kendra

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Historic Property Inventory and Evaluation Naval Arctic Research Laboratory (NARL) Point Barrow and NARL Point Barrow Airstrip



Point Barrow, Alaska
August 2010

Prepared by:

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Naval Arctic Research Laboratory
Historic Property Inventory and Evaluation
Naval Arctic Research Laboratory (NARL) Point Barrow and NARL Point Barrow Airstrip
Point Barrow, Alaska

Prepared by: Russell Sackett, R.A.
Historical Architect
Naval Facilities Engineering Command, Northwest
August 2010

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List of Acronyms

AHRS ..... Alaska Heritage Resources Survey
ANCSA ..... Alaska Native Claims Settlement Act
Arcon ..... Arctic Contractors
ARL ..... Arctic Research Laboratory
ARLAB ..... Arctic Research Laboratory Advisory Board
ARLIS-1 ..... Arctic Research Laboratory Ice Station-1
ARL/NARL ..... Arctic Research Laboratory/Naval Arctic Research Laboratory
CES ..... Civil Engineering Squadron
DEWLine ..... Distant Early Warning Line
DoD ..... Department of Defense
EIS ..... Environmental Impact Statement
HABS ..... Historic American Building Survey
HAER ..... Historic American Engineering Recordation
IGY ..... International Geophysical Year
LRRS ..... Long Range Radar System
NARL ..... Naval Arctic Research Laboratory
NARL PB ..... Naval Arctic Research Laboratory Point Barrow
NASA ..... National Aeronautical and Space Administration
NAVFAC NW ..... Naval Facilities Engineering Command Northwest
NEPA ..... National Environmental Policy Act
NPR ..... National Petroleum Reserve
NRHP ..... National Register of Historic Places
NSF ..... National Science Foundation
ONR ..... Office of Naval Research
POW-M ..... Point Barrow Main Station
TB ..... Tuberculosis
UIC ..... Ukpeagvik Iñupiat Corporation
USAF ..... United States Air Force
USGS ..... United States Geological Survey
WWII ..... World War II

1 INTRODUCTION

The Navy Seabees arrived at Point Barrow, Alaska in 1944 to establish a camp to support oil exploration in the Naval Petroleum Reserve No. 4 (NPR 4). By the end of the first year, the Seabees had constructed Point Barrow Camp, primarily of Quonset huts parallel to the Chuckchi Sea between Middle Salt Lagoon and Imikpuk Lake. An airstrip was built just to the east between Imikpuk Lake and North Salt Lagoon, and a radio antenna array was constructed to the south (Figure 1).

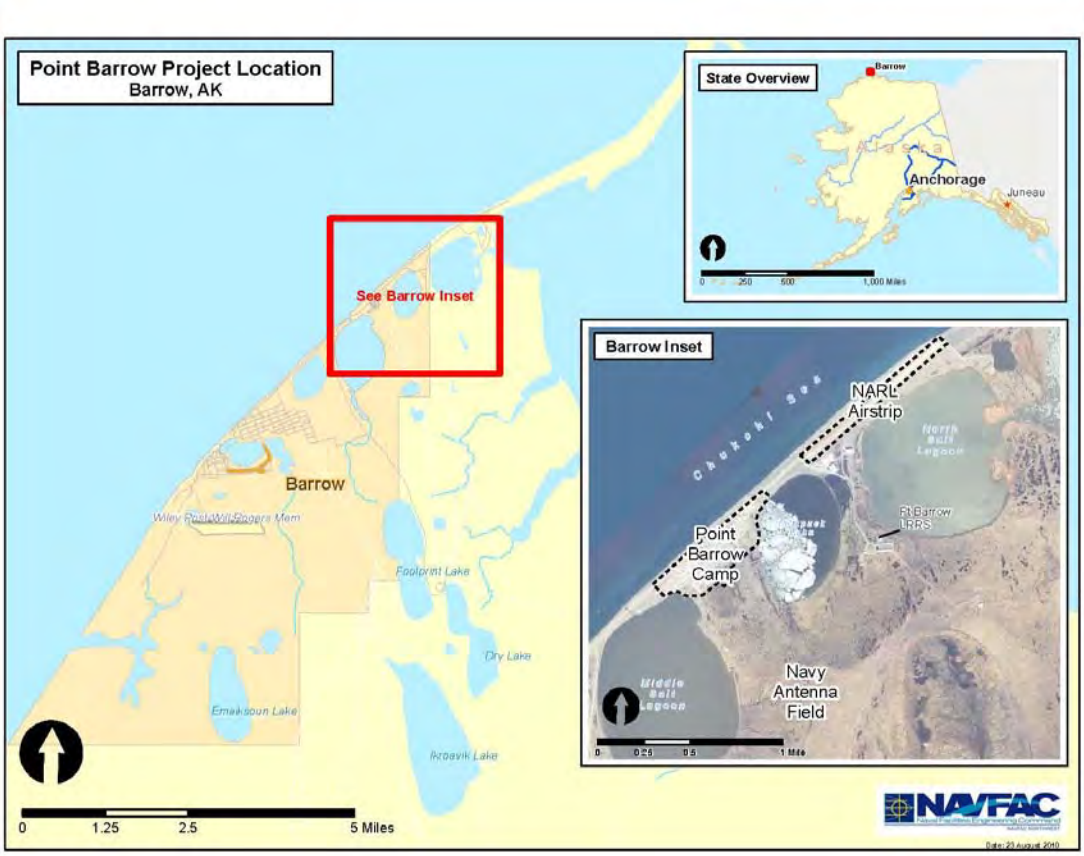


Figure 1: Project Site Location

The Arctic region grew in military importance with the onset of the Cold War. Needing to know more about the region, the Navy established its Arctic Research Laboratory (ARL) under the Office of Naval Research (ONR) in 1946. In 1947, ARL began funding Arctic research that had an application to Navy needs. The field research was supported by the Point Barrow Camp under the Director of Naval Petroleum Reserves. Not only did it support ARL, Point Barrow Camp supported a multitude of federal agencies conducting research in the region. This logistical support lasted until the Navy was directed to cease oil explorations in 1953, and Point Barrow Camp was placed in caretaker status. The camp consisted of approximately 80 buildings, primarily Quonset huts with a few Butler buildings, sited in three rows parallel to the sea. ARL was in its Development Period.

The Navy leased the camp to the United States Air Force (USAF) in 1954 to support the construction of the Distant Early Warning Line (DEWLine) stations along the western half of Alaska's Arctic Coast. As part of this lease agreement, the USAF agreed to operate and provide logistical support to the camp and ARL. With the Point Barrow Main (POW-M) Station (main DEWLine station for stations in the western half of Alaska) constructed to the southeast of Point Barrow Camp, the airstrip was used to support both the camp and POW-M. The USAF also began conducting ice island studies using the camp and airstrip as support. The early 1950s saw the beginning of ARL's Golden Period. The International Geophysical Year (IGY) brought international attention to ARL and Point Barrow Camp. ARL began receiving more grant applications than it could support. At the end of ARL's Golden Period, the camp consisted of approximately 190 buildings, primarily Quonset huts and a few Butler and WWII Temporary Wood stick built buildings, following the original camp siting.

Three events in the late 1960s-early 1970s marked the beginning of the end of what was then called the Naval Arctic Research Laboratory (NARL) and Point Barrow Camp as a naval facility. The discovery of oil and subsequent development of the oil fields began draining the science away from the Point Barrow Camp to Prudhoe Bay. The Navy's Arctic interests had shifted to the eastern Arctic and the National Science Foundation (NSF) was mandated by Congress to be responsible for research in the Arctic. Under NSF, research projects became large bureaucratic projects taxing the Point Barrow Camp's infrastructure's ability to support it and no longer addressed Navy needs. NARL began its final period – Mega Project Period. By the late 1970s ONR began looking at ways to end its involvement, finally ending NARL, closing the facility in 1980, and decommissioning the camp in 1981. At the time of its decommissioning, the camp consisted of approximately 100 buildings, only two of which were constructed as permanent buildings (Building 360 and 442).

Since 1981, the Point Barrow Camp has been transferred to the Ukpeagvik Iñupiat Corporation. Today, less than half of the buildings extant at the time the camp was decommissioned remain. The Navy retains ownership of two parcels of land that once composed Point Barrow Camp, referred to as the Antenna Field and the Airstrip (Figure 2). In anticipation of relinquishing these parcels to the Bureau of Land Management, this study addresses the eligibility of the NARL Point Barrow Airstrip for inclusion in the National Register of Historic Places. Evaluation of eligibility of the Navy Antenna Field parcel was completed as part of the Navy's cleanup of the parcel that included the removal of the antenna arrays.[1]

[1] Determined eligible for inclusion in the National Register of Historic Places under Criteria A for its association with the early Cold War in Alaska, detection. Although the radio station was originally constructed to serve the oil exploration communications needs, it was transferred to the US Air Force in 1946 who operated it as a classified program until the completion of the DEWLine stations at which time it was abandoned (Sackett 2010).

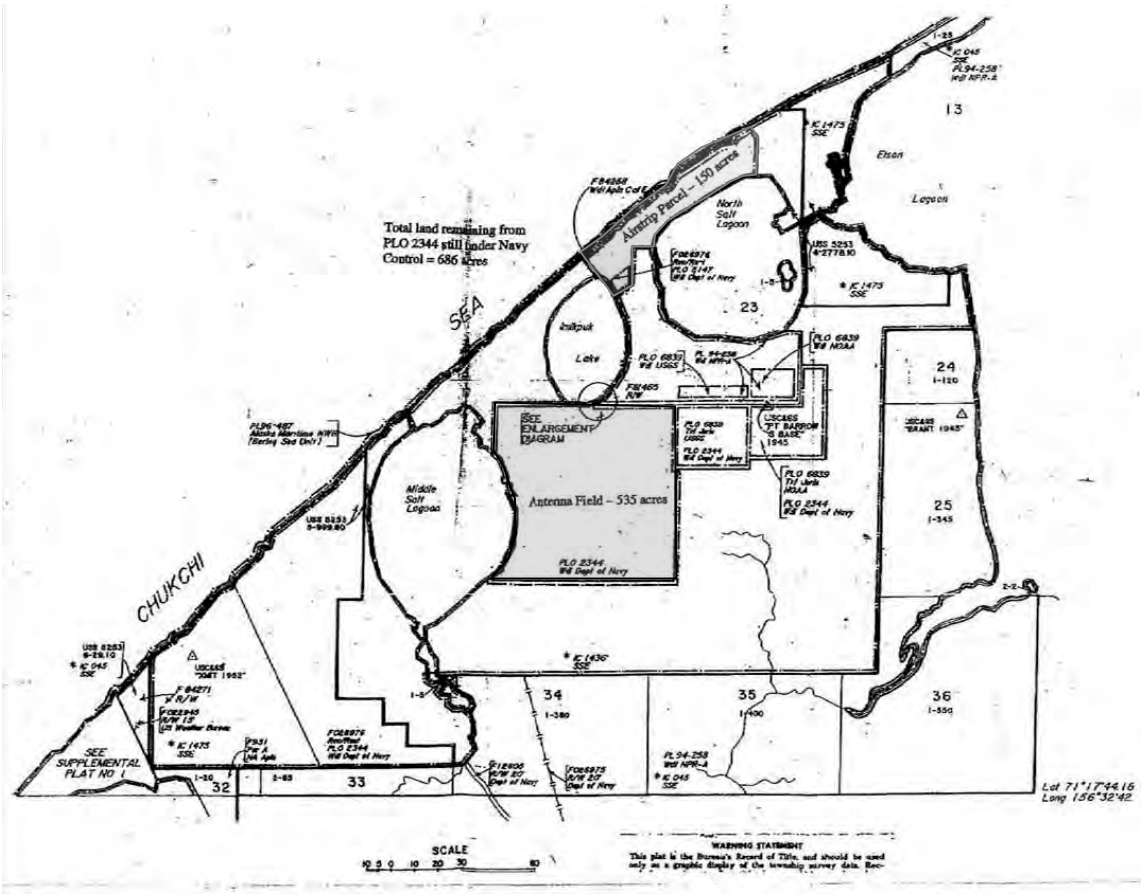


Figure 2: Point Barrow, Alaska Bureau of Land Management Property Map.

Note: Navy owned land shaded.

The history of Point Barrow Camp is a complex history with a multitude of historic contexts that the buildings and structures created by that history can be evaluated for eligibility for inclusion in the National Register of Historic Places (NRHP). It is important to understand that the camp is not ARL or NARL. Arctic Research Laboratory/Naval Arctic Research Laboratory (ARL/NARL) was a branch of the ONR established to support research in the Arctic. The Point Barrow Camp was the facility used by ARL/NARL to support that research. Although owned by ARL/NARL, the Point Barrow Camp was operated by the USAF for the greater part of its existence. It is also important to understand that ARL was in response to the need to understand the Arctic as it related to military Cold War strategies and as such, part of the Cold War history. Further, Point Barrow Camp was a military installation with an initial mission of supporting oil exploration and later a research mission.

The science that ARL/NARL funded was logistically supported out of the Point Barrow Camp but manifestations of that research can be found throughout the Alaskan Arctic Coastal Plain. The oil exploration that was logistically supported by the Point Barrow Camp left features throughout the NPR 4. The construction of the DEWLine that Point Barrow Camp supported has left foot prints along the Alaskan Arctic Coastline. And,

other federal agencies that operated out of Point Barrow Camp left their own manifestations on the region unrelated to ARL/NARL. A full evaluation of all that Point Barrow Camp touched, let alone ARL/NARL, is beyond the scope of this report. Much has been written on the academic research conducted out of Point Barrow Camp, but little exists on the sites (cultural landscapes) created by that research and only hints of the military research that remains classified.

The full significance that Point Barrow Camp had under a Cold War context can only be guessed at this time. Much of the research remains classified and unavailable for review. That which is known emphasizes the significant role Point Barrow Camp played during the Cold War era. Oceanographic studies supported out of the camp and ARL discovered and mapped the Barrow Canyon that provides the ability to navigate submarines under the Arctic ice; ice studies provided valuable information for submarine operations and communications under the ice; ionospheric studies assisted in development of communications systems that remained classified for military use until the onset of satellites in the 1960s; and permafrost studies influenced the design of DEWLine stations, to name a few known projects. The significance of the research supported first by ARL and later NARL for military purposes continued into the early1970s, until NSF became responsible for Arctic research. The 1970s began NARL's final phase – Mega Project Period, and the beginning of the end for NARL and for Point Barrow Camp as a Navy installation.

Although ARL/NARL was a military funded program, it supported all levels of research that could have interest to the military in understanding the Arctic environment. Research projects truly ran the alphabetic gamut from anthropology through zoology. Point Barrow Camp under ARL became the only facility in the Arctic to operate year-round and served an international science community.

Unquestionably, Point Barrow Camp meets the NRHP Criteria A on the local, state, and national levels for its role in Arctic science/engineering. It also meets the NRHP Criteria A on the state and national levels for its role in oil exploration as well as the NRHP Criteria A on the national level for its role in the Cold War. Final determination of eligibility, however, rests on whether the property retains enough historic integrity to represent how it was during its periods of significance. This study provides the necessary information used to determine that the Point Barrow Camp no longer retains its historic integrity as a potential historic district but that Building 250 is individually eligible for listing in the NRHP. This study has also determined that the airstrip is not eligible for listing in the NRHP.

This report only addresses the buildings and structures extant at the NARL, Point Barrow Airstrip that are owned by the Navy. A review of the Point Barrow Camp was performed at the level required only to address integrity. The airstrip is an ancillary property in support of Point Barrow Camp and its eligibility would rest on whether there is an historic district that would encompass it.

This report does not address surface debris potentially associated with Navy activities over the period of significance (1944-1981). Eligibility of this material was earlier addressed under the proposed cleanup of the Navy Antenna Field parcel (Olson 2010). A separate report is being prepared to address the potential for archaeological sites to be located on the Navy Antenna Field and NARL, Point Barrow Airstrip parcels that may have eligibility under Criteria D.

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2 METHODOLOGY

For this project, Naval Facilities Engineering Command Northwest (NAVFAC NW) conducted archival research and an intensive field survey of the original NARL, Point Barrow Airstrip as well as a survey of the NARL, Point Barrow Camp. In this section, the methods used to gather information for the historic context and prepare the NRHP eligibility recommendations for NARL facility are detailed.

2.1 Archival Research

During the course of archival research, a variety of documents, including primary and secondary sources, were evaluated for information content and importance. Relevant sources were copied, compiled, and analyzed. From the documents reviewed and the data collected, information was gathered regarding the history of NARL and its Point Barrow Camp facilities.

The primary and secondary sources reviewed for developing the historic context contained in this report were found at various repositories. The following repositories were either visited or contacted during the archival research phase:

- Air Force Historical Studies Office, Washington, D.C.
- Anchorage Museum of Art and History, Anchorage, Alaska
- Alaska Heritage Resources Survey (AHRS), Alaska Office of History and Archaeology, Anchorage, Alaska
- Historic American Building Survey (HABS)/Historic American Engineering Recordation (HAER), HABS No. AK-184-A, National Park Service, Washington, D.C.
- NAVFAC NW Environmental Planning Library, Silverdale, Washington
- NAVFAC NW Real Property Records, Silverdale, Washington
- Naval History and Heritage Command, Washington, D.C.
- University of Alaska Fairbanks Archives, Fairbanks, Alaska

2.2 Field Investigations

On August 1-4, 2010 Russell Sackett, NAVFAC NW Historical Architect, conducted an architectural survey (exterior only) of what was the NARL, Point Barrow Camp and its associated airstrip and radio antenna field. Dave Grant (NAVFAC NW) and Bruce Larson (NAVFAC Atlantic), archaeologists, assisted in the survey and conducted a reconnaissance archaeological survey of the antenna field.

Data collected included identifying extant facilities with integrity from the period of significance, new facilities constructed after the Navy's departure, identifying Navy facilities no longer extant, as well as identifying properties from the period of significance that no longer retain historic integrity, and photographic documentation. Results of the survey are presented in the discussion of Survey Results and Analysis.

2.3 Report Organization

This document presents a Section 110 identification and evaluation of historic properties associated with the Naval Arctic Research Laboratory's Airstrips in anticipation of this property's transfer to the Bureau of Land Management. It is organized into presenting the historic context under which the properties are evaluated (Section III), survey results (Section IV), and the evaluation of the properties for eligibility for inclusion in the NRHP (Section V).

3 HISTORIC CONTEXT

3.1 Oil Exploration and Point Barrow Camp (1944-1953)

Alexander Malcolm Smith first reported finding oil seepage on the Alaskan North Slope at Cape Simpson in 1917. Harry Campbell, on behalf of a private company, examined the finds in 1921 and staked two groups of oil claims. In 1923, President Warren G. Harding, by executive order, established the Naval Petroleum Reserve No. 4 (NPR 4). NPR 4 covered a 23-million acre area in northwestern Alaska between the Brooks Range and the Arctic Coast. It was the last of the naval petroleum reserves to be established that set large tracks of land that may have oil aside for future Navy needs. Oil shortages experienced during World War I prompted the establishment of these reserves as the Navy was changing its fleet from coal to oil. The Geological Survey conducted geological and topographic exploration of the reserve from 1923 through 1926. After this initial exploration, partly because of the Great Depression, NPR 4 received very little attention (Reed 1958a:3).

Oil shortages were once again experienced during World War II (WWII) and President Franklin D. Roosevelt ordered the exploration of NPR 4 in January 1944. Seabee Detachment 1058 was sent north in the spring of 1944 to begin oil exploration. This detachment was a petroleum unit consisting of 181 men and 15 officers. The detachment first attempted to land at Cape Simpson but was unable to find a suitable landing area and was diverted to Barrow. By August 1944 the Seabees had constructed a camp (Point Barrow Camp) along with an airstrip approximately four miles northeast of Barrow, Alaska and six miles southwest of Point Barrow to provide logistical support for the exploration work (Figure 3). At the end of the first season the camp consisted of 16' x 16' tents and twenty-two 20' x 56' Quonset huts providing barracks, mess huts, warehouses, hospital and dispensary huts, ship's store and photographic laboratory, engineering office and radio communication room, and a recreation hall. In addition, an airstrip was constructed consisting of a main strip 150' wide and 5,000' long with a cross strip 150' wide and 4,300' long (Reed 1958a:25). The following year Marston matting was placed over the main strip to compensate for the strip becoming soft with the spring thaw. A steel arched hangar and concrete turntable were added at the west end of the main strip. The hangar burned the following year and



Figure 3: Point Barrow Camp, late 1940s.

(Floyd Akin Photograph Collection, 1940s-1970s.) (University of Alaska, Fairbanks Archives).

was replaced by a nose hangar. Fire would plaque the camp for the first three years of its operation.

The Army Airways Communications System (AACS) Detachment 123rd Army Airways Communications System Squadron installed in 1944 the farthest north radio installation in the world. This array field was located approximately one-half -mile south of Point Barrow Camp and consisted of a Quonset hut, a transmitter, and a pair of rhombus receiving antennas. Two doublet receiving antennas were added a year later. It was installed to serve aircraft supplying the oil exploration activities and to communicate with the exploration units in the field. Aircraft at that time were operated by Wien Alaskan Airlines and Pan American Airlines under contract to the Navy (Singer 1945). Mobile communications stations on tractor drawn sled trains provided radio links to the mobile exploration camps. In addition to the antenna arrays, AACS had Quonset huts in the Point Barrow Camp to house its personnel. These consisted of barracks, mess, and recreational facilities. Specific Point Barrow Camp buildings used have not been identified.

The antenna array's Quonset hut was connected by telephone (wires laid on ground) to the U.S. Weather Bureau in Barrow to provide weather forecasting to Point Barrow Camp. Because the phone line was constantly being broken, an Army weather observation station was added to the field. By 1946, the Army Signal Corp began providing the oil exploration units with communication services from its Barrow facility. The antenna array took on another mission and upon the establishment of the USAF, under that management.

After V - J Day, the exploration shifted from military to civilian contractors and the camp was turned over to the Director of Naval Petroleum Reserves. Three contracting firms merged to form Arctic Contractors (Arcon) to operate the camp beginning in 1946 and to continue oil exploration (USNBYD 1947, Vol. II: 188-190). Point Barrow Camp provided the logistics for the outlying exploration camps. Jamesway huts and wanigans were constructed at the camp and sledded out to the various exploration camps.

By 1953, when President Eisenhower ordered the end of Navy oil exploration in NPR 4, over $47.6 million (equivalent to over $929.0 million in 2009) had been spent in support of the oil exploration. Pont Barrow Camp consisted of approximately 80 temporary buildings and infrastructure valued at $896,999 (equivalent to approximately $17.5 million in 2009). The camp's buildings were classified as temporary since the Navy never expected to conduct oil exploration beyond 1950 (Reed 1958a:173). These buildings primarily consisted of Quonset huts of two types; small (20' x 56') and large double-decked (40' x 100'). An aerial photograph of the camp taken in 1948 (Reed 1958a:88) suggests that the camp contained only Quonset huts, a few stick built buildings (World War II Temporary Wood), and a few Butler buildings. Jamesway huts and wanigans were only used in exploration camps. Point Barrow Camp was not only the logistical center for the oil exploration but it supported, directly or indirectly (direct support[2] in *italics*) a number of other agencies (Reed 1958a:182):

[2] Activities directly linked to support/assist Navy's oil exploration program.

- U.S. Army
    - Alaska National Guard
    - Ionosphere Project[3]
    - *Signal Corps*[4]
    - *Snow, Ice, and Permafrost Research Establishment*[5]
- U.S. Navy
    - *Arctic Test Station*[6]
    - Arctic Research Laboratory
    - Project Lincoln[7]
    - Operation Ski Jump[8]
- U.S. Coast and Geodetic Survey[9]
- U.S. Geological Survey
- U.S. Weather Bureau
- Civil Aeronautics Administration[10]
- U.S. Air Force[11]
    - Airways and Air Service Communications[12]
    - Beetle project[13]
    - Project Keys[14]
- National Bureau of Standards[15]

[3] Study consisted of sending radio signals between Barrow and Anchorage to map and better understand the ionosphere. Facilities used for this study are unknown.
[4] Provided the camp with its communications.
[5] Run by the U.S. Army Corps of Engineers (Reed1958b). Snow, Ice, and Permafrost Research Establishment later renamed the Cold Regions Research and Engineering Laboratory (CRREL).
[6] Conducted development studies on Arctic housing, strength of foundations, snow compaction tests, airfield construction on sea ice, performance and modification of equipment and other studies.
[7] A lighter than air program (Knechtman 2010)
[8] Oceanographic studies conducted by Woods Hole from camps on the ice. Study consisted of Ski Jumper I and Ski Jumper II.
[9] Conducted studies on magnetic properties of the earth in the Barrow area and geodetic control and hydrographic surveys
[10] Managed the camp's airstrip
[11] Max Brewer (2010) and John Schindler (2010) stated independently that the USAF was conducting a classified project called Cake Eater from 1947-1953. Both believe it was part of the early research associated with the development of the DEWLine communication system. The project was on NARL property but that was all they could say. The USAF's historian does not have any information on a "Cake Eater" project (Rouland 2010a) and no other information has come to light. It may have been the name of the USAF's listening station as the area Brewer and Schindler indicated for the Cake Eater coincides with those antennas.
[12] Consisted of the Army Airways Communications System facility, this was renamed Airways and Air Service Communications when Army Air Corp became the USAF.
[13] Beetle project consisted of the construction of a Barter Island Camp and runway and construction of certain LORAN elements such as the 265' tall tower at Skull Cliff, 30 miles southwest of Barrow.
[14] Program conducted by the USAF Optical Research Laboratory, however, USAF's Historian has no information on this project (Rouland 2010b)
[15] Conducted upper atmosphere and radio propagation studies

- U.S. Bureau of Indian Affairs - Alaska Native Service
- U.S. Fish and Wildlife Service

Prior to the establishment of the Navy's Point Barrow Camp there were few low paying jobs available for the local Iñupiat. With the prevalence of Tuberculosis (TB) in the community, the Navy was hesitant to employ individuals from the community. A health clinic was established in the early 1950s that provided TB testing and assisted in improving living conditions. This helped remove the hesitation and employment opportunities increased. With the higher wages offered by the Navy, people were drawn to the camp to seek employment as laborers, equipment operators, mechanics, carpenters, guides and assistants on survey, seismic, and mapping crews. Women were employed to sew and repair clothing (Brewster 1997:277-288).

It was to this camp that the ARL's first researchers arrived in 1947 (Global Security 2010; Shelesnyak 1948:97; Schindler 2001:29-32).

3.2 Arctic Research Laboratory, Development Period (1947-1953)

The exploration for oil in NPR 4 highlighted to the Navy the need for better understanding of the Arctic. The onset of the Cold War also brought the Arctic to the military's attention. The Office of Naval Research (ONR) was established in 1946 partly in response to this need. It was mandated by Congress to execute two primary missions: "1) encourage, plan, promote, initiate and coordinate a program of naval mission oriented research and 2) to conduct a research program to augment those conducted by other elements of the Navy" (Laursen, et al. 2001:247). Lieutenant Commander M.C. Shelesnyak, a physiologist with ONR, had a special interest in stress physiology, thermal regulation, human ecology and polar research. Through his interest grew the idea of an Arctic research facility. He developed requirements for Arctic research, relating them to general and specific needs of the Navy. Based on these, he presented a plan to the Chief of ONR. In 1946, ONR's director Vice-Admiral Harold G. Bowen, USN (Ret), Chief, Naval Research, sent letters to all of the bureaus and offices in the Navy inviting comments in regard to potential of creating a research laboratory in the Arctic. Receiving support from the bureaus, Bowen then sought advice of scientist and Arctic specialists outside the Navy. A result of this communications was the development of ARL's general policy:

> "1. to provide facilities for fundamental researching all appropriate scientific fields related to the Arctic environment;
> 2. to afford facilities within the laboratory and also facilities as a base for field studies in Arctic Alaska; and
> 3. to stimulate and promote basic research in the interest of national security." (Frosch 1969:357).

By early 1947 Lieutenant Commander Shelesnyak (then Doctor) became the Head of ONR's Environmental Biology Branch, Medical Sciences Division and continued to work towards creating ARL. He began to look for a suitable Arctic site for a laboratory.

The Navy's Point Barrow Camp was selected as the site for ARL. Selection of this site was based on; 1) it is the northerly United States settlement in North America, 2) it is a typical Arctic Coastal Region, 3) the historic role of Point Barrow in American Arctic exploration, both scientific and commercial; and 4) the existence of NPR 4 and its Point Barrow Camp. The Commander in charge of the Point Barrow Camp understood the benefits of Arctic research in the engineering field. The camp had supported various independent research activities since its creation in 1944. With the Commander's support, the Director of Naval Petroleum Reserves agreed to provide facilities for a laboratory and personnel housing, along with support for local travel (Shelesnyak 1948:100-101).

The first group of scientist arrived at ARL in August, 1947. Led by Dr. Laurence Irving from Swarthmore College, the group of seven men (five from Swarthmore College and two from Cornell University) began ARL's first research season in a 20' x 40' Quonset hut (Building 263) remodeled as a physiological laboratory. Remodeling of the hut consisted of providing areas for equipment, supplies, animal quarters and temperature control chambers.

In 1948 ONR appointed Dr. Laurence Irving as ARL's first Scientific Director and contracted Swarthmore College as the operator of the science program. One of Dr. Irving's first accomplishments was the formation of the Arctic Research Laboratory Advisory Board (ARLAB). The Director Naval Petroleum Reserves and the Scientific Director ARL, along with representatives from The Johns Hopkins University, U.S. National Museum, Scripps Oceanographic Institution, Carnegie Institution of Washington, Smithsonian Institution, U.S. Geological Survey, and ONR made up ARLAB. The ARLAB further developed ARL's policy and programs, defined the duties of the Scientific Director and reviewed and selected research projects for the upcoming 1948 season.

A second building was remodeled for the 1948 season. This was a two-story, double-decker 40' x 100' Quonset hut (Building 250) that provided laboratories and workshop on the ground floor and library, storeroom, seminar room and office on the second floor. Building 263 was converted to a residential unit and later as a warehouse. Researchers during the second season increased to about 30 scientists and technicians. Research centered on metabolic activity of Arctic life; physiology of bird navigation and migration; marine fauna; vitamin content of Arctic flora and fauna and health studies of the Point Barrow residences; dental study of Point Barrow residences; blood and tissue analyses of Arctic animals for fat content; comparative study of mite fauna; ecologic studies of lichens; and geophysical problems of the area.

Swarthmore College's contract to ONR to operate ARL ended at the end of the 1949 field season with Dr. Irving stepping down as the ARL Science Director and because of the lack of his ability per the contract to influence the research conducted. A new contract was entered with The Johns Hopkins University. This contract continued until the end of 1953. The time during the Swarthmore College/The Johns Hopkins University years of is referred to as ARL's Developmental Years. Research conducted during these years was developmental. Extant buildings that made up Point Barrow Camp were slowly taken over and renovated as research needs expanded (Schindler 2001:29; Laursen, et al.

2001:253). ARL's Science Director had to visit institutions to inform them of the existence of the Barrow facility, its ability to support Arctic research and to request research proposals.

Navy oil exploration ended in 1953 and the Navy's Director of Naval Petroleum Reserves ended its logistical support of ARL. With the exception of the few core buildings used to support ARL, the camp was placed in caretaker status. The Johns Hopkins University did not renew its contract primarily due to its dissatisfaction in not being able to select what research would be conducted at the facility. The University of Alaska received the ONR contract as the ARL science operator in 1954 and ARL entered its Golden Period (1955-1969), defined by the cutting edge research conducted at the facility.



Figure 4: Point Barrow Camp, 1950s.

(Anchorage Museum of History and Art)

3.3 Arctic Research Laboratory/Naval Arctic Research Laboratory Golden Years (1954-1969)

In 1954 the USAF requested use of all the Point Barrow Camp facilities to support construction of the DEWLine. The Navy permitted the use of the facilities in exchange for an agreement that the USAF would operate and support Point Barrow Camp and ARL. Construction of the DEWLine began in 1955. Project Lincoln[16], an earlier feasibility study partly conducted at ARL, demonstrated the need and capabilities of what became the DEWLine (Laursen, et al. 2001:248).

Point Barrow Camp was used as a staging area for the construction of the DEWLine's western portion. Buildings were converted to workshops where prefabricated panels were put together to form 28' long x 16' wide x 10' high modular building units. Once completed, these were cat trained out to their final locations. With the completion of the line in 1957, use of the camp by the USAF for this purpose ended (Lindgren 1966; Lackenbauer, et al. 2005).

Point Barrow was the location of the Main Station of the western end of the DEWLine. POW-M was constructed just to the south of the western end of the airstrip between Imikpuk Lake and North Salt Lagoon. Once completed in 1957, the Alaska Air Command, Elmendorf Air Force Base, provided the station with air support, and the USAF supplied the station yearly by barge. The USAF included logistical support to ARL, and later NARL, in its support of POW-M for the next 17 years.

[16] Project Lincoln in this context refers to studies conducted by the Lincoln Laboratories and not to the Navy's Project Lincoln.

The Joint Commission on the Ionosphere, meeting in Belgium in 1950, passed a resolution in support of a third international effort in geophysics. The intent of this effort was to follow the models of the earlier First International Polar Year, 1882/83 and the Second International Polar Year, 1932/33. The timing of 1957/58 (July 1, 1957 to December 31, 1958) was selected for the event to coincide with a period of maximum solar activity. Unlike the First and Second International Polar Years, research was to be conducted worldwide rather than limited to the Poles. The principal fields of study were to be on the aurora and airglow, cosmic rays, geomagnetism, glaciology, gravity, seismology, solar activity, upper atmosphere studies using rockets and satellite vehicles, and nuclear radiation. The event came to be known as the International Geophysical Year (IGY) 1957/58 (National Academy of Sciences 1959).

IGY brought world attention on ARL and Point Barrow Camp. John Reed, with the U.S. Geological Survey, was the chairman of the U.S. Arctic Committee. Reed's experience in the Arctic began with the Navy's oil exploration of NPR 4 and he later conducted projects supported by ARL. Through ARL's connection with John Reed, it became the center of logistical support for IGY remote studies in Alaska and on the Arctic ice as well as specific research conducted on site that consisted of meteorology (high altitude rawinsonde and solar radiation measurements), geomagnetism (permanent observatory, quick run Ruska magnetograph, and visual indicating equipment), aurora and airglow (airglow photometer, radio wave absorption, and scanning spectrometer), ionospheric physics (absorption measurements and vertical incidence), and oceanography (sea level and steric observations) (National Academy of Sciences 1959).

In its first twenty years, ARL hosted approximately 1,500 persons that conducted 784 research projects in the Arctic. These were from 74 North American universities as well as from four Japanese, two Danish, two English, one Swedish, one German, one Irish, and one Brazilian universities. Other institutions using NARL to conduct research included Riksmuseet of Stockholm, the National Museum of Canada, the National Science Museum of Japan, the New York Botanical Garden, the Smithsonian Institute, the California Academy of Sciences, the Woods Hole Oceanographic Institution, and the Scripps Institution of Oceanography. Government agencies that conducted research at ARL were the Office of Naval Research, the Naval Electronics Laboratory, the Naval Civil Engineering Laboratory, the Naval Ordnance Laboratory, the Naval Underwater Sound Laboratory, the Bureau of Yards and Docks, the Naval Oceanographic Office, the Naval Mine Defense Laboratory, the Army Corps of Engineers, the Army Materiel Command, the Walter Reed Army Medical Center, the Air Force Cambridge Research Laboratories, the Air Force Aero-medical Laboratory, the Geological Survey, the Fish and Wildlife Service, the Department of Agriculture, the Environmental Science Services Administration, the Coast and Geodetic Survey, the Weather Bureau, the National Bureau of Standards, the Public Health Service, the Arctic Health Research Laboratory, the National Institutes of Health, the Atomic Energy Commission, and the National Aeronautics and Space Administration (Reed 1969:183). Areas of significant research for the Navy addressed physical, chemical and biological oceanography; details of ocean bottom, heat flow and thermal structure of bottom water; acoustic properties and biological, climatic and ice histories as derived from the investigation of sediments; aeromagnetic and gravity surveys; surface circulation and ice drift; and other features of

underwater, under-ice acoustics including long range propagation, effects of ocean bottom and ice reflectivity, signal attenuation and transmission loss in ice, ambient noise effects and biological relationships of deep scatter layers (Frosch 1969:358). In addition to the Point Barrow Camp, ARL had field (Table 1) and ice stations, all supported out of the camp.

Table 1: ARL Field Stations

Field Station	Distance from Barrow
Umiat	149 nautical miles SSE
Lake Peters	262 nautical miles SE
Meade River Village (Atkasuk)	55 miles S
Wainwright (DEWLine)	80 miles W
Teshekpuk Lake	68 nautical miles E
Cape Thompson	270 miles SW
Point Hope	275 nautical miles W
Noluck Lake	167 miles S
Helmerick's	135 miles E
Anaktuvuk Pass	217 miles SE
Narwhal Island	189 miles E
Deadhorse	178 miles E
Pingok Island	146 miles SE
Carol Lake	50 miles SW
Demarcation Point	400 miles SE
Colville Delta (Camp Putu)	170 miles SE
Cape Deaufort (DEWLine)	250 miles SW
Icy Cape (DEWLine)	124 miles W
Peard Bay (DEWLine)	45 miles W
Cape Simpson (DEWLine)	40 miles E
Kogu Inlet (DEWLine)	120 miles SE
Beechy Point (DEWLine)	200 miles SE
Humphrey Point (DEWLine)	400 miles SE
Point Lay (DEWLine)	160 miles W

Beginning in 1950, the USAF began studies of ice islands. Research stations were erected (ice stations) on ice islands with USAF logistical support out of the Point Barrow Camp. The first was Arctic Research Laboratory Ice Station-1 (ARLIS-1) and was followed by five more with the last one abandoned in 1970. By 1958, ARL had a fleet of eight aircraft operating out of the Point Barrow Camp to support the research being conducted at ice stations and remote terrestrial sites.

From 1959 through 1961, ARL supported research focused on Project Chariot. Project Chariot was proposed by the U.S. Atomic Energy Commission to demonstrate the peaceful application of nuclear energy by looking at creating a harbor near Cape Thompson. The proposal was to set off up to six atomic explosions to create the deep-water harbor. ARL and Point Barrow Camp supported over 100 scientists conducting over 40 investigations on the biological and physical environment of the Cape Thompson region. The purpose of the investigations was "to permit: a) estimates of the biological cost of the excavation operation and b) judgements as to whether or not there would be effects that could result in widespread damage or disruption of ecological systems" and

"could be used as base lines in studies to be conducted in postexcavation time." (Wilimovsky and Wolfe 1966:iii). The resulting publication represents the first environmental study produced anywhere prior to the passage of the National Environmental Policy Act (NEPA) in 1970 (Hobbie 1995:51).

Ownership of NPR 4 was transferred from the U.S. Navy to the Department of the Interior in 1960. The 4,972.6 acres that formed ARL's Point Barrow Camp area was withdrawn from NPR 4 in April 1961 for use by the Navy as a research center.

Point Barrow Camp experienced a major winter storm event in October, 1963. The storm's 80-mph winds produced seas in excess of 10' from the northwest. It swept a number of Quonset huts off their foundations and swept supplies, obsolete equipment and thousands of empty oil drums into Elson Lagoon as well as washing away portions of the airstrip. Some barges, wanigans and oil drums were swept as far east as the west coast of Cape Simpson, about 40 miles from the Barrow Spit with considerable debris lodged on the Barrier Islands.

In 1965, ARL's name changed to the Naval Arctic Research Laboratory (NARL) in recognition of the Navy's ONR's role in it. A new Laboratory (Building 360) was constructed in 1968 to replace Building 250. This building provided NARL a state-of-the-art laboratory facility and one of only two buildings designed as permanent building.

Point Barrow Camp began supporting the National Aeronautical and Space Administration's (NASA) high altitude research program in 1965. NASA began launching Nike-Cajon missiles (Nike Ajax booster with dart like second stage) on January 27, 1965 with the last of the 68 launches occurring on May 17, 1972. This project was to obtain meteorological data, atmospheric composition and ozone distribution in the upper atmosphere. NASA constructed a launch facility to support the program approximately 3,000' north of the airstrip. Facilities were temporary wanigans, none of which are extant (Openshaw 1983, Astronautix 2010).

With the discovery of oil in 1968, interest in non-military driven Arctic research began to peak. Congress passed the National Environmental Policy Act (NEPA) in 1970. The construction of the Trans-Alaska Pipeline became the first major engineering project to require the preparation of an Environmental Impact Statement (EIS). NARL, with its Project Chariot report support experience, provided the Arctic expertise in the preparation of this EIS as well as in the design of roads, airstrips, and on living and working facilities. The discovery of oil in the Prudhoe Bay fields in 1968-69 also began the end of NARL (Laursen, et al. 2001:248; Anonymous 1971:22).

Iñupiat employment opportunities at Point Barrow Camp continued after the end of oil exploration. By the end of the Golden Period, the Department of Labor estimated that one-third (777 people) of the Barrow Village work force was employed by NARL. The Iñupiat's experiences and knowledge of the Arctic was of great value to the scientists, especially for those conducting fieldwork because of their knowledge of ice conditions and Arctic wildlife. As a result, a special relationship formed between ARL/NARL and the Iñupiat (Brewster 1997:277-288). They were supportive of the research that was conducted and could have an active participation in the projects.

During the Golden Years the Point Barrow Camp grew to 191 buildings[17]. NARL became the world's largest facility for the support of all forms of Arctic research. It was the only Arctic research facility to operate throughout the year. ONR operated NARL as a national/ international research site and support facility. Unlike the Development Years, ONR received more unsolicited research proposals than it and the Point Barrow Camp laboratory was able to support. Prior to 1968, NARL provided a base for transient scientists conducting research during the spring through fall months. By 1970, NARL had an in-house, year-round staff of 130 conducting year-round studies. This grew to 320 during peak season.



Figure 5: NARL and its science building as it neared completion, 1968.

(Photo on file, NAVFAC-NW, Silverdale, Washington)

John Hobbie summed up Point Barrow Camp and NARL's Golden Years,

> "There has been no comparable laboratory for research in the tropics or temperate regions or in any other habitat or region with the single exception of the McMurdo Laboratory (Antarctica)…"

He further characterized the camp,

> "The scientific atmosphere at the laboratory was intense and many prominent scientists, …, were then graduate students and research assistants so scientific arguments and discussion cut across all fields and disciplines."
> (Hobbie 1995:52).

3.4 Naval Arctic Research Laboratory Mega-Project Period (1970-1981)

The last decade of NARL's existence is referred to as the Mega-Project Period. By the 1970s the growth and diversification of research conducted forced ONR to review its NARL mission. By this time, non-Department of Defense (DoD) research accounted for 87% of the research supported by NARL. The U.S. Navy's Arctic interests had shifted eastward to the North Atlantic. This interest was centered on the Kola Peninsula and the

[17] The site plans from the period only indicate 110 buildings. The 191 buildings may also include buildings located at remote camps in addition to the Point Barrow Camp number.

White Sea, homeport to the Soviet's fleet. The 1967-68 discovery of oil started to draw scientific talent and emphasis from Barrow to Prudhoe Bay. In 1971, Congress mandated the NSF as the lead agency for Arctic research and research projects became multi-investigator, multi-discipline, big projects that taxed NARL's aging physical camp facilities. Under NSF, research became a more bureaucratized, impersonal, and costly business. The 1970s high tech and specialized research made it more difficult for the Barrow residence to support, let alone be part of it (Norton 2001:2). With the passing of the Alaska Native Claims Settlement Act and the organization of the various native corporations, especially the Ukpeagvik Iñupiat Corporation (UIC), skilled native employees were drawn away from NARL for positions with the newly formed corporations.

In 1971 the USAF returned custody of the camp to the Navy and in 1972 the camp was renamed NARL, Point Barrow (NARL PB). In the same year, the Navy began considering cutting back NARL's funding. In 1979 the ONR presented the University of Alaska with a plan to reduce the level of Navy support for NARL and the camp. The plan called for:

> "1. continuing support of DoD research and, on a limited reimbursable basis, non-DoD sponsored research;
> 2. reducing the cost of NARL operation from $11.5 million to $6.7 million annually, most of which were operation and maintenance costs;
> a. reducing the requirement for facility maintenance and eliminate the science fabrication shops; thus, setting out on a site cleanup and old building demolition course;
> b. terminating ship operations, unless the research project needing these services assumed full costs;
> c. reducing the vehicle pool and vehicle maintenance;
> d. discontinuing library services, resulting mostly from shifting space needs;
> e. intensifying property disposal and consolidation and reducing housing units and work space; and
> f. reducing the Animal Research Laboratory] to caretaker status by transferring animals to other institutions." (Laursen, et al. 2001:252)

A new host agency or consortium of agencies was sought to assume operational costs of the facility, but none were found. The University of Alaska's contract was terminated on September 30, 1980. In October 1980 all Navy support for research ended. NARL PB was decommissioned in June 1981 and placed in caretaker status under the U.S. Geological Survey (USGS) management in September of the same year. A five year plan was implemented for the transfer of NARL PB to the UIC. The UIC had begun inquiring in 1978 into the possible transfer of NARL PB to them. In 1984 the USGS ends its caretaker role and the facility is taken over by UIC with final transfer of NARL PB to UIC ownership occurring on June 14, 1989. Of the 191 buildings that were extant during the peak years of NARL, only 46 were left at the time of transfer to the corporation (Laursen, et al. 2001:252).

4 SURVEY RESULTS

4.1 NARL, Point Barrow (Point Barrow Camp) (BAR-075)

Approximately 80 buildings made up the Point Barrow Camp at the end of the Navy's Oil Exploration Period and ARL's Development Period – 1953 (Photographs 3 and 4). These consisted of the two sizes of Quonset huts (20' x 56' single story and 40' x 100' double-decker), and a few Butler and WWII wood framed temporary buildings. The camp was laid out in three rows parallel to the Chukchi Sea. There were two roads that extended the length of the camp that the buildings were aligned on. Only connections of these two roads were at their ends, there were no intermediate connections. Functionality of the camp generally was the industrial area (composed of all building types but primarily the large Quonset hut) that made up the eastern third of the camp; residential (primarily the small Quonset hut) found in the western third of the camp; and the administrative (a mix of building types) in the center. By the end of these periods, ARL only occupied a few of these buildings. The majority of the buildings were used to support the oil exploration activities. Building 250, a large double-decker Quonset hut, was the focus of ARL activity in the camp. ARL was not the only non-oil exploration entity, however, that was supported by the camp through use of the infrastructure. As a World War II (WWII) installation, the building stock represents the common, temporary nature of military installations constructed as part of the war effort.

By 1966, Point Barrow Camp (Figure 6) had grown to approximately 110 buildings and structures. This expansion continued to use the same building types as the previous periods with the exception of an addition of a large, wood framed power house (Building 342, Photograph 6). A third road appears by 1966 between the camp and the shoreline (Beach Road). Connections of the three roads still remain at the camp ends with no intermediate connections. As in the previous period, ARL/NARL did not use all of the facilities. The various contractors that operated the camp had use of many of the buildings, the USAF used buildings as logistics support for their ice station studies, and other buildings were being used by various other federal agencies. The layout of the camp continued in the site plan established by the Navy's oil exploration period as was as the camp's functional division.

Changes to the Point Barrow Camp began with the construction of NARL's new laboratory (Building 360) in 1968. The building of this laboratory caused the removal of a number of the small Quonset huts towards the western portion of the camp's southern edge, center (Photograph 5; Figure 7). A few connecting roads between the two major roads, primarily in the area of the new laboratory begin to be developed. A new steel framed power house (Building 442; Figure 6) is also constructed at this time. No changes occurred to the camp between 1968 and the end of the NARL Mega-Project Period and the decommissioning of the camp in 1981.

Since 1981, there has been an active demolition program at Point Barrow Camp. A 2003 partial aerial of the camp (Figure 8) shows this change. However, even more demolition has occurred since the 2003 aerial. Today, only 48 buildings are extant from the Point Barrow Camp's periods of significance (Figure 9). Of these 48 buildings, six no longer retain historic integrity.

The industrial eastern third of the camp still retains most of the original large Quonset huts (Photographs 1, 2, and 5). Building 40, now used by Spenard Builders Supply, has had its industrial end changed to reflect more of a contemporary commercial end and has lost its integrity. The central portion of the camp has undergone the greatest amount of change (Photographs 3, 4, 9, 10, 11, and 18). Over 34 buildings since 1981 have been removed, leaving a large vacant area. A new fuel depot (Photograph 3) has been added in this area. Temporary buildings have been brought into this area (Photograph 9 and 18) and ATCO buildings introduced.

The western small Quonset hut "residential" third of the camp has also undergone change, however, there is a row of six (Buildings 163-170; Photographs 15 and 16) that still retains integrity along with two (Buildings 263 and 268) adjacent on the southern side of the street. Of the six large industrial Quonset huts (Photographs 12, 13, and 14) that neighbor these residential units to the north, only one retains its historic integrity (Building 57). The remaining (Buildings 58, 60, 61, 63, and 65) have had their industrial ends changed to residential ends and no longer retain historic integrity. Building 360, the 1968 Laboratory Building, is located adjacent to the southeast of the residential units. It still retains its integrity although two new buildings have been added behind it (Figure 9; Photograph 19).

Building 250 (1948 ARL Laboratory) is located at the southern edge, center portion of the camp (Photographs 7 and 8). It visually is isolated from other areas that retain integrity. The building had a small Quonset hut added perpendicular to its west elevation at some point. This is no longer extant, but a "shadow" is left where it once connected to Building 250. Although abandoned and deteriorating, its exterior still retains its historic integrity.

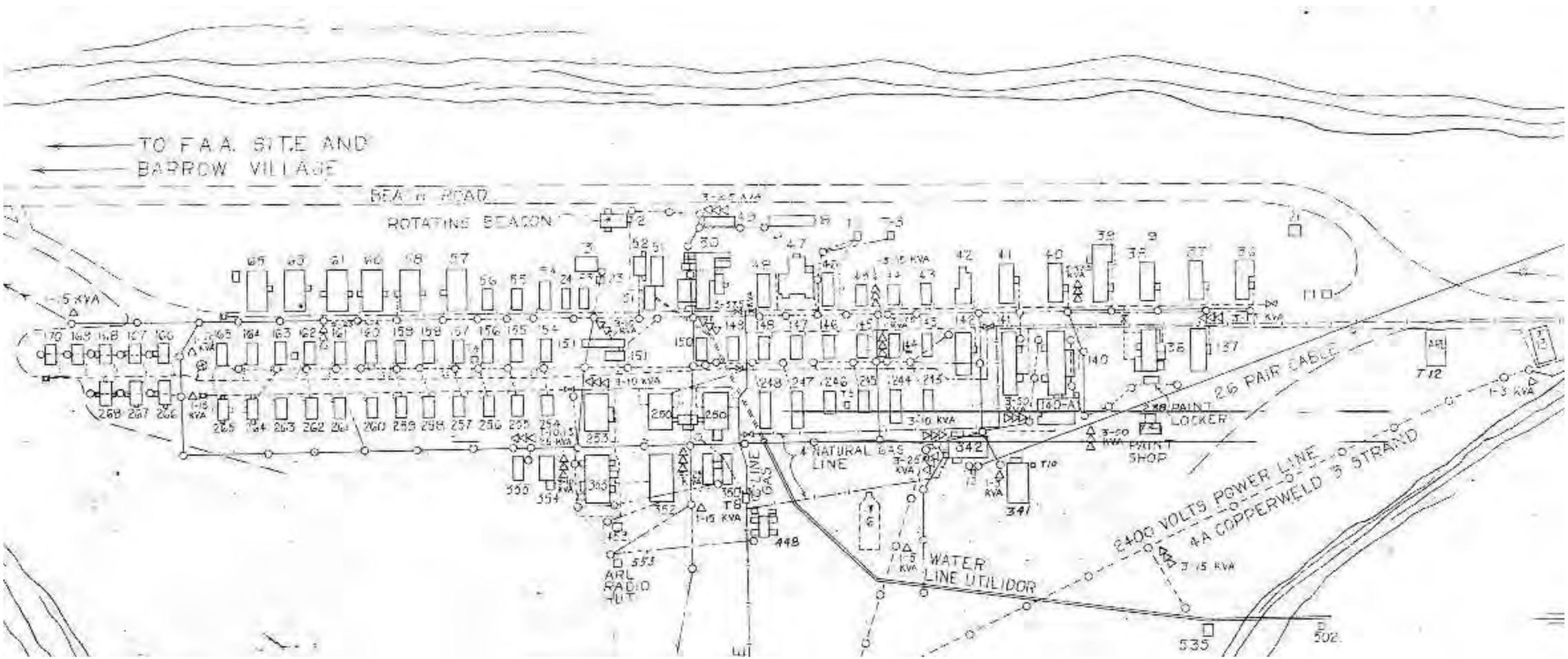


Figure 6: Main Camp Site Map, 1966 towards the end of ARL's Golden Period (1955-1969).

Table 2: Building Key for Figure 6

T- 1	Head	47	Admin	151	Disp Qtrs	253	Clothing
T- 3	Head	48	Quarters	153	Stove Shop	254	Quarters
T- 4	Head	49	Reefer Hse	154	Quarters	255	Quarters
T- 5	Head	50	Mess/Gall	155	Quarters	256	Quarters
T- 6	Cellar	51	Boiler Hse	156	Quarters	258	Quarters
T- 8	Gas Mtr	52	Shwer Hse	157	Quarters	259	Quarters
T- 9	Head	53	Plmb Shop	158	Recreation	260	Quarters
T-10	Head	54	Dry Cleang	160	Rigg Loft	261	Quarters
T-11	Head	55	Quarters	161	Quarters	262	Warehouse
T-12	Stor Whse	56	Rigg'g Shp	162	Quarters	263	Warehouse
T-13	Whse Tent	57	Food Whse	163	Quarters	264	Fam Qtrs
2	Theatre	58	Food Whse	164	Warehouse	265	Fam Qtrs
3	Laundry	60	Food Whse	165	Warehouse	266	Fam Qtrs
8	Quarters	61	Warehouse	166	Fam Qtrs	267	Fam Qtrs
12	Fuel Trans	63	Misc Whse	167	Fam Qtrs	268	Fam Qtrs
21	Beacon	65	Whse	168	Fam Qtrs	342	Power Hse
23	Refr Repair	137	Equip	169	Fam Qtrs	350	Anim Hse
24	Plumbing	138	Carpe Shop	170	Fam Qtrs	351	Laboratory
36	Sled Shop	140	Light Duty	238	Paint Shop	352	Butler Bldg
37	Warehouse	141	Gen Whse	341	Tent Whse	354	Garage
38	Clothing	142	Fire Station	243	Quarters	355	Warehouse
39	Warmup	143	Quarters	244	Quarters	448	Anim Cplx
40	Light Duty	144	Quarters	245	Quarters	453	Bear House
41	Hvy Duty	145	Quarters	246	Quarters	502	Pump Hse
42	Elect Shop	146	Quarters	247	Quarters	535	Pump Hse
43	Quarters	147	Store (PX)	248	Quarters	553	Radio Shck
44	Quarters	148	Quarters	250	Library,		
45	Quarters	149	Recreation	Office, Laboratory			
46	Quarters	150	Quarters	and Quarters			

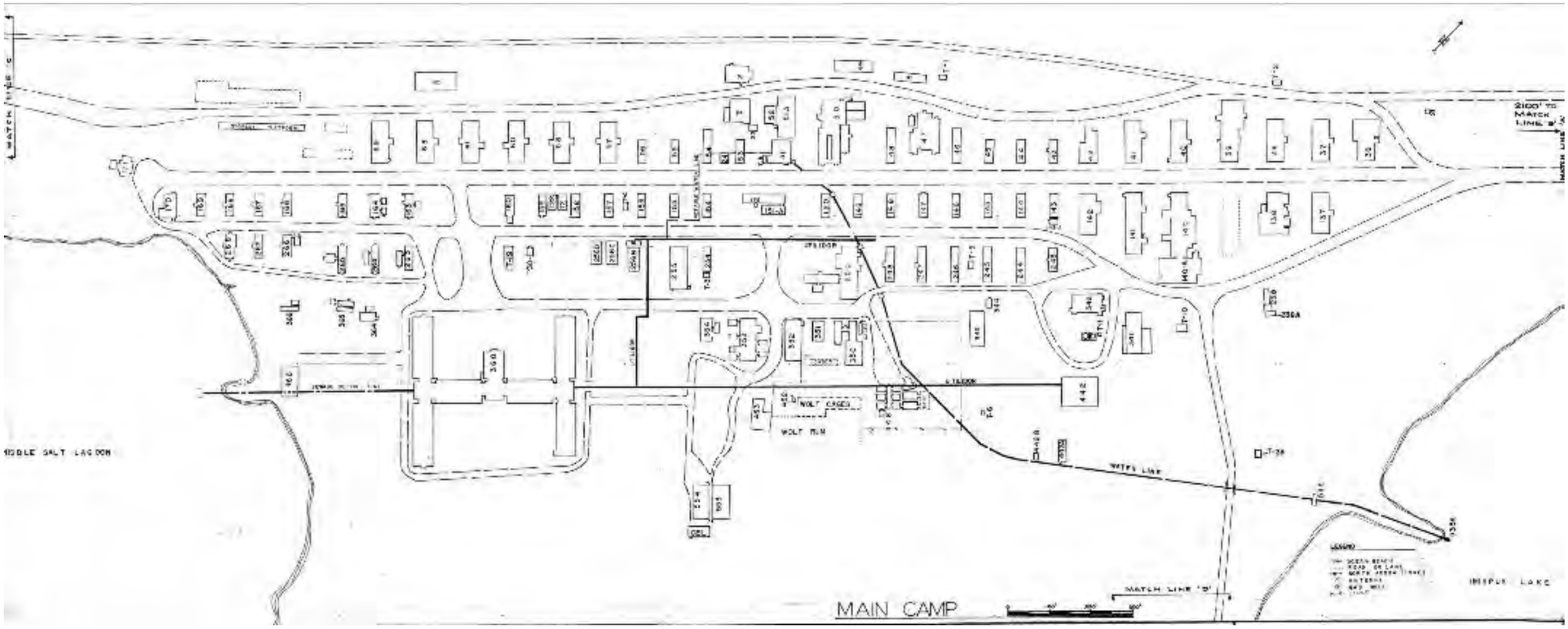


Figure 7: NARL, Point Barrow Site Map, 1979, at the end of NARL's Mega-Project Period (1971-1980).

Table 3: Building Key for Figure 7

T-1	Head	48	Quarters	149	Recreation	255	Quarters
T-3	Head	49	Reefer Hse	150	Quarters	256	Quarters
T-4	Head	50	Mess/Gall	151	Disp/Qrtrs	263	Warehouse
T-5	Head	51	Boiler Hse	154	Quarters	264	Fam Qtrs
T-6	Cellar	52	Shwer Hse	155	Quarters	265	Fam Qtrs
T-10	Head	53	Plumb Shp	156	Quarters	266	Fam Qtrs
T-11	Head	54	Dry Cleang	157	Quarters	267	Fam Qtrs
T-19	Unknown	55	Quarters	158	Recreation	268	Fam Qtrs
T-21	Unknown	56	Rigg'gShp	159	Unknown	341	Unknown
T-22	Unknown	57	Wrhse	160	Rigg'g Lft	342	Power Hse
T-30	Unknown	58	Wrhse	163	Quarters	344	Unknown
T-32	Unknown	60	Wrhse	164	Warehouse	345	Unknown
2	Theatre	61	Warehouse	165	Warehouse	350	Anim Hse
3	Laundry	63	Whouse	166	Fam Qtrs	351	Laboratory
5	Unknown	65	Wrhse	167	Fam Qtrs	352	Butler Bldg
24	Plumbg Ax	137	Equip	168	Fam Qtrs	353	Unknown
36	Sled Shop	138	Carp Shop	169	Fam Qtrs	354	Garage
37	Warehouse	140	Light &	170	Fam Qtrs	360	Sci Lab
38	Clothing		Heavy Duty	171	Unknown	364	Unknown
39	Warmup		Shop	238	Paint Shop	365	Unknown
40	Parts Whse	141	Gen Wrhse	243	Quarters	366	Unknown
41	Parts Whse	142	Fire Station	244	Quarters	442	Unknown
42	Elect Shop	143	Quarters	245	Quarters	448	Anim Cplx
43	Quarters	144	Quarters	246	Quarters	452	Unknown
44	Quarters	145	Quarters	247	Quarters	453	Bear House
45	Quarters	146	Quarters	248	Quarters	466	Unknown
46	Quarters	147	Store	250	Laboratory	553	Unknown
47	Admin	148	Quarters	254	Quarters	554	Unknown



Figure 8: Partial aerial of NARL Point Barrow in 2003.

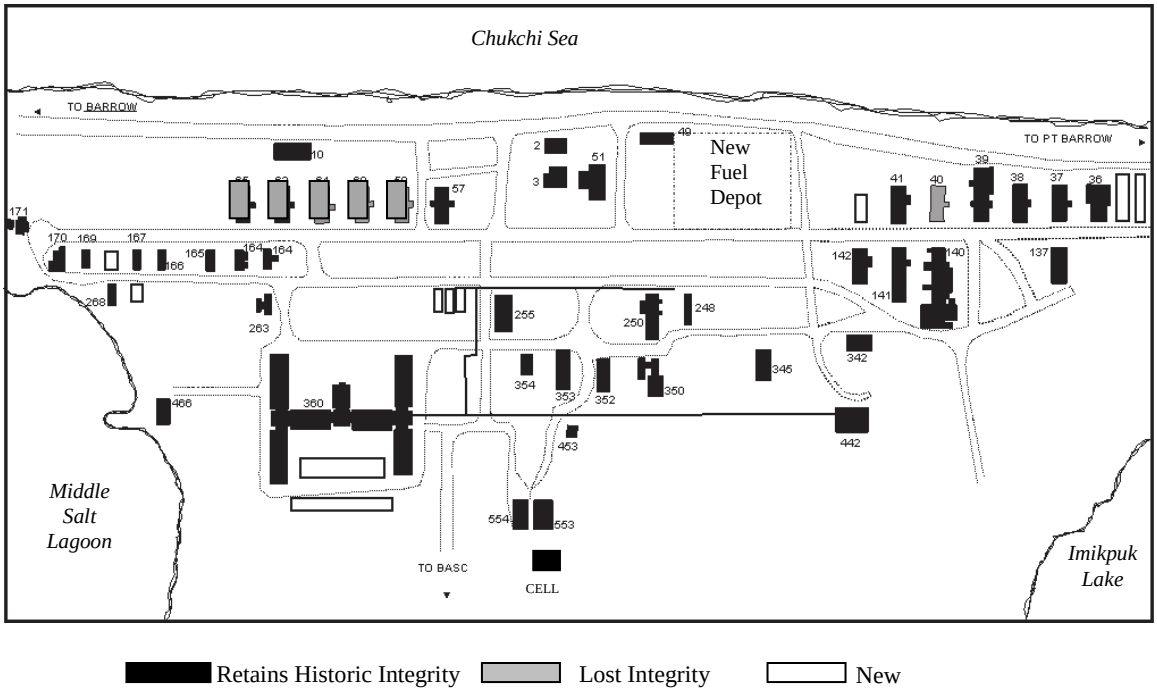


Figure 9: NARL, Point Barrow Site Map, 2010.

Table 3: Building Key for Figure 9							
T-6	Cellar	51	Boiler	164	Warehouse	342	Pwr House
2	Theatre	57	Food Wrhse	165	Warehouse	345	Unknown
3	Laundry	58	Bus Mgmt	166	Quarters	350	Animal
10	Ind Safety	60	Acad Progrs	167	Quarters	352	Butler
36	Sled Shop	61	Truck Ops	169	Quarters	353	Unknown
37	Warehouse	63	Elect Trades	170	Quarters	354	Garage
38	Cloth'g	65	Const. Trds	171	Unknown	360	Ilisĝvik
39	Warm Shp	137	Equip Stor	248	Quarters	442	Power Plant
40	Prts Wrhse	140	Shop	250	Lab/Lib	448	Animal
41	Prts Wrhse	141	Warehouse	255	Quarters	453	Bear Hse
42	Elect Shop	142	Fire Sta	263	Warehouse	553	Unknown
49	Reefer Hse	162	Quarters	268	Quarters	554	Unknown

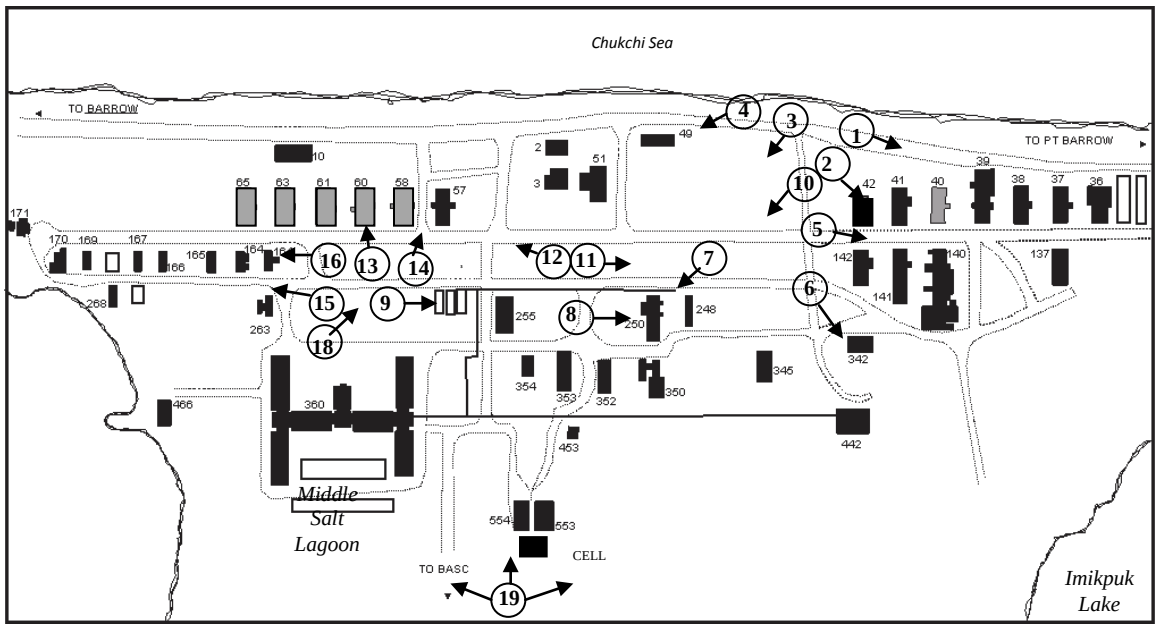


Figure 10: Photograph locations and directions



Photograph 1: Eastern end of the south side of Beach Road, Buildings 36-41

(Buildings 37 and 38 set back)



Photograph 2: Building 42-Typical Navy WWII Temporary Wood stick built building.

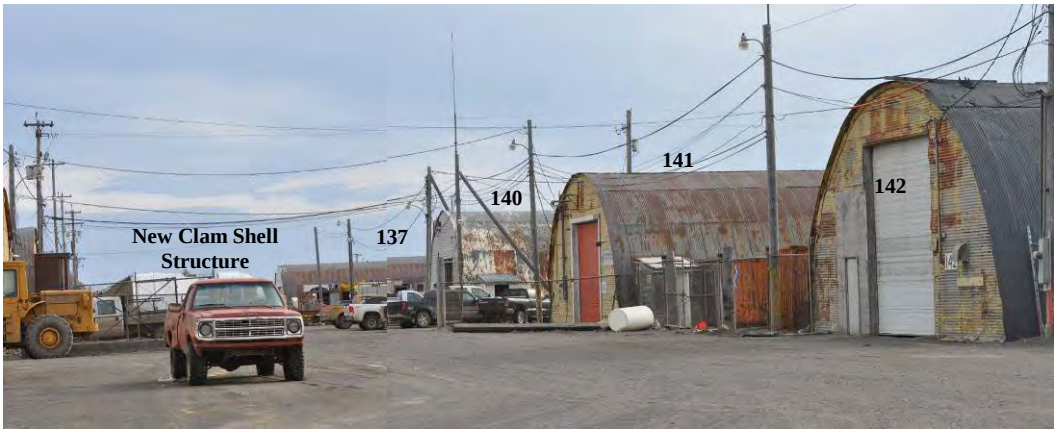


Photograph 3: New fuel depot.



Photograph 4: South side of Beach Road towards center of camp.

Blue building is new, flat roofed building is Building 49 and Building 2 directly behind it. At far left is portion of a fuel tank in the new fuel depot.



Photograph 5: Second row of Quonset huts south of Beach Road towards at eastern end of camp.



Photograph 6: Building 342 (Old Power House) on the left and Building 442 (Power House) on right.



Photograph 7: Building 250 – original ARL Laboratory, Library, Workshop, and Office Building.

North (end) and east elevations. Elevated utilidor in foreground.
Building 250 represents a large double deck Quonset hut type.



Photograph 8: Building 250 – original ARL Laboratory, Library, Workshop, and Office Building. West elevations.



Photograph 9: ATCO replacement units.

Building 255 in background along with elevated utilidor.



Photograph 10: Wanigans.

Newer Quonset type structure to the left. Empty area in foreground represents area where original Quonset huts have been demolished.



Photograph 11: Central area of camp where Quonset huts have been reorganized.



Photograph 12: Buildings 57, 58, 60, 61 & 63 (blue, right to left).

Note changes of ends from industrial to residential.



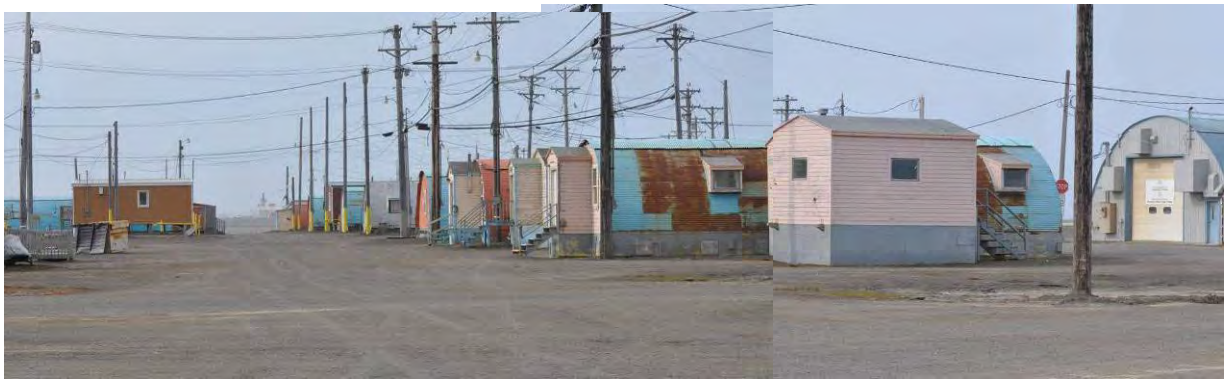
Photograph 13: Building 60 with its changed end.

Original end had traditional Quonset industrial end.



Photograph 14: Residential and Original End Treatments.

Building 58 on left with new "residential" end and Building 57 on right with original end treatment with exception of new sectional overhead garage door.



Photograph 15: Residential Quonset hut along second row at western end of camp.

Building 162 on far right. Note new stick built building on left.



Photograph 16: Typical end elevation of residential Quonset hut.



Photograph 17: Naval Arctic Research Lab, Quonset Huts.

(Ukpeagvik Industrial Center-NARL, Quonset Huts), HABS No. AK-184-A.
Photograph by Jet Lowe 1991.



Photograph 18: Typical temporary buildings found throughout the camp.



Photograph 19: Panoramic view of the south side of Point Barrow Camp

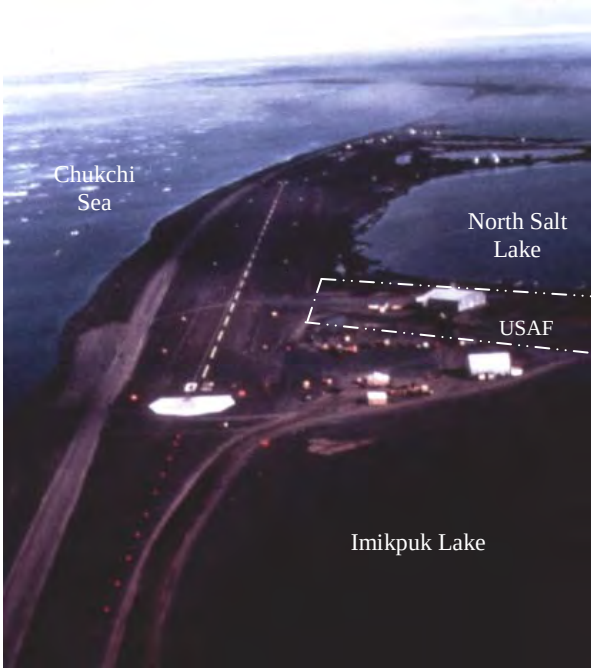
4.2 NARL, Point Barrow Airfield (BAR-079)

4.2.1 Runway

The airstrip site is located northeast of the former NARL Point Barrow Camp, parallel to the Chukchi Sea, at the northern edges of Imikpuk Lake, and north and west of the North Salt Lagoon (Photograph 20). The airstrip was originally constructed by the Seabees in 1944 to support the Navy's Barrow Point Camp and oil exploration in NPR 4. As with the construction of the base camp, a gravel pad was built up to form the base of the airstrip. The airport consisted of a main strip 150' wide by 5,000' long paralleling the coast with a cross strip 150' wide by 4,300' long. After the 1945 spring thaw, when the main runway became soft, the main airstrip was covered by Marston matting.

A concrete turntable was placed at the western end of the main strip plus a Marston matting parking apron. Support buildings were placed around the parking apron (Figure 11; Photograph 21). Airport lighting ran evenly spaced along the edges of the main runway.

The cross strip no longer exists. The USAF constructed an apron, air field support buildings, and the road to the POW-M where it was. Other changes to the airstrip are the removal of all airfield lighting and the concrete turntable at its western end. The airstrip's Marston matting is in good shape and is still serviceable by smaller aircraft (Photograph 22). The Marston matting apron is in fair condition, but beginning to deteriorate (Photograph 23).



Photograph 20: NARL Airstrip in 1966.

Toward the end of NARL's Golden Years. North is to the left. USAF property in dashed area

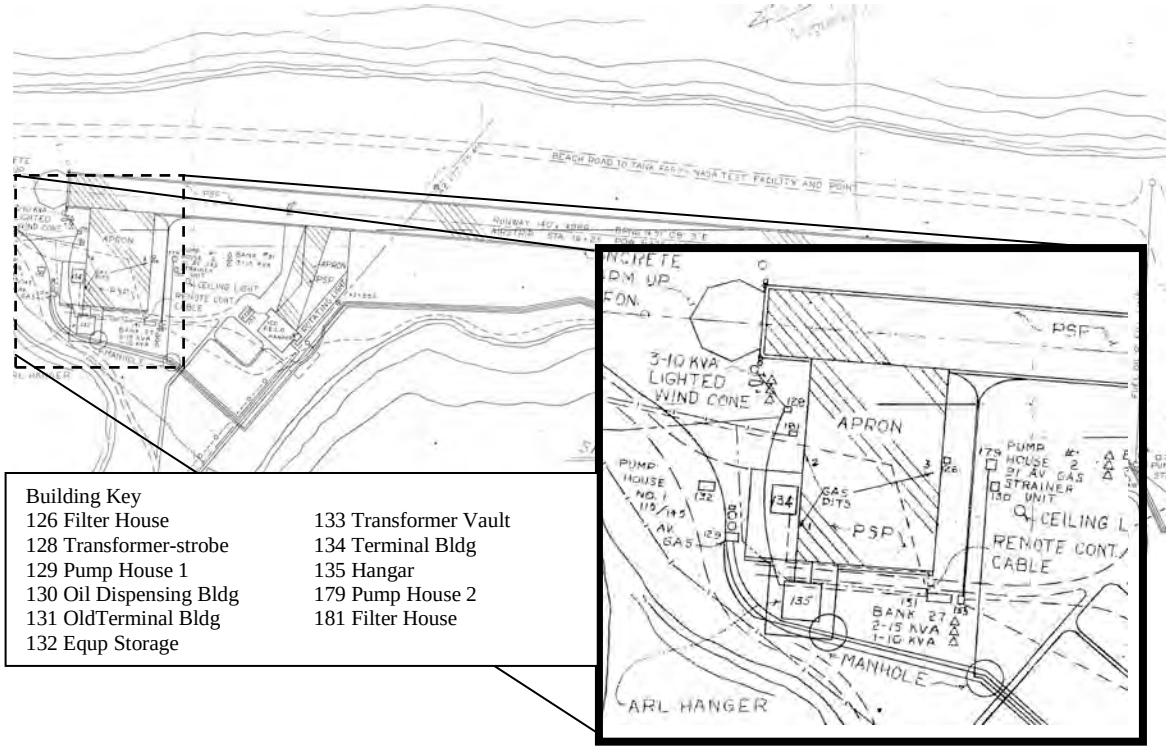


Figure 11: NARL Airstrip Facilities, 1966

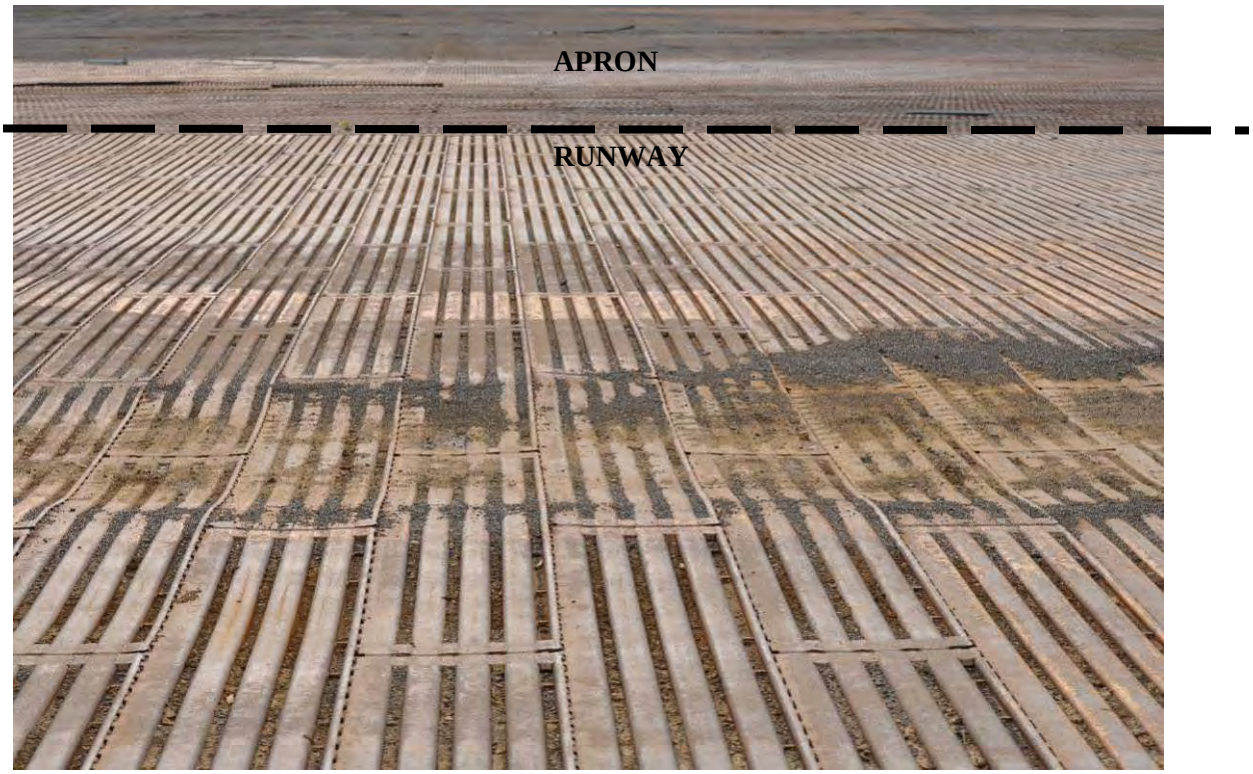


Photograph 21: 2003 Aerial of NARL Airstrip buildings prior to the demolition of Buildings 133 and 134.



Photograph 22: Un-pierced Marston matting, NARL Airstrip runway.

Looking northeast.



Photograph 23: Airstrip's un-pierced Marston matting in foreground with apron's pierced Marston matting in background.

4.2.2 Hangar, Building 136 (BAR-080)

Building 136 is a 34,569 square foot hangar located at the south side of the apron (Photograph 24). It is a steel framed, gabled roof building approximately 193' x 213' constructed in 1970. It has a concrete slab on a piling foundation, metal siding and corrugated metal roofing. Attached to the main room of the hangar on its rear elevation is a row of eight single story storage rooms/offices built on pilings with exposed concrete or tiled floors and sheetrock interior walls/ceiling. This section of the building has a shed roof. No changes have been made to the hangar since its erection. It was constructed during NARL's Mega Period.



Photograph 24: Front elevation of Building 136.

Note change in Marston matting in right photograph from the runway's un-pierced matting to the apron's pierced matting.

4.2.3 Operational/Terminal, Building 133 (BAR-081)

The Operational/Terminal Building was built in 1947. This building is a representative of Navy World War II Temporary Wood buildings although constructed after the war. It is a 1,818 square foot building approximately 46' by 47' located on the west side of the apron between the apron and Building 134 (Photograph 25). Building 133 is a rectangular gabled roofed wood framed building that has a shallow shed roof section on the left side. The building's exterior is wood shiplap siding painted yellow. The interior has wood and sheetrock finishes. It was constructed during the oil exploration period.




Photograph 25: Rear and right elevations (left photo) and front elevation of Building 133.

4.2.4 Vehicle Parking (Warm), Building 134 (BAR-082)

Building 134 was a Vehicle Parking (Warm) facility constructed in 1947. It is a 1,397 square feet located to the west of Building 133 (Photograph 26). This building is a representative of Navy WWII Temporary Wood buildings although constructed after the war. It is wood framed, approximately 34' by 40' with a shallow shed roof consisting of rolled asphalt roofing. The building has a concrete slab on-grade with two rooms; office space and open vehicle space. The front elevation (high point of shed roof) had three large wood sectional garage doors evenly spaced across the elevation. The left elevation had a single personnel door towards its right-hand end, a boarded up window towards the center, and an electrical panel at its left-hand end. A wood pole extended from the side of the electrical panel above the roof line that serves where the electrical entered the building. The rear elevation had a single light fixed sash window towards the center of the elevation. It was constructed as part of the oil exploration period.




Photograph 26: Building 134.

Left and rear elevations (left) and front and left elevations (right), Bldg 134.

4.2.5 Transformer Hut, Building 130 (BAR-083)

Building 130 is a 74 square foot transformer hut built in 1947 located on the east side of the apron (Photograph 27). It is a skid mounted building that is of wood frame construction with wood siding and measures 6' by 12'. There are no interior finishes and no insulation. It was constructed as part of the oil exploration period.



Photograph 27: Front and right elevations of Building 130.

4.2.6 Sewage Plant Generator, Building 18 (BAR-084)

The Sewage Plant Generator, built in 1973, is approximately 24' by 60' and immediately to the east of the hangar (Photograph 28). This building is wood framed with Transite board siding. It is a plain front gable roofed building with a double leafed solid wood door on its gable end. Roofing material consists of rolled asphalt roofing. The building retains its historic integrity. It dates from NARL's Mega Project Period.





Photograph 28: Front (left photo) and left elevations of Building 18.

4.2.7 Water Treatment Plant-WTP (BAR-085)

The Water Treatment Plant is located adjacent to the Hangar's west elevation (Photograph 29). It is approximately 24' by 60' and constructed in 1995. It is a modular prefabricated metal building with a concrete floor. This building was constructed after the Navy closed NARL PB and does not fall in NARL's period of significance.



Photograph 29: Front (left photo) and right elevations of the Water Treatment Plant.

5 DETERMINATIONS OF ELIGIBILITY

This section evaluates the extant facilities for eligibility for inclusion in the NRHP under the Navy NPR 4 Oil Exploration and ARL/NARL contexts. This section is divided into two sub-sections with the first presenting the NRHP criteria and aspects of integrity required for a property to be eligible. The second section discusses the NARL, Point Barrow facilities extant collectively in terms of meeting the criteria and retention of historic integrity.

5.1 NRHP Criteria of Eligibility

A Historic Property is a building, structure, site, district, or object that is included in or eligible for inclusion in the NRHP. Properties that may be considered for eligibility to the NRHP must be a least 50 years old; possess integrity; *and* meet one or more of the following criteria:

Criterion A: Properties that are associated with events that have made a significant contribution to the broad patters of our history;

Criterion B: Properties that are associated with the lives of persons significant in our past;

Criterion C: Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: Properties that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 80.4).

Properties less than 50 years of age may be considered for eligibility under Criteria Consideration G if they have gained significant importance in the last 50 years.

In addition to meeting one of the criteria for eligibility a property must also retain its integrity to be eligible for listing in the NRHP. The Secretary of the Interior defines integrity as "the ability of a property to convey its significance," and lists the following Seven Aspects of Integrity as effective guides for its assessment:

Location The place where the historic property was constructed or the place where the historic event occurred.

Design The combination of elements that create the form, plan, space, structure, and style of a property. Design reflects functions, technologies, and aesthetics. For example, if a gabled roof has been replaced with a flat roof or an open bay has been walled in, integrity of design has been diminished.

Setting	The physical environment of a historic property. It includes the relationships of surrounding features, reflects the designer's intent, and can indicate function.
Materials	The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. A facility that has been reconstructed or extensively remodeled does not retain integrity of materials.
Workmanship	The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. For facilities constructed from standardized designs, integrity of workmanship would include original brickwork, joinery, finishes, and ornamentation.
Feeling	The property's expression of the aesthetic or historic sense of a particular period of time. A facility that has not been considerably altered since its period of significance, retains its surrounding landscaping, and maintains an original relationship with neighboring buildings likely retains integrity of feeling.
Association	The direct link between an important historic event or person and a historic property, where that facility conveys that relationship. A radio antenna field from ARL's Gold Period retains integrity of association with the period if the period's complex remains intact (NPS 1985).

Either a historic property retains integrity or it does not. In general, facilities must retain several, and usually most, aspects to retain integrity. Explained most clearly in the National Register Bulletin on applying the NRHP criteria for evaluation, "The retention of specific aspects of integrity is paramount for a property to convey its significance. Determining which of these aspects are most important to a particular property requires knowing why, where, and when the property is significant" (NPS 1998:44). Change to properties associated with research may not always mean a loss of integrity. If constant change of a property was inevitable to maintain changes in research needs and technology, its evolution is significant, and the changes may not mean a loss of integrity. If the changes were unrelated to research needs and technological changes, the property may not be able to convey its significance and therefore may not retain integrity. A property may meet one or more criteria of significance for eligibility, but if it does not retain its historic integrity, it is not eligible for inclusion in the NRHP.

5.2 Evaluation

5.2.1 Naval Oil Exploration, Point Barrow Camp

SIGNIFICANCE: The Point Barrow Camp has historic significance as defined under the NRHP Criterion A for its association with early oil exploration on the North Slope of Alaska. Its period of significance would be 1944-1953. Although tasked with exploring NPR 4, the Navy's exploration conducted drilling (coring and oil) in specific areas within the reserve but conducted other levels of exploration over an area twice as big as the 37,000 square mile NPR 4. The Navy's oil exploration program discovered:

- the Umiat oil field, estimated in 1954 to contain about 70 million barrels of recoverable oil;
- the Simpson oil field estimated to contain around 12 million barrels of oil;
- a small field at Fish Creek;
- the Barrow gas field estimated to contain between five and seven billion cubic feet of gas;
- the Gubic gas field, estimated to contain about 22 billion cubic feet of recoverable gas;
- the small Wolf Creek gas field estimated to contain around 881,000 cubic feet of gas;
- the Oumalik gas field, not large enough for commercial production;
- the Meade gas field, estimated at 10 billion cubic feet of gas; and
- the Square Lake gas field with no estimated quantity of gas other than it may be substantial (Reed 1958a:169-171).

In addition to the discovery of these fields, the Navy's oil exploration program:

- covered 67,000 square miles seismically;
- geologically mapped 21,000 square miles;
- conducted trimetrogon photography of all of NPR 4;
- conducted vertical aerial photography of about 70,000 square miles;
- conducted airborne magnetometer coverage of about 75,000 square miles; and
- conducted gravity-meter coverage of about 26,000 square miles (Reed 1958a:171).

The work performed by the Navy's NPR 4 oil exploration program provided the foundation for future exploration/discoveries on the North Slope. The program also significantly increased the understanding of the Arctic through the research conducted in support of the program or that the program supported but not directly associated with the program.

INTEGRITY: By the end of the Navy Oil Exploration Period, Point Barrow Camp consisted of approximately 80 buildings consisting of WWII temporary buildings commonly used in the war effort. Only nine large industrial Quonset huts retain integrity at the eastern end of the camp. Residential and industrial Quonset huts that remain from this period at the western end of the camp have all been modified since the period of significance. The residential huts have Arctic entries added and the industrial ends of the larger huts have been changed to more residential ends. Point Barrow Camp no longer reflects how it appeared at the end of the Navy Oil Exploration Period.

ELIGIBILITY: The Point Barrow Camp under the Navy Oil Exploration context is not eligible for inclusion in the National Register of Historic Places due to the loss of integrity.

5.2.2 ARL Point Barrow Camp/NARL, Point Barrow

SIGNIFICANCE: The overall period of significance for ARL Point Barrow Camp/NARL, Point Barrow is 1947 to 1981. The period is further divided into three sub-periods: ARL Development Period (1947-1953); Golden Years (1954-1969), and Meg-Project Period (1970-1981).

5.2.2.1 ARL Development Period (1947-1953)

SIGNIFICANCE: The ARL was established under the ONR in 1946 in recognition of the need to understand the Arctic as a result of the oil explorations being conducted by the Navy in NPR 4 and in light of the military Cold War strategies. ARL's first supported research season began in 1947 in a few Quonset huts remodeled for their use. The ARL Development Period is characterized by ARL's initial development and slow growth not only in assuming conversion of buildings at the camp to their use but in attracting research to their program. This period also represents a time when other federal agencies were conducting their own research out of the camp unsupported by ARL. ARL is reliant on the Director of Petroleum Reserves for its logistical support.

INTEGRITY: ARL during this period only has use of a few Quonset huts operated by the Director of Petroleum Reserves. The end of this period coincides with the end of the Oil Exploration Period. The Point Barrow Camp no longer retains the level of integrity to reflect how it appeared at the end of the Development Period. Building 250, ARL's Laboratory/Library/Admin Office, a large double-decker Quonset hut, was remodeled for ARL's use in 1948 and continued this use to 1968 when it was replaced. Building 250 still retains its historic integrity from this period.

ELIGIBILITY: ARL Point Barrow Camp/NARL, Point Barrow is not eligible for inclusion in the National Register of Historic Places as an historic district due to loss of integrity. Building 250 is individually eligible for listing in the National Register of Historic Places under Criteria A for its association with ARL/NARL Arctic research with a period of significance of 1948-1968.

5.2.2.2 ARL/NARL Golden Years (1954-1969)

SIGNIFICANCE: During ARL/NARL Golden Years, the Point Barrow Camp became the world's largest facility supporting Arctic studies in a full range of subjects. It was a Navy-owned, contractor-operated research facility with emphasis on research in line with Navy needs. The ONR provided the impetus through its ARL/NARL facilities for the growth of all Arctic research in the United States. This period is defined by the cutting edge research supported by ARL/NARL and Point Barrow Camp. Research conducted during this period provided the engineering ability to build projects, such as the DEWLine stations and the Trans-Alaska Pipeline System, in Arctic regions; the ability to work in the Arctic, the ability to navigate under the Arctic ice by submarine as well as navigate in the northern regions; ice properties and their relationship to engineering strengths important to construction, such as oil platforms, in waters subject to freezing; and the understanding of the Arctic basin and its importance to both aquatic and terrestrial environments just to name a few. This period also saw NARL/Point Barrow Camp support the first environmental study that would be used as a model for such

studies after the National Environmental Policy Act was passed and required such studies.

INTEGRITY: Point Barrow Camp consisted of approximately 110 buildings at the end of the Golden Years Period.18 Major change consisted of the demolition of a number of Quonset huts to make room for the construction of a new laboratory (Building 360) in 1968, construction of a new power house (Building 442) and changes in the road system with the development of a few cross connectors between the original roads. Today, only 48 buildings from this period are extant. Six of these (large Quonset huts) have lost their integrity with modifications made to their ends. The center of the camp has been completely altered through the demolition of original buildings, the addition of a dominating fuel depot, changes in traffic patterns, and addition of a few mobile temporary buildings on skids. The clustering of extant buildings from this period are at either end of the camp with no direct connection to the facility's main mission – Building 250, Laboratory.

ELIGIBILITY: NARL, Point Barrow is not eligible for inclusion in the National Register of Historic Places as an historic district under the ARL/NARL Golden Years due to loss of integrity. The property no longer reflects how it existed at the end of the Golden Years to form an eligible historic district. Although there are the two clusters of buildings at either end of the camp (industrial Quonset huts one eastern end and residential Quonset huts on western end) there is not a direct tie with the camp's main mission building during this period – Building 250. Without this direct tie neither of the clusters is eligible as separate historic districts or as individual buildings under this context since they were support facilities and not mission critical facilities (Lusignan 2010). Building 250, as the mission critical facility, is individually eligible for listing under this context in the National Register of Historic Places under Criteria A for its association with ARL/NARL Arctic research with a period of significance of 1948-1968. Building 360, Laboratory, was constructed in 1968, a year before the end of this period. Since it is less than 50 years of age, it must have achieved "exceptional importance" as required under Criteria Consideration G for eligibility for inclusion in the National Register of Historic Places. By the end of this period, Building 360 was just being occupied and had not achieved exceptional importance in the short one year of its existence. Building 360 is not individually eligible for listing in the NRHP under the ARL/NARL Golden Years context.

5.2.2.3 NARL Mega-Project Period (1970-1981)

SIGNIFICANCE: The beginning of the NARL Mega-Project Period marks the beginning of the end of NARL and the Point Barrow Camp as a naval installation. The discovery of oil in the Prudhoe Bay fields in the late 1960s began drawing research and research support away from Point Barrow to the oil fields and the Trans Alaska Pipeline corridor. Early in this period the Navy's interests had shifted to the North Atlantic approaches to the Soviet Arctic and congress mandated the National Science Foundation responsible for Arctic science, removing NARL from this role. The research that NARL, Point Barrow did support, were continuations of and outgrowths of research first

[18] Various articles state approximately 190 buildings. Drawings from this period indicate 110. Difference may represent buildings ARL/NARL had at various remote sites.

established in the Golden Years. Major change to this research, however, was how it was approached reflecting NSF's big science; consisted in the larger scale, multi-disciplinary, hi-tech nature of the research. The Point Barrow Camp infrastructure was lagging in its ability to support the scale research was taking on. The Navy began looking at ways to end NARL and Point Barrow Camp early in this period and began cutting both budget and maintenance of the facilities. The Navy ended NARL and NARL, Point Barrow research support in 1980 and decommissioned the installation in 1981, ending ARL/NARL's 34 year history of supporting research in the Alaskan Arctic.

INTEGRITY: There were no major changes to NARL, Point Barrow during the Mega-Project Period and at the end of the period the camp remained much as it did at the end of its Golden Years. Today, only 48 buildings from this period are extant. Six of these (large Quonset huts) have lost their integrity with modifications made to their ends. The center of the camp has been completely altered through the demolition of original buildings, the addition of a dominating fuel depot, changes in traffic patterns, and addition of a few mobile temporary buildings on skids. The NARL, Point Barrow no longer retains a sense of how it appeared at the end of this period. Changes have affected the site's original design (site plan); its setting in that it no longer reflects the original intent of the design and does not convey functionality of camp areas; and feeling, it no longer conveys how its appeared in 1981 when the NARL, Point Barrow was decommissioned as a Navy installation and it went under USGS caretaker status.

ELIGIBILITY: NARL, Point Barrow is not eligible for inclusion in the National Register of Historic Places as an historic district because it has lost its historic integrity, no longer reflecting how it appeared when it was decommissioned in 1981. Although Building 360, Science Lab, retains its historic integrity from the Mega-Project Period, it has not achieved the exceptional importance requirement under Criteria Consideration G. It replaced an older facility in a continuing program and represents only a newer generation of facility rather than the outcome of exceptionally important events. It, however, should be reevaluated once it turns 50 years old (2018).

5.2.3 NARL, Point Barrow Airstrip

5.2.3.1 Naval Oil Exploration

The airstrip was originally constructed by the Seabees in 1944 to support the Navy's Point Barrow Camp and oil exploration in NPR 4, and it meets the NRHP Criterion A for its association with the early oil exploration on the North Slope of Alaska with a period of significance of 1944 to 1953. The property, however, does not retain historic integrity for this period. The airstrip no longer retains its cross strip, being removed when the USAF constructed POW-M and supporting air field facilities. The concrete turntable and runway lighting have been removed. The period's Navy hanger has been replaced by a larger pre-fabricated metal building, and the USAF constructed a hangar and support facilities as part of POW-M. The airstrip does not convey the design, setting, feeling and association as the 1944-1953 Naval airstrip that supported the Point Barrow Camp and remote oil exploration camps. The NARL Airstrip is not eligible for inclusion in the National Register of Historic Places under the Naval Oil Exploration context.

5.2.3.2 ARL Point Barrow Camp/NARL, Point Barrow

During the period of ARL/NARL's use of Point Barrow Camp, the airstrip supported the main camp, the remote sites, ice stations, and seasonal research conducted throughout the Arctic Coastal Plan. The airstrip retains its historic integrity as it appeared at the end of NARL's Mega-Project Period (1970-1981).

For a supporting element to be eligible for listing in the National Register of Historic Places it must be directly adjacent to what it supported and able to be included in a larger historic district (Lusignan 2010) centered on the mission critical aspect of the property. The airstrip does not have a direct visual tie to the Point Barrow Camp and a number of new dominating features have been added between it and the camp (a number of new buildings on the eastern edge of the camp and the new blue Astroturf football stadium). Further, the Point Barrow Camp has lost the necessary integrity to form a larger historic district, leaving only Building 250 as eligible for listing in the National Register of Historic Places. The NARL Airstrip is not eligible for listing in the NRHP under the ARL/NARL context.

5.2.3.3 Cold War Era

The airstrip supported the construction of the DEWLine beginning in 1954 and continued to serve the Point Barrow POW-M DEWLine Station [now Point Barrow Long Range Radar System (LRRS)]. The airstrip is adjacent to POW-M and the site boundary for POW-M can easily incorporate the airstrip and associated USAF airstrip facilities as an historic district eligible for inclusion in the National Register of Historic Places. The Navy owned buildings are non-contributing elements to this historic district. POW-M was determined eligible for inclusion in the NRHP at an earlier date under Section 106 for an undertaking of converting the radar system to an unmanned LRRS and appropriately mitigated under a Memorandum of Agreement between the 611th Civil Engineering Squadron (CES) and Alaska State Historic Preservation Officer. Although the airstrip may be eligible for inclusion in the NRHP under Criteria A as a contributing element to an historic district centered on the POW-M DEWLine station, the DEWLine mitigation has been completed and on file at the Alaska Office of History and Archaeology (Gasek 2010).

6 BIBLIOGRAPHY

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APPENDIX A: POINT BARROW CAMP TIMELINE

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POINT BARROW CAMP TIMELINE

1882/83	- First Polar Years1917 - Oil seepage reported at Cape Simpson.
1923	- National Petroleum Reserve 4 (NPR 4) established by Executive Order #3797-A - Preliminary topographic/geological work begins.
1926	- Preliminary work ends.
1932/33	- Second Polar Years
1944	- Navy begins NPR 4 oil exploration. - Point Barrow Camp established to support oil exploration.
1946	- NPR 4 transferred from Seabees to the Director of Naval Petroleum Reserves. - Arctic Contractors (Arcon) contracted to operate the camp and to conduct oil exploration . - Office of Naval Research (ONR), Arctic Research Laboratory (ARL) established.
1947	- Research under ARL begins, marking beginning of ARL's Development Period.
1948	- Swarthmore College contracted by ONR to operate ARL. - Building 250 renovated to house ARL's Laboratory/Library/ Admin Offices. ARL's core Point Barrow Camp until 1968.
1949	- Swarthmore College contract ends. - The Johns Hopkins University contracted by ONR to operate ARL.
1953	- Navy oil exploration ends. - Point Barrow Camp placed in caretaker status. - The Johns Hopkins University's contract ends. - End of ARL's Development Period.
1954	- Beginning of ARL/NARL's Golden Years. - University of Alaska contracted by ONR to operate ARL. - Point Barrow Camp permitted to USAF for construction of DEWLine. - USAF takes custody of camp. - Puget Sound and Drake Company under subcontract to Western Electric contracted by USAF to operate camp.
1957	- Nuclear submarine *Nautilus* navigates under the Arctic ice.
1957/58	- International Geophysical Year (IGY)
1958	- Puget Sound and Drake Company contracted by USAF to operate camp.
1959	- ARL/Point Barrow Camp begins research support for Project Chariot.

1960	- NPR 4 transferred from Department of the Navy to the Department of the Interior with exception of Point Barrow Camp.
1961	- The 4,972.6 acres that formed Point Barrow Camp withdrawn from NPR 4 by the Navy as a research center. - Project Chariot research comes to an end.
1963	- Vinnell Corporation contracted by USAF to operate camp. - October storm
1965	- ARL changed to Naval Arctic Research Laboratory (NARL). - NASA begins Nike missile launches.
1968	- Laboratory Building (360) constructed . - Discovery of Prudhoe Bay oil.
1969	- Nike launches end.
1970	- Beginning of NARL's Mega-Project Period.
1971	- USAF returns custody of Point Barrow Camp to the Navy. - Pacific Architects and Engineers contracted to operate camp. - Alaska Native Claims Settlement Act (ANCSA) passed. - Congress mandates NSF as lead in arctic research.
1972	- Point Barrow Camp renamed NARL, Point Barrow.
1973	- Ukpeagvik Iñpiat Corporation (UIC) formed under provisions of ANCSA.
1974	- ITT Arctic Services contracted to operate camp. - Construction of the Trans-Alaska Pipeline System (TAPS) begins.
1976	- NPR 4 renamed the National Petroleum Reserve in Alaska (NPRA) and renewed oil exploration begins.
1978	- UIC begins inquiring about transfer of NARL, Point Barrow facilities to them.
1979	- Navy presents plan to reduce level of Naval Support for NARL, Point Barrow.
1980	- University of Alaska's contract terminated. - Navy ends NARL and support of research at NARL, Point Barrow. - United States Geological Survey (USGS) takes custody of NARL, Point Barrow and places it in caretaker status.
1981	- NARL, Point Barrow decommissioned.

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APPENDIX B: AHRS FORMS

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Alaska Heritage Resources Survey

AHRS #: BAR-075 Aliquot: SE ¼, SE ¼ Sec 21 and SW ¼ Sec 22, T23N, R18W
Lat./Long.: N71°19'30" W156º40'45" Acreage: 4,973
Map sheet: BARROW B-4 UTM: 05 N 7915236 W 582922

Site Name(s): POINT BARROW CAMP, NARL PT BARROW

Site Description: Point Barrow Camp consists of a complex of primarily Quonset huts aligned in three rows parallel to the Chukchi Sea. Majority of buildings were constructed in 1944. The 1968 H-shaped laboratory is the dominant feature. Of the approximately 190 buildings that made up Point Barrow Camp in its Golden Years (1955-1969), only 46 are extant.

Significance: The Navy established Point Barrow Camp (PBC) in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. Ending of Naval oil exploration in 1953 and building of DEWLine, the Air Force took over running PBC in 1954. That same year UA received contract to operate the laboratory. ARL changed to NARL in 1965. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981w/core camp area transferred to UIC in 1984. The complex is significant for the cutting edge arctic research it supported and the advancements in our understanding of the Arctic, for early Alaskan oil exploration and for it role in the Cold War.

Location: The camp is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow.

Citations:
Norton, David W. (editor)
2001 *Fifty More Years Below Zero: Tributes and Meditations for the Naval Arctic Research Laboratory's First Half Century at Barrow, Alaska.* The Arctic Institute of North America, Calgary, Alberta and Fairbanks, Alaska
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest
Shelesnyak, M.C.
1948 "The History of the Arctic Research Laboratory (under Contract with Office of Naval Research) Point Barrow, Alaska." *Arctic*, Vol.1, No.2, pp.97-106.
Ott Water Engineers, Inc.
1984 *Final Environmental Assessment of Demolition/Disposal Alternatives for the Naval Arctic Research Laboratory Barrow, Alaska.* Prepared for Western Division, Naval Facilities Engineering Command under Contract Number: N62474-83-C-3065.

Danger of Destruction:
Present Condition: No longer conveys a uniform district.
Ecosystem:
Pertinent Dates: AD 1944-1980
Period: Historic
Resource Nature: Building
Cultural Affiliation: Euro-American
Preservation Status & Date: Not Eligible
Property Owner: Ukpeagvik Iñupiat Corporation

Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-076 Aliquot: SEC 27 and NW ¼ and SW ¼ SEC 26 T23N, R18W,
Lat./Long.: N 71.32704, W156.67670 Acreage: >001
Map sheet: BARROW B-4 UTM: 05

Site Name(s): BUILDING 250, ARL/NARL POINT BARROW LABORATORY

Site Description: Building 250 is a large, double-decker Quonset hut that measures 40 feet x 100 feet and painted yellow. Interior of the building was not open for inspection. The north elevation (end elevation) is steel framed and sheathed in plywood. A personnel door is centrally placed with two boarded up windows evenly spaced on either side. The two windows closest to either side of the door are covered by a metal vent. The second floor of this end wall has two, horizontally large boarded up windows evenly spaced and a large louver vent is evenly placed above these openings. The east and west elevation's second floor are similar in that they have 9 gable dormers extending from the arch of the Quonset hut. Each dormer has a boarded up window. The first floor of these elevations originally had single sash windows evenly spaced that are now covered by small wood framed shiplap sided shed roof additions. One that covers approximately 1/3 of the west elevation and two smaller ones on the east elevation. The north end of the Quonset hut has a wood frame shallow gabled addition that has few windows in the second floor. A smaller single story Quonset hut extended perpendicular from the west elevation and has been demolished, leaving only a ghost of its end.

Significance: The Navy established Point Barrow Camp (PBC) in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. Building 250 was the original Laboratory/Library/Administration building for ARL (later renamed NARL in 1965) in 1947 and continued as such until 1968 when a new building was constructed to replace it. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981w/core camp area transferred to UIC in 1984. The complex is significant for the cutting edge arctic research it supported and the advancements in our understanding of the Arctic, for early Alaskan oil exploration and for its role in the Cold War.

Location: Building 250 is located towards the center of and on the southern edge of Point Barrow Camp which is located along the coast of the Chukchi Sea approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow, immediately to the southeast of NARL, Pt Barrow Camp.

Citations:
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest
Danger of Destruction: Slated to be demo'd winter of 2011.
Present Condition: Fair
Ecosystem:
Pertinent Dates: AD 1947-1968
Period: Historic
Resource Nature: Building
Cultural Affiliation: Euro-American
Preservation Status & Date: Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101

Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-079
Aliquot: NE ¼ SEC 22, SE ¼ SE ¼ SEC 15, SW ¼ SEC 14, T23N, R18W
Lat./Long.: N71.3436 W156.6199 Acreage: 150
N71.3431 W156.6193
N71.3352 W156.5482
N71.3335 W156.6448
N71.3335 W156.6512
N71.3345 W156.6549
Map sheet: BARROW B-4
UTM: 05 N 7916392 W 583914

Site Name(s): NAVAL ARTIC RRESERCH LABORATORY (NARL) AIRSTRIP (POINT BARROW CAMP AIRSTRIP, ARTIC RESEARCH LABORATORY (ARL) AIRSTRIP)

Site Description: The NARL Airstrip is150' by 5000' long . Originally there was a cross strip 150' wide by 4300' long which was removed in 1953/54 when the Pt Barrow DEW Line station was built. The airstrip is covered by unpierced Marston matting. At the western end of the runway on the south side are located a hangar (BAR-088), terminal (BAR-081), vehicle warm parking bldg (BAR-082), transformer hut (BAR-083), sewage treatment generator (BAR-085), and a water treatment plant (BAR-085) around a pierced Marston matting apron. Just to the west of the buildings, but not part of the NARL context, the USAF has a hangar and a few outbuildings.

Significance: The NARL Airstrip was constructed in 1944 to support the Navy's oil exploration in NPR 4. Beginning in 1947 it supported the Arctic Research Laboratory and the after 1954 it also supported the US AF's Pt Barrow Main DEW Line station. Use of the airstrip ended with the Navy's decommissioning of NARL in 1981.

Location: The airstrip is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow, northeast of the main NARL Pt Barrow Camp between Imikpuk and North Salt lakes.

Citations:
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest
Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1944-1981
Period: Historic
Resource Nature: Structure

Cultural Affiliation: Euro-American
Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101
Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-080 Aliquot: NE ¼ SEC 22, T23N,R18W,
Lat./Long.: N 71º20'02" W 156º38'51" Acreage: >001
Map sheet: BARROW B-4 UTM: 05 N 7916272 W 584019

Site Name(s): HANGER (BLDG 136) NARL AIRSTRIP

Site Description: Building 136 is a steel framed 34,569 square foot hangar built in 1970 during NARL's Mega-Project Period. It is a steel framed, gabled roof building approximately 193-feet by 213-feet. It has a concrete slab on a piling foundation, metal siding and corrugated metal roofing. Attached to the main room of the hangar on its rear elevation is a row of eight single story storage rooms/offices built on pilings with exposed concrete or tiled floors and sheetrock interior walls/ceiling. This section of the building has a shed roof.

Significance: The Navy established Point Barrow Camp (PBC) and the airstrip in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. The Air Force took over running PBC in 1954 and began using the airstrip for its as well as the Barrow POW-M DEWLine station. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981w/core camp area transferred to UIC in 1984. The hanger was constructed during NARL's Mega-Project period. The complex is significant for the cutting edge arctic research it supported and the advancements in our understanding of the Arctic, for early Alaskan oil exploration and for it role in the Cold War..

Location: The Hangar is located at the western end, south side of NARL Airstrip. The airstrip is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow.

Citations:

Norton, David W. (editor)
2001 *Fifty More Years Below Zero: Tributes and Meditations for the Naval Arctic Research Laboratory's First Half Century at Barrow, Alaska.* The Arctic Institute of North America, Calgary, Alberta and Fairbanks, Alaska

Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest

Shelesnyak, M.C.
1948 "The History of the Arctic Research Laboratory (under Contract with Office of Naval Research) Point Barrow, Alaska." *Arctic*, Vol.1, No.2, pp.97-106.

Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1970
Period: Historic
Resource Nature: Building
Cultural Affiliation: Euro-American
Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101
Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-081 Aliquot: NE ¼ SEC 22, T23N,R18W,
Lat./Long.: N 71º20'03" W 156º39'54" Acreage: >001
Map sheet: BARROW B-4 UTM: 05 N 7916290 W 583923

Site Name(s): OPERATIONAL BLDG TERMINAL (BLDG 133) NARL AIRSTRIP

Site Description:
The Operational Building Terminal, built in 1947, is a 1,818 square foot building approximately 46-feet by 47-feet located on the south side of the apron between the NARL Airstrip and Building 134. This is a rectangular gabled roof wood frame building that has a shallow shed roof section. Exterior is wood siding originally painted yellow. Interior has wood and sheetrock finishes.

Significance: The Navy established Point Barrow Camp (PBC) and airstrip in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. The Air Force took over running PBC in 1954 and began using the airstrip to support the Barrow POW-M DEWLine station. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981.

Location: The Terminal is located at the western end, south side of the NARL Airstrip. The airstrip is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow, northeast of the main NARL Camp between Imikpuk and North Salt lakes.

Citations:
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest

Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1947
Period: Historic
Resource Nature: Building
Cultural Affiliation: Euro-American
Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101
Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-082 Aliquot: NE ¼ SEC 22, T23N,R18W,
Lat./Long.: N 71º20'02" W 156º39'05" Acreage: >001
Map sheet: BARROW B-4 UTM: 05 N 7916257 W 583884

Site Name(s): VEHICLE PARKING (WARM) (BLDG 134) NARL AIRSTRIP

Site Description: Building 134 is a Vehicle Parking (Warm) facility constructed in 1947 that is 1,397 square feet located to the south of NARL Building 133 (BAR- This building is wood frame approximately 34-feet by 40-feet with a shallow shed roof consisting of rolled asphalt roofing. The building has a concrete slab on-grade with two rooms; office space and open vehicle space. The front elevation (high point of shed roof) has three large wood sectional garage doors evenly spaced across the elevation. The left elevation has a single personnel door towards its right-hand end, a boarded up window towards the center, and an electrical panel at its left-hand end. A wood pole extends from the side of the electrical panel above the roof line that serves where the electrical enters the building. The rear elevation as a single, single light fixed sash window towards the center of the elevation.

Significance: The Navy established Point Barrow Camp (PBC) and the airstrip in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. The Air Force took over running PBC in 1954 and began using the airstrip to support the Barrow POW-M DEWLine station. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981. The complex is significant for the cutting edge arctic research it supported and the advancements in our understanding of the Arctic, for early Alaskan oil exploration and for it role in the Cold War..

Location: The Vehicle Parking (Warm) building is located at the western end, south side of the NARL Airstrip. The airstrip is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow, northeast of the main NARL Camp between Imikpuk and North Salt lakes.

Citations:

Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest

Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1947
Period: Historic
Resource Nature: Building
Cultural Affiliation: Euro-American

Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101

Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-083 Aliquot: NE ¼ SEC 23, T23N,R18W,
Lat./Long.: N 71º20'06" W156º38'51" Acreage: >001
Map sheet: BARROW B-4 UTM: 05 N 7916402 W 584015

Site Name(s): TRANSFORMER HUT (BLDG 130) NARL AIRSTRIP

Site Description:
Building 130 is a 74 square foot transformer hut built in 1947 located on the north side of the NARL Airstrip (BAR-08) It is a skid mounted building that is of wood frame construction with wood siding and measures 6-foot by 12-foot. There are no interior finished surfaces and no insulation.

Significance: The Navy established Point Barrow Camp (PBC) and the airstrip in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. The Air Force took over running PBC in 1954 and began using the airstrip to support the Barrow POW-M DEWLine station. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981. The complex is significant for the cutting edge arctic research it supported and the advancements in our understanding of the Arctic, for early Alaskan oil exploration and for it role in the Cold War..

Citations:
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest

Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1947
Period: Historic
Resource Nature: Structure

Cultural Affiliation: Euro-American

Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101

Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-084 Aliquot: NE ¼ SEC 22, T23N, R18W,
Lat./Long.: N 71º20'05" W 156º38'48" Acreage: >001
Map sheet: BARRIW B-4 UTM: 05 N 7916320 W 584052

Site Name(s): SEWAGE PLANT GENERATOR (BLDG 18) NARL AIRSTRIP

Site Description:
The Sewage Plant Generator, built in 1973, is approximately 24-feet by 60-feet and immediately to the north of the Hangar. This building is wood framed with Transite board siding. It is a plain front gable roofed building with a double leafed solid wood door on its gable end. Roofing material consists of rolled asphalt roofing.

Significance: The Navy established Point Barrow Camp (PBC) and the airstrip in 1944 to provide logistics support for oil exploration in NPR 4. Office of Naval Research established the Arctic Research Laboratory (ARL) in 1946 and began using extant buildings at PBC in 1947. The Air Force took over running PBC in 1954 and began using the airstrip to support the Barrow POW-M DEWLine station. The Navy ended its involvement with the facility in 1980 and decommissioned it in 1981. The complex is significant for the cutting edge arctic research it supported and the advancements in our understanding of the Arctic, for early Alaskan oil exploration and for it role in the Cold War.

Location: The Sewage Plant Generator is located at the western end, south side of the NARL Airstrip. The airstrip is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow, northeast of the main NARL Camp between Imikpuk and North Salt lakes.

Citations:
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest

Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1973
Period: Historic
Resource Nature: Building

Cultural Affiliation: Euro-American

Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101

Repository:
Accession #:
BIA/BLM #: Other # (specify):

Alaska Heritage Resources Survey

AHRS #: BAR-085 Aliquot: NE ¼ SEC 22, T23N,R18W,
Lat./Long.: N 71º20'01" W 156º38'55" Acreage: 155
Map sheet: BARROW B-4 UTM: 05 N 7916251 W 583982

Site Name(s): WATER TREATMENT PLANT, NARL AIRSTRIP

Site Description:
This building measures 24-feet by 60-feet building constructed in 1995. It is a modular prefabricated metal building with a concrete floor and gable roofed and unadorned.

Significance:
The Water Treatment Plant was constructed after the core area of NARL Camp was transferred to Ukpeagvik Iñupiat Corporation. It is not associated with NARL Point Barrow Camp and not eligible for inclusion in the NRHP.

Location: The Water Treatment Plant is located at the southern end, eastside of the NARL Airstrip. The airstrip is located along the Chukchi Sea coast approximately 4 miles northeast of Barrow and 6 miles southwest of Point Barrow, northeast of the main NARL Camp between Imikpuk and North Salt lakes.

Citations:
Sackett, Russell
2010 Historic Property Inventory and Evaluation NARL, Point Barrow and NARL Point Barrow Airstrip. Silverdale, WA: Naval Facilities Engineering Command, Northwest

Danger of Destruction:
Present Condition: Good
Ecosystem:
Pertinent Dates: AD 1995
Period: Historic
Resource Nature: Building

Cultural Affiliation: Euro-American

Preservation Status & Date: Not Eligible
Property Owner: Department of the Navy,
Naval Facilities Engineering Command, Northwest
Attn: Real Estate Services
1101 Tautog Circle
Silverdale, WA 98315-1101

Repository:
Accession #:
BIA/BLM #: Other # (specify):

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Southeast Alaska Acoustic Measurement Facility - Ketchikan, Alaska



The Southeast Alaska Acoustic Measurement Facility (SEAFAC) is the Navy's only West Coast asset for making high fidelity passive acoustic signature measurements. SEAFAC includes directive line arrays, data collection and processing systems for real-time data analysis and signature evaluation.

As the Navy's primary acoustic engineering measurement facility in the Pacific, SEAFAC provides the capability to perform RDT&E evaluations to determine the sources of radiated acoustic noise, to assess vulnerability, and to develop quieting measures.

Located in Behm Canal near Ketchikan, Alaska, the facility provides an ideal ship acoustic measurement site characterized by low ambient noise and minimal noise interference. SEAFAC supports submarine operations over a full range of speeds and depths required for underway tests during acoustic trials. SEAFAC is also capable of supporting submarine target strength measurements.

The facility consists of a site to collect acoustic signatures of submerged submarines underway, and a unique site to measure acoustic signatures of motionless (static) submerged submarines with various onboard machinery secured or under unloaded operation. Acoustic signatures can be collected for a variety of speeds and operating conditions as the submarine transits back



and forth between the dual bottom-mounted acoustic arrays. At the static site, suspension barges lower the submarine on cables and position it between measurement arrays to evaluate acoustic signatures of individual machinery components.

The Static Site can test vessels of all sizes and types moored or suspended between surface barges. Submarines for example are suspended at various depths from the surface barges between two underwater arrays and the ship's propulsion systems are secured. Surface ships could be put on shore power with ship power and propulsion systems secured. Test personnel then obtain unique measurements on individual pieces of equipment and machinery. The signal processing and in-water hardware were designed to easily accommodate a variety of sponsors and requirements.

Click to view SEAFAC fact sheet on public safety measures

Naval Surface Warfare Center, Carderock Division
Southeast Alaska Acoustic Measurement Facility
1 Back Island
Ketchikan, AK 99901-5637

Driving Directions

From Ketchikan International Airport:

The airport is located on Gravina Island, across Tongass Narrows from Ketchikan.
Take the airport ferry to the airport parking lot.
From the airport ferry parking lot, turn left and follow Tongass Highway north for approximately 11.5 miles.
Turn left onto North Point Higgins Road (just after Higgins Spur), then an immediate right onto Knudson Cove Road.
Follow the road approximately one quarter mile to the left turn to Knudson Cove Marina.
Go to the bottom of the hill, turn right into parking lot for the Marina. The transfer boat will be at the Marina's floats to transport to SEAFAC, Back Island.

Call SEAFAC (247-6289) prior to departing for Knudson Cove so that the boat will be dispatched for the pick-up.

Commander Naval Sea Systems Command
1333 Isaac Hull Avenue, SE
Washington Navy Yard, DC 20376

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NORTHWEST
Training and Testing Environmental Impact Statement/ Overseas Environmental Impact Statement

Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Measurement Facility

The U.S. Navy passively measures sound generated by vessels to assess vulnerability and develop quieting measures at the Southeast Alaska Acoustic Measurement Facility, the Navy's primary acoustic measurement facility in the Pacific Ocean.





Since March 1992, the U.S. Navy has conducted research, development, test and evaluation activities ("testing activities") at the Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Measurement Facility (SEAFAC), located in the Western Behm Canal near Ketchikan, Alaska (see Figure 1).

SEAFAC is the Navy's only West Coast facility for measuring sound generated by vessels, called "acoustic signatures." All measurements are passive in nature with no active emissions. These measurements enable the Navy to identify the sources of sound on the vessel (typically a submarine or surface ship), assess its vulnerability and develop quieting measures. The testing activities conducted at SEAFAC assist in maintaining the United States' superiority in submarine stealth technology, preserving submarines' tactical advantage and protecting its survivability against threats. Stealth is reduced with the use of active acoustics, which reveals a submarine's position. Measuring the output of mid-frequency active sonar is therefore not conducted at SEAFAC. Activities conducted at SEAFAC are primarily for the U.S. Pacific Fleet.

continued on back page

The Navy's Southeast Alaska Acoustic Measurement Facility provides an ideal acoustic measurement site for vessels because of low levels of ambient noise and minimal noise interference.

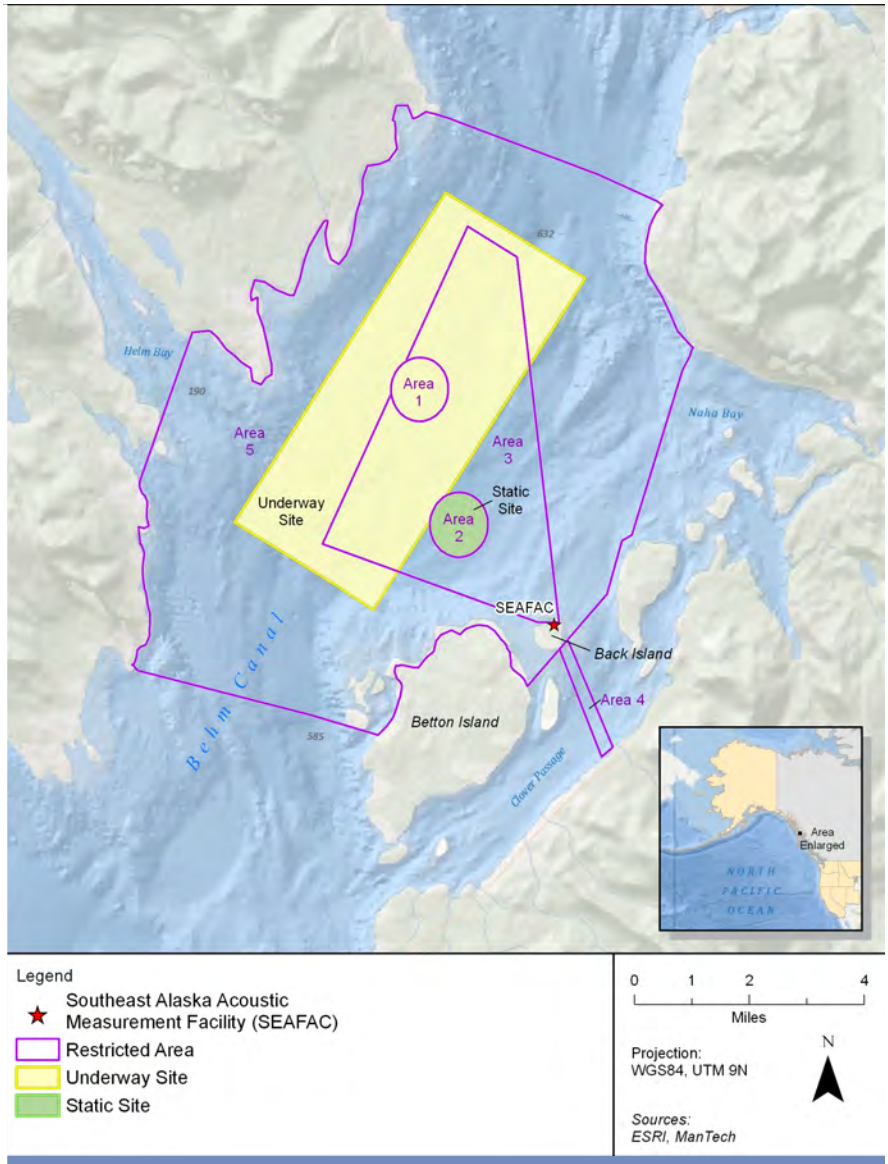


Figure 1. The Southeast Alaska Acoustic Measurement Facility consists of three major components in Western Behm Canal: the Underway Measurement Site, the Static Site, and the Back Island Operations Center and supporting facilities.

The Navy's Southeast Alaska Acoustic Measurement Facility is celebrating its 20th anniversary of the first acoustic measurement trial conducted at the facility.

To learn more about SEAFAC, visit: www.navsea.navy.mil/nswc/carderock/pub/who/sites/seafac.aspx

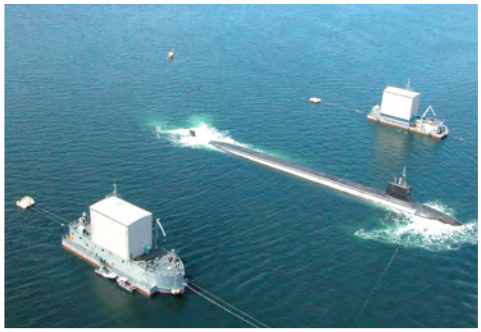
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SEAFAC provides an ideal acoustic measurement site for Navy and other military and civilian vessels because of low levels of surrounding (ambient) noise and minimal noise interference. SEAFAC consists of the following components:

- Underway Measurement Site
- Static Site
- Back Island Operations Center and supporting facilities

These components are within the restricted areas of Behm Canal. The areas are restricted to ensure vessel safety (submarine, surface ship and civilian craft), reduce sound from non-participating vessels and protect the Navy's sensitive in-water acoustic instruments and associated cables.









ACOUSTIC MEASUREMENTS AT SEAFAC

Submarines are critical assets used by the Navy to defend the United States and its interests, and the stealth of a submarine is of the utmost importance. SEAFAC ensures the highest level of stealth by measuring the precise level of sound emitted from a submarine.

The Navy uses in water sensors (hydrophones) to passively acquire acoustic signatures into an electronic format to allow for real-time analysis and evaluation of shipboard systems.

SEAFAC has two sites to acquire these acoustic signatures: the Underway Measurement Site and the Static Site. The data acquired at both sites are relayed to the Operations Center where Navy scientists and engineers process the signatures, analyze the results and determine the source of the sound, which occurs real-time.

Underway Measurement Site

The Underway Measurement Site acquires the signature of the ship while it is moving through the water. Measurements during movement ensure that propulsion and flow noises can be captured. The measurement process is slow and takes about 30 minutes to conduct 6 minutes of data acquisition for every single measurement. The remainder of the time is spent repositioning the ship for the next measurement. Typically, a submarine will spend two to five days conducting underway testing.

Static Site

At the Static Site, suspension barges lower the submarine on cables to hold it in a stable position. The Submarine can be suspended at various depths to evaluate how sea pressure affects the acoustic signature. The Static Site primarily measures the signature of rotating equipment onboard the vessel. The vessel does not have to maneuver so the testing can be conducted more rapidly. Also, better communication lines exist between the vessel and the Operations Center, therefore, the testing is more controlled and efficiently conducted. Typically, the submarine will spend one to seven days conducting Static Site testing.

Public Safety Measures

The location of the Southeast Alaska Acoustic Measurement Facility (SEAFAC) in Behm Canal, an isolated glacial fjord, provides ample room to maneuver in a low ambient noise environment, which is ideal for navigation safety and acoustic measurements.

For in-water testing activities conducted at SEAFAC, the Navy works with the U.S. Coast Guard to maintain law enforcement and safety. Prior to testing activities, the Navy informs Canadian authorities of submarines transiting Canadian waters en route to Ketchikan, Alaska. Other established notification procedures inform the Coast Guard, the Federal Aviation Administration, mariners, fisheries, the media and local agencies of upcoming testing activities.

MARCH 2012
PRINTED ON RECYCLED PAPER

Naval Arctic Research Laboratory
Utqiaġvik (Barrow), Alaska

Airstrip Site (Site 5)

Imikpuk Lake Drinking Water Investigation

September 2017

The Navy has developed a proactive policy to assess past releases of per- and polyfluoroalkyl substances, commonly known as PFAS, specifically perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). These substances may be present in the soil, groundwater, and/or surface water at Navy sites as a result of historical firefighting activities using aqueous film forming foam (AFFF), such as responses to crashes, equipment testing, and training. Imikpuk Lake is near an AFFF source area at the former Naval Arctic Research Laboratory (NARL) facility where AFFF use is documented (Figure 1). Imikpuk Lake used to be the primary drinking water source for the Ukpeaġvik Iñupiat Corporation-NARL (UIC-NARL) facility. The UIC-NARL facility currently obtains drinking water from the Barrow Utilities and Electric Coop Inc (BUECI) water treatment plant, which uses the Isatkoak Reservoir as the drinking water source for the City of Utqiaġvik (Barrow). Water from Imikpuk Lake is periodically used as an alternate drinking water source by elders, hunters, and fishers in the area and, therefore, was sampled as part of the Navy's effort to assess PFAS exposure in drinking water. ***Out of concern for the community, the Navy is assessing exposure to certain PFAS compounds in surface water in Imikpuk Lake that is periodically used as drinking water before investigating PFAS on Navy property.***

Figure 1



Historically, fuel spills occurred at the NARL Airstrip Site. In 1970, 400 gallons of aviation gasoline were spilled in the Navy hangar (Building 136). The Navy's fire department covered the fuel with foam to remove the threat of fire.

IMIKPUK LAKE SURFACE WATER SAMPLING

The Navy conducted surface water sampling at Imikpuk Lake in July 2017 near the NARL to determine whether PFAS were present at concentrations above the EPA lifetime health advisory (LHA). The results of the five surface water samples collected revealed four samples with PFOA detected above the EPA LHA (greater than 70 parts per trillion [ppt]); all five samples had PFOS and combined PFOS and PFOA detected above the EPA LHA (greater than 70 ppt) (see Figure 2).

BACKGROUND

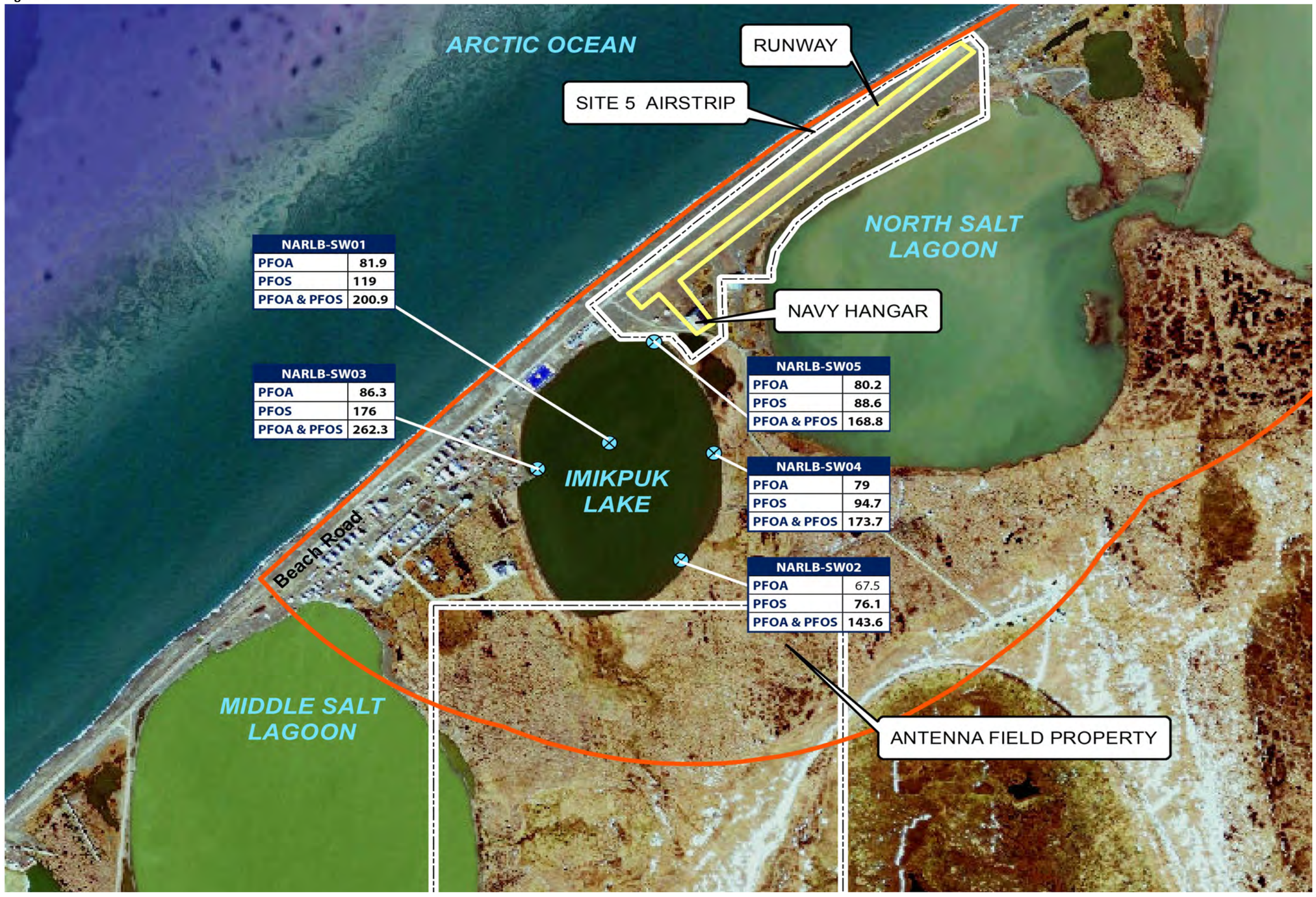
PFAS are manufactured chemicals that have been used since the 1950s in many household and industrial products because of their stain- and water-repellant properties. PFAS are now present virtually everywhere in the world because of the large amounts that have been manufactured and used. Once these compounds are released to the environment, they break down very slowly.

Based on these results, it is not recommended to use Imikpuk Lake as a drinking or cooking water source at this time.

It is not recommended to use Imikpuk Lake as a drinking or cooking water source at this time.

All five samples contained PFOS and/or PFOA above the EPA lifetime health advisory level of 70 parts per trillion.

Figure 2



Legend

- Surface Water Sampling Locations
- Site Boundary (suspected source)
- Site 5 – 1-mile zone
- Navy Property Boundary

Notes:

All concentrations are reported in parts per trillion (equivalent to nanograms per liter).

Bold indicates a PFOS and/or PFOA concentration above the EPA lifetime health advisory of 70 ppt combined.

N

0 0.2 0.4 mile

PFAS are "emerging" contaminants, which have no Safe Drinking Water Act regulatory standards or routine water quality testing requirements at this time. The EPA is currently studying PFAS to determine if regulation is needed. In May 2016, the EPA released lifetime health advisory levels for two PFAS. ***Health advisory levels are not regulatory standards. They are health-based concentrations which should offer a margin of protection for anyone throughout his or her life from adverse health effects resulting from exposure to PFOS and PFOA in drinking water.*** The EPA health advisory level for lifetime exposure is 70 ppt for PFOS and 70 ppt for PFOA. When both PFOS and PFOA are found in drinking water, the combined concentrations should also not exceed 70 ppt. This investigation focuses on PFOA and PFOS because these are the only PFAS with EPA lifetime health advisory levels in drinking water.

The Navy performed this sampling in coordination with partners such as Agency for Toxic Substances and Disease Registry Region 10, Alaska Department of Health and Social Services, Alaska Department of Environmental Conservation, North Slope Borough, Native Village of Barrow, and UIC.

NAVY POLICY

The Navy has developed a proactive policy to assess potentially impacted drinking water and eliminate unacceptable exposure to PFOS and/or PFOA near installations where there were known or suspected releases of PFAS to the environment. Navy policy is to sample drinking water sources 1 mile downgradient (in the direction of groundwater flow) from a known or suspected release of PFAS. Sampling in this area will allow the Navy to identify if the community has been exposed to PFOS and/or PFOA in drinking water above the EPA lifetime health advisory levels.

ACTIONS BASED ON RESULTS

The results of samples collected in July 2017 show that Imikpuk Lake water contains PFOS and PFOA above the EPA lifetime health advisory. Based on these results, it is not recommended to use Imikpuk Lake as a drinking or cooking water source at this time.

Our first priority was to determine if PFOS and/or PFOA were present in Imikpuk Lake above the EPA lifetime health advisory. The Navy will complete an investigation to determine and assess the extent of contamination, evaluate the potential for risk, and develop appropriate response actions following federal and state environmental regulations and guidance.

HEALTH INFORMATION

Exposure to PFOS and PFOA appears to be global. Studies have found both compounds in the blood samples of the general population. Studies on exposed populations indicate that PFOS and/or PFOA may cause elevated cholesterol levels and possibly low infant birth weight. In studies conducted using laboratory animals, effects on developmental, neurological, immune, thyroid, and liver function were observed. Evidence linking PFOS and/or PFOA with cancer is inconclusive.

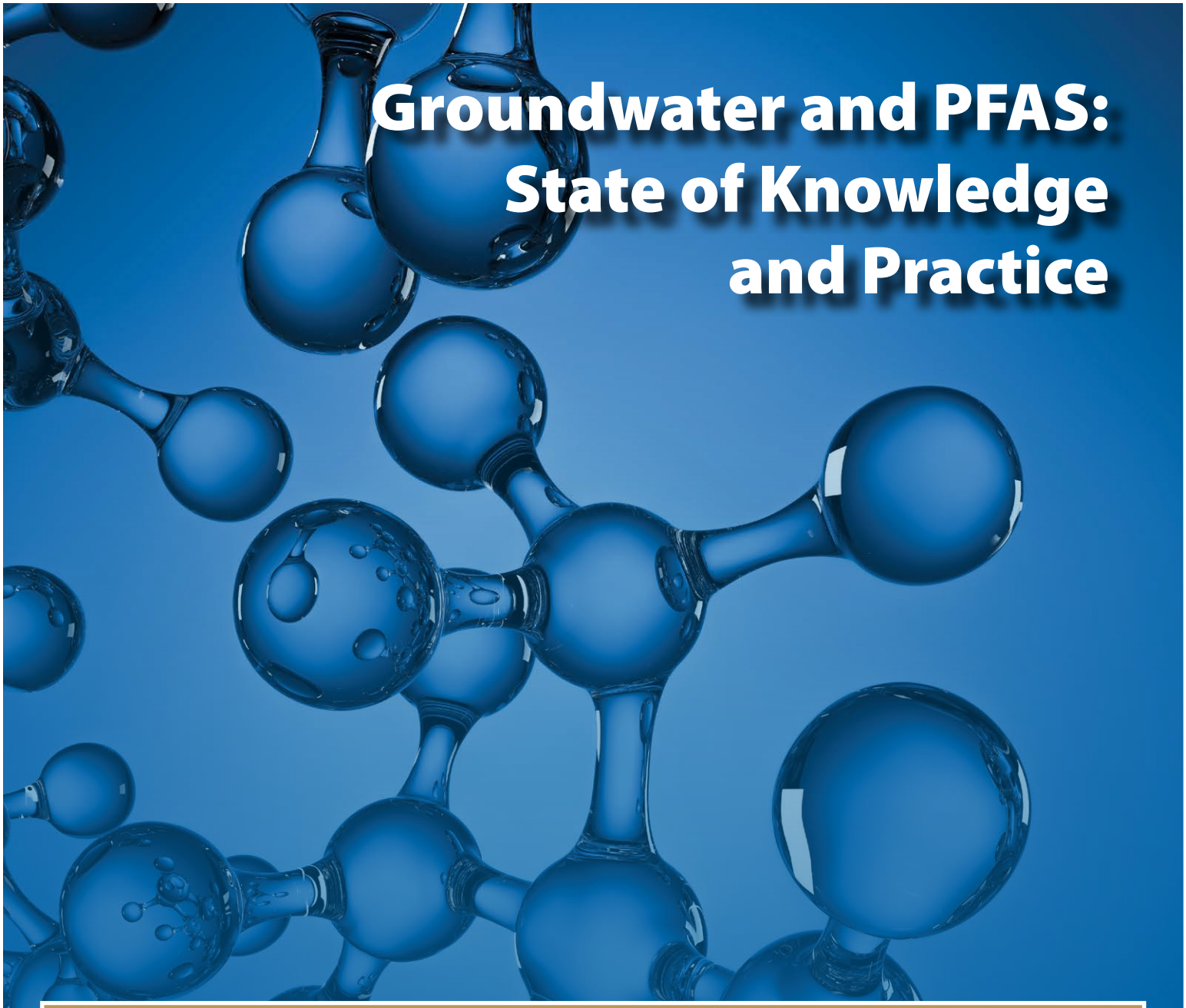
Health effects from exposure to low levels of PFAS are not well known and studies are continuing. At this time, it is not possible to link exposures to PFOS and/or PFOA to a person's individual health issues. Blood tests are available to measure these chemicals, but they are not routinely done because the results can be inconclusive and test results do not predict health effects. Long-term exposure effects are still being investigated by the EPA.

Based on what is known and still unknown about PFOS and PFOA, the EPA recommends that people not drink or cook with water that contains these compounds above the EPA's lifetime health advisory levels. This investigation focuses on PFOS and PFOA because these are the only PFAS for which the EPA has established a lifetime health advisory level in drinking water.

For more information, visit
www.secnav.navy.mil/eie/pages/pfc-pfas.aspx

The Navy has established the following website to keep you updated as more information becomes available:
https://navfac.navy.mil/PFASBARROW

If you have specific questions, please contact the Navy Public Affairs Office by leaving a voicemail at **360-396-1030** *or by sending an email to* **PAO_feedback@navy.mil**.



Groundwater and PFAS: State of Knowledge and Practice

Human and Ecological Impacts
Section 3

One of eight sections prepared by National Ground Water Association volunteers. Each section was prepared to stand independently, or to be integrated with the other seven sections.

NGWA℠ The Groundwater Association Press

Human and Ecological Impacts

INTRODUCTION

Poly- and perfluoroalkyl substances—collectively referred to as PFAS—are terms used to describe a large group of organic fluorinated alkanes.[1] In the perfluoroalkyls, all hydrogen atoms attached to carbons in the aliphatic chain have been replaced by fluorines.[2] The polyfluoroalkyls have at least one carbon on the alkane that is not fully fluorinated (Buck et al. 2011).

Over many decades of use, thousands of PFAS have been synthesized and used in a wide range of industrial and consumer applications (Lindstrom et al. 2011; Kirsch 2013). These applications include firefighting foams, metal plating and finishing, textile coatings, paper packaging, and as processing aids in fluoropolymer manufacturing. PFAS enter the environment following industrial releases, use of PFAS-containing firefighting foam, the use and disposal of industrial and consumer articles and the discharge of treated municipal effluent (UNEP 2015).

The six PFAS addressed in this document were selected based on their inclusion in the USEPA's Third Unregulated Contaminant Monitoring Rule (UCMR3), a program conducted under the Safe Drinking Water Act (SDWA) to develop information on the occurrence of unregulated contaminants in public water systems (USEPA 2012a). The six PFAS are categorized as either perfluoroalkyl carboxylic acids(PFCAs) or perfluoroalkyl sulfonic acids (PFSAs).

The PFCAs perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), and perfluoroheptanoic acid (PFHpA) are perfluoroalkl acids that contain a fully fluorinated carbon chain of seven, eight, or six carbons, respectively, and a terminal carboxylic acid functional group.[3] The PFSAs perfluorooctane sulfonate (PFOS), perfluorohexane sulfonate (PFHxS),and perfluorobutane sulfonate (PFBS) contain a perfluorinated alkyl carbon chain of eight, six, and four carbons, respectively, and a terminal sulfonate or sulfonic acid group.

Table 3.1 provides a list of the PFAS addressed in this section: their acronyms, chemical abstract service (CAS) registry numbers, and molecular formulas.

PHYSICAL AND CHEMICAL PROPERTIES

Many of the chemical and physical properties of PFAS that have made them commercially valuable as surfactants also determine their potential for partitioning, persistence, and accumulation in the environment and in biota. The PFAS listed in Table 3.1 have low pKa's[4], and as a result, these PFAS tend to exist in their ionic (charged) forms in environmental and biotic media (Conder et al. 2008; CONCAWE 2016). These characteristics also contribute to their relatively high aqueous solubility. The fluorinated carbon chain of the PFCAs and PFSAs is hydrophobic and lipophobic, and in combination with the carboxylate and

Disclaimer: This publication is a collaborative effort to try to set forth best suggested practices on this topic but science is always evolving, and individual situations and local conditions may vary, so members and others utilizing this publication are free to adopt differing standards and approaches as they see fit based on an independent analysis of such factors. This publication is provided for informational purposes only, so members and others utilizing this publication are encouraged, as appropriate, to conduct an independent analysis of these issues. The NGWA does not purport to have conducted a definitive analysis on the topic described in this publication, and it assumes no duty, liability or responsibility for the contents or use of the publication.

[1] An alkane is a molecule in which all of the carbon-carbon bonds are single. An alkyl is an alkane where at least one hydrogen has been replaced by a non-hydrogen atom or molecule. An alkyl has the general formula CnH2n+1; the perfluoroalkyls have the basic formula CnF2n+1– (Buck et al. 2011).

[2] Except those hydrogen atoms whose substitution would modify the nature of any functional groups present (Buck et al. 2011).

[3] A carboxylic acid functional group has the molecular formula COOH. A sulfonic acid functional group has the molecular formula SO3H.

[4] The pKa is a measure of the tendency of an acid (in this context, the perfluorocarboxylic and perfluorosulfonic acids) to dissociate in solution (i.e., the aqueous environment). In general, a low pKa indicates that an acid dissociates fairly readily to form the corresponding positively and negatively charged chemical species. For example, PFOA will dissociate to form F(CF2)7COO- and H+.

Table 3.1. Name, acronyms, and molecular formulas of PFAS.

Name	Acronym	CAS Registry Number	Molecular Formula
Perfluoroalkyl Carboxylic Acids	**PFCAs**		
Perfluoroheptanoic Acid	PFHpA	375-85-9	F(CF2)6COOH
Perfluorooctanoic Acid	PFOA	335-67-1	F(CF2)7COOH
Perfluorononanoic Acid	PFNA	375-95-1	F(CF2)8COOH
Perfluoroalkyl Sulfonates/ Perfluoroalkyl Sulfonic Acids	**PFSAs**		
Perfluorobutane Sulfonate	PFBS	375-73-5	F(CF2)4SO3H
Perfluorohexane Sulfonate	PFHxS	432-50-8	F(CF2)6SO3H
Perfluorooctane Sulfonate	PFOS	1763-23-1	F(CF2)8SO3H

sulfonate functional groups, imparts amphiphilic and surfactant characteristics to these compounds.[5]

Because of the amphiphilic properties of many PFAS, they do not preferentially partition to lipids, but instead tend to bind to proteins. In humans, the highest concentrations have been detected in serum and liver, and to a lesser extent, the kidney and other organs. The carbon-fluorine bond is extremely strong and renders many PFAS resistant to biotic and abiotic degradation (ECHA 2013; CONCAWE 2016). However, PFAS precursors can degrade to terminally stable PFAS such as PFOA and PFOS that are resistant to further degradation (Buck et al. 2011).

Buck et al. (2011) defines PFAS precursors as large functional derivatives and polymers that contain a perfluoroalkyl moiety and degrade in the environment to form PFOS, PFOA, and similar substances that are stable and resistant to further degradation.

Bioaccumulation

Octanol-water partition coefficients (Kow) can be used as a predictor of bioaccumulation, as they provide a measure of the extent to which a chemical partitions between water and lipid. In general, partitioning to lipids is associated with the potential to persist and bioaccumulate, because of the limited metabolic capacity and blood flow of lipid tissue. Given the amphiphilic nature of many PFAS, determination of Kow's is not experimentally feasible. Thus, while Kow's have been calculated for PFAS (see e.g., CONCAWE 2016), it is not clear that they provide a meaningful predictor of the potential of PFAS to accumulate or biomagnify (Conder et al. 2008; ECHA 2013; UNEP 2015; CONCAWE 2016).

The potential for bioaccumulation is typically assessed by empirical measurements of bioconcentration factors (BCFs) bioaccumulation factors (BAFs), biomagnification factors (BMFs), and trophic magnification factors (TMFs). These terms are defined in Appendix 1, which also provides a summary and interpretation of reported values for the PFAS addressed in this section. As can be seen from the range of values shown in that Appendix, the bioaccumulation of PFAS (data are primarily for PFOA and PFOS) depends on whether the organism is aquatic or terrestrial, on the organism's trophic level, and on whether it has lungs or gills (ECHA 2013; CONCAWE 2016).

- PFOS, but not PFOA or PFBS, bioconcentrates in fish.
- PFOS bioaccumulates in fish but not in zooplankton or bivalves.
- PFOA does not bioaccumulate in phytoplankton, bivalves, or fish.
- Both PFOS and PFOA biomagnify in multiple species.
- Trophic magnification of PFOA occurs in air-breathing aquatic species but not in species with gills.

The Stockholm Convention Persistent Organic Pollutants Review Committees for PFOS (OECD 2002) and PFOA (UNEP 2015) considered the weight of evidence sufficient to support conclusions that both PFOS and PFOA are bioaccumulative. Accumulation of PFNA in wildlife is well documented (see section on Exposure of Ecological Receptors). Although there are few empirical data on the potential bioaccumulation of PFBS, PFHpA, and PFHxS, a review of published

[5]An amphiphilic compound has both hydrophilic and lipophilic properties, and as a result, does not fully solubilize in either medium. In biological systems, these compounds tend to partially partition to both aqueous and lipid compartments.

values indicates that in general, BAFs and BCFs increase with the number of fluorinated carbons (Conder et al. 2008).

HUMAN EXPOSURE

As previously discussed, PFAS, including PFOA and PFOS, are often characterized as persistent since many are extremely resistant to typical environmental degradation processes. They do not hydrolyze, photolyze, or biodegrade under environmental conditions (USEPA 2012b), resulting in widespread human exposure.

Human exposure to these chemicals can occur through the following pathways:

- Ingestion of PFAS-containing food, either directly contaminated (food grown on contaminated soils, fish caught from contaminated waters) or indirectly (food contaminated from PFAS-treated food paper wrappings such as pizza boxes, sandwich wrappers, popcorn bags, etc.)
- Ingestion of PFAS in drinking water
- Occupational exposure
- Direct contact through the use of consumer products containing PFAS
- Personal care products (e.g., dental floss, cosmetics)
- Inhalation of ambient air and dust, or contact with PFAS-contaminated soils.

Currently, the relative importance of the different human routes of exposure, to the general population, to these compounds is not well established.

Due to the ubiquitous use of PFAS in a variety of products and industrial applications, it is estimated that PFAS exposure is widespread throughout the US population. Multiple biomonitoring studies have estimated that greater than 95% of the general population have been exposed to select PFAS (CDC 2009; Olsen et al. 2005, 2007, 2008, 2012; Biomonitoring California 2016).

In 2002, 3M Company, a principal manufacturer of PFOS at that time, discontinued production of PFOS and related chemicals. In 2006, the USEPA launched the PFOA Stewardship Program. The goals of the program for member companies were to commit to a 95% reduction in emissions of PFOA, precursor chemicals, and product content levels and to work toward eliminating these chemicals from emissions and products by 2015. Under the Stewardship Program and through the Toxic Substances Control Act (TSCA), as of 2015 EPA will have removed or restricted approximately 300 distinct PFAS from the market (USEPA 2016a).

Calafat et al. (2007) and Olson et al. (2005, 2007, 2008, 2012) have evaluated the temporal trend of PFAS concentrations in blood plasma. Data from the NHANES study (Calafat et al. 2007) and from Olson and coworkers' evaluation of PFAS serum concentrations of adult American Red Cross blood donors have shown that serum concentrations of PFOS, PFOA, and PFHxS have declined following reduction of PFOS and related chemical production. Olsen et al. (2012) determined the decline in PFOS serum concentrations suggest a population halving time of 4.3 years which is generally consistent with a PFOS excretion half-life of 4.5–7.4 years (Harada et al. 2005).

A discussion of the potential routes of human exposure and the relative importance of each route follows in the discussion below.

Water Use

PFOS and PFOA have been widely detected in surface water including rivers, lakes, and streams (Boulanger et al. 2004, 2005; Kim and Kannan 2007; Nakayama et al. 2007; Lasier et al. 2011), and in groundwater in the United States (USEPA 2017a, NJDWQI 2016; ATSDR 2016a). PFHpA and PFHxS were commonly detected in the few studies that analyzed surface water for these compounds (Kim and Kannan 2007; Nakayama et al. 2007; Simcik and Dorweiler 2005). Reported concentrations of PFAS in surface water samples are generally below 50 nanograms (ng)/L (ATSDR 2015).

Surface water contamination can occur as a result of wastewater discharge from PFAS manufacturing (Davis et al. 2007; USEPA 2008), from municipal wastewater facilities (Boulanger et al. 2005; Sinclair and Kannan 2006), through the use of PFAS containing firefighting foam at military installations and firefighting training facilities (Moody and Field 1999; Moody et al. 2003; ATSDR 2016a), and potentially through the land application of biosolids contaminated with PFAS (Higgins et al. 2005; Lindstrom et al. 2011; Yoo et al. 2009; Washington et al. 2009a, b; USEPA 2011; Yoo e al. 2011; Sepulvado et al. 2011; Venkatesan and Halden 2013; Armstrong et al. 2016).

The USEPA uses the UCMR program to collect data for contaminants suspected to be in drinking

Table 3.2. Summary of UCMR3 data[1] (January 2017).

Contaminant	MRL (µg/L)	# PWSs with Results > MRL	HA (µg/L)	# PWSs with Results > HA
PFOA	0.02	117/4920	0.07	13
PFOS	0.04	95/4920	0.07	46
PFNA	0.02	14/4920	No Value	Not Applicable
PFHxS	0.03	55/4920	No Value	Not Applicable
PFHpA	0.01	86/4920	No Value	Not Applicable
PFBS	0.09	8/4920	No Value	Not Applicable

[1] January 2017 UCMR3 Data Summary for Chemical Contaminants, USEPA 2017.
MRL = UCMR Minimum Reporting Level; HA = Health Advisory

water, but do not yet have health-based standards set under the Safe Drinking Water Act (SDWA). The USEPA develops a new list of UCMR contaminants every five years. Under the third revision to UCMR (UCMR3), the USEPA began testing public water supplies (PWSs) in 2013 for six PFAS; the agency's data provides the most comprehensive population-based data set of PFAS occurrence in drinking water. Table 3.2 summarizes the UCMR data as of January 2017.

In 1035 samples of raw and finished PWS water in New Jersey, PFOA was the most frequently detected PFAS. It was detected in 65% of 72 public water supplies, with the highest detection in finished water of 100 ng/L, and at least one sample with concentrations exceeding 40 ng/L in 17% of the public water supplies tested (NJDWQI 2016).

One of the most robust studies investigating PFAS exposure due to groundwater contamination is the C8 Health Project which was created, authorized, and funded as part of the settlement agreement reached in the case of *Jack W. Leach et al. v. E.I. du Pont de Nemours & Company* (no. 01-C-608 W.Va., Wood County Circuit Court, filed 10 April 2002). Industrial discharges of PFOA to the atmosphere with subsequent deposition and leaching into groundwater, as well as direct releases into the Ohio River, led to groundwater contamination over six water districts (Frisbee et al. 2009). The C8 Health Project published a series of Probable Link Reports which, based upon the available scientific evidence, linked PFOA exposure to a number of human diseases including diagnosed high cholesterol, testicular and kidney cancer, ulcerative colitis, thyroid disease, and pregnancy-induced hypertension. The C8 Science Panel did not find a link between PFOA exposure and other types of cancers reviewed in the study, birth defects, miscarriage or stillbirth, preterm birth or low birth rates, Type II diabetes, stroke, asthma or chronic obstructive airway disease, neurodevelopmental disorders in children, common infectious or autoimmune disorders, Parkinson's disease, osteoarthritis, liver disease, chronic kidney disease or coronary artery disease (C8 Science Panel 2013; Looker et al. 2014).

Drinking Water

Biomonitoring studies have shown drinking water can be a significant source of exposure among populations whose water is impacted with PFAS contamination (Frisbee et al. 2009; Hoffman et al. 2011; ATSDR 2013; MN DOH 2009; NH DHHS 2016), often resulting in PFAS serum concentrations above those measured in the general population (CDC 2009). Frisbee et al. (2009) and Hoffman et al. (2011) conducted biomonitoring as part of the C8 Health Project. Frisbee and coworkers evaluated data for 66,899 study participants and found that four PFAS (PFHxS, PFOS, PFOA, PFNA) were detectable in >97% of the serum samples. The geometric mean PFOA serum concentrations were approximately 8.5 times higher in the C8 study population as compared to the NHANES study population. Concentrations of PFHxS, PFOS, and PFNA were comparable between the two groups (Frisbee et al. 2009; CDC 2009). In a subset of the C8 Study population, Hoffman and coworkers used a pharmacokinetic model to evaluate the relationship between drinking water and serum PFOA levels. The authors concluded that for each 1 µg/L increase in PFOA water concentration, there was a 141.5 µg/L (95% confidence interval, 134.9–148.1)

increase in serum concentration. The steady-state serum:drinking water ratio from the pharmacokinetic model was calculated to be 114 (Hoffman et al. 2011).

Less is known however, as to whether drinking water is a significant route of PFAS exposure among the general population. Hurley et al. (2016) determined there was an association between PFOS and PFOA serum concentrations in women and concentrations of these compounds in public drinking water supplies. Study participants were linked to UCMR3 public water drinking supply PFAS results through residential zip code. It was determined that 40% of the combined concentrations of PFOS and PFOA exceeded the USEPA Drinking Water Health Advisory (HA) of 0.07 µg/L (USEPA 2016c, d). The investigators found median serum concentrations of PFOS and PFOA were 29% and 38% higher, respectively, among those with detectable levels of PFOS and PFOA in water compared to those without detectable levels.

Dermal: Studies have shown very limited absorption of PFAS through the skin, and thus routine exposures such as during showering or bathing, or through recreational activities such as swimming or wading will not likely cause significant exposure to PFAS (ATSDR 2016b; MDDOH 2016).

Although there is experimental evidence PFOA is dermally absorbed in experimental animals (Kennedy 1985; O'Malley and Ebbens 1981), it is not expected to be a significant route of exposure (Fasano et al. 2005). Studies measuring the dermal penetration of PFOA in preparations of isolated rat, mouse, and human epidermis have indicated that the rodent skin may be more permeable to PFOA than human skin (Fasano et al. 2005; Franko et al. 2012). Franko et al. (2012) found that approximately 24% of a dermal dose of PFOA (0.5 mg in 1% acetone) was absorbed across isolated full thickness human skin in 24 hours and 45% of the dose was retained in skin, while Fasano et al. (2005) found that following application of the ammonium salt of PFOA to isolated human or rat epidermis (approximately 30 mg ammonium PFOA/cm2), approximately 1.44% was absorbed across rat epidermis, while only 0.048% of the dose was absorbed across human epidermis. Fasano et al. (2005) estimated the dermal penetration coefficient to be 9.49 $x10^{-7}$ cm/hour in the isolated human epidermis and 3.25 $x10^{-5}$ cm/hour in the isolated rat epidermis. There are little to no data available on the dermal absorption of other PFAS but they are expected to be similar to PFOA.

Incidental Ingestion: There is no information regarding exposure to PFAS through incidental ingestion during routine activities such as showering, bathing, or brushing teeth. It has been recommended by various state agencies to avoid ingestion of PFAS-contaminated water during these activities in order to reduce exposure. However, the incidental ingestion of PFAS during showering, bathing, or brushing teeth is not expected to be a significant source of exposure due to the negligible amount of water ingested (NJDOH 2016; AKDHHS 2015; MNDOH 2016; VT ANR DOH 2016). There is no information regarding exposure to PFAS through incidental ingestion during recreational activities such as swimming. However, the incidental ingestion of PFAS during recreational activities such as swimming is not expected to be a significant source of exposure due to the negligible amount of water ingested.

Soil

There is little information regarding background concentrations of PFAS in soil (ATSDR 2015) and the one limited study found concentrations to be very low or below detection limits (Washington et al. 2009a). Soil contamination tends to occur at manufacturing sites of producers and users of PFAS (3M 2007, 2008), where aqueous film forming (AFFF) type firefighting foams have been used or where disposal of treated products has occurred (e.g., landfills) (USEPA 2016c, d), and potentially where biosolids containing PFAS are applied (Washington et al. 2009a, b; Sepulvado et al. 2011; Venkatesan and Halden 2013; Armstrong et al. 2016), or where contaminated groundwater is used for irrigation. Contaminated soils also can be transported offsite via water and wind.

Numerous military installations and firefighting training areas have PFAS contamination due to the use of AFFF-type fire suppression agents (Moody and Field 1999; Moody et al. 2003; ATSDR 2016a, ASTSWMO 2015). Soil contamination with resultant groundwater contamination can occur through direct application or through spray drift.

The use of PFAS-contaminated biosolids as a soil amendment and the use of contaminated groundwater for irrigation may result in the contamination of soils and therefore may also result in the indirect

contamination of produce and domestic animal feed grown on contaminated soils. PFAS have been detected in biosolids samples (Washington et al. 2009a; Sepulvado et al. 2011; Venkatesan and Halden 2013; Armstrong et al. 2016) as a result of wastewater plants having received PFAS-containing industrial waste (USEPA 2011a; Yoo et al. 2009; Yoo et al. 2011). Concentrations in biosolids are expected to decline because of the phaseout of the use of PFOS and PFOA in manufacturing and industrial processes.

Incidental Ingestion: Incidental ingestion of soils represents a potential exposure route for PFAS

Dermal: As discussed in the previous sections, the dermal absorption of PFOS is slow and not significant. Although there are little to no data on other PFAS, dermal absorption is also expected to be insignificant.

Inhalation of re-suspended soil particulates: There is no information available regarding exposure through the inhalation of re-suspended soil particulates. However, this pathway is not expected to be a relevant exposure pathway to the general population unless located near contaminated soil sites or near agricultural fields where PFAS-contaminated biosolids were applied as a soil amendment.

Ambient air and dust

PFOA and PFOS are not volatile and airborne fractions are primarily bound to aerosol particles (Trudel et al. 2008; USEPA 2016c, d; ATSDR 2015). These compounds can be released into the atmosphere from fluoropolymer manufacturing and industrial and municipal waste incinerators (ATSDR 2015; USEPA 2016c, d). They can be transported long distances through the atmosphere and have been detected globally at low concentrations (Jahnke et al. 2007).

PFOS has been detected in samples collected over the Atlantic Ocean east of southern Africa. Shoeib et al. (2006) detected PFAS concentrations crossing the North Atlantic and the Canadian Arctic Archipelago. However, although air maybe a potential source of exposure, it is considered an insignificant exposure pathway.

PFAS have been measured in indoor dust in residential, commercial, and office settings because of their use in carpets, textiles, paint, furniture, and other consumer products. Strynar and Lindstrom (2008) detected nine PFAS in indoor dust samples collected from homes and daycare centers in Ohio and North Carolina. PFOS and PFOA were the most commonly detected (94.6% and 96.4% of samples, respectively) with maximum detections of 12,100 ng/g for PFOS and 35,700 ng/g for PFOA. Incidental exposure from indoor dust is an important exposure route, particularly for small children because of their hand-to-mouth behaviors (USEPA 2016c, d).

Food

Food is a significant source of exposure to PFAS (Trudel et al. 2008; ATSDR 2015; Lindstrom et al. 2011; Vestergren and Cousins 2009; ASTSWMO 2015), and modeling has indicated that 90% of human exposure to PFOS and PFOA may be through ingestion of contaminated food (Fromme et al. 2009). PFOA has been detected in a variety of foods including snack foods, vegetables, meat, dairy products, human breast milk, and fish. PFOS has been detected in eggs, milk, meat, fish, root vegetables, and human breast milk. Occurrence in food products can result from the use of contaminated water in processing and preparation; growth of food in contaminated soils (e.g., in areas that receive biosolids soil amendments from wastewater treatment plants); direct and indirect exposures of domestic animals to PFAS from drinking water and consumption of feed crops grown in contaminated soil; fish tissue bioaccumulation from contaminated waterways; and food packaging materials containing PFAS (Hag et al. 2011; Lindstrom et al. 2011; Sepulvado et al. 2011; Venkatesan and Halden 2013; Armstrong et al. 2016; ATSDR 2015; Forns et al. 2015; USEPA 2016c, d).

Infants can be exposed to PFAS compounds through the ingestion of breast milk and through the ingestion of formula or cereals made with contaminated drinking water or cross contaminated through migration from packaging and containers (Tao et al. 2008, Hag et al. 2011, Fromme et al. 2010; Liorca et al., 2010). Studies have shown breast milk is a significant exposure route for infants to PFAS. A study of PFAS content in breast milk was conducted by Tao et al. (2008). PFOS and PFOA were the predominant PFAS compounds found in the analysis of 45 breast milk samples, with mean concentrations of 131 pg/mL and 43.8 pg/mL, respectively. Hag et al. (2011) have shown breast milk contributed greater than 94% of total PFOS exposure in 6-month-old infants, and greater than 83% of PFOA exposure. Fromme et al. (2010) determined that the resultant body burden at

age six months was similar to (PFOS) or higher (PFOA) than that found in adults after evaluating measured PFAS content of maternal blood during pregnancy and six months after delivery, in cord blood, and in blood of infants at six months and nineteen months after birth, as well as in monthly breast milk samples.

Liorca et al. (2010) evaluated commercial formulas and food purchased from a retail store. Six PFAS compounds, including PFOS and PFOA, were detected in all brands of infant milk formulas and baby food cereals analyzed. It was hypothesized that the presence of the PFAS compounds could be associated with possible migration from packaging and containers during processing.

Some studies suggest the consumption of fish from contaminated waters may be a major source of human exposure to PFOS (Trudel et al. 2008; Fromme et al. 2009; Domingo 2012). PFOS has been shown to bioaccumulate readily in fish, appears to have the highest bioaccumulation potential of the PFAS in food webs, and is the predominant PFAS detected in fish tissue (Houde et al. 2011). In a study of PFAS concentrations in fish and surface water in New York State, although PFOA was typically found at higher concentrations in water than PFOS, measured concentrations of PFOS in fish tissue were approximately 9,000-fold greater than the levels detected in surface water (Sinclair et al. 2006). The USEPA national screening study of PFAS in freshwater fish determined 80% of samples of urban river fish tissue samples and 100% of Great Lake fish tissue samples contained some detectable PFAS. PFOS was the most commonly detected PFAS in both fish populations; the maximum detected PFOS concentrations were 127 ppb and 80 ppb in river fish and Great Lake fish tissues, respectively (Stahl et al. 2014).

Exposure to PFAS-Containing Products

Consumer Products

Although not a primary exposure route, use of PFAS-containing consumer products may result in potential exposure. Some examples are listed as follows (ATSDR 2015; USEPA 2016c, d).

- Stain/water repellants on clothing, bedding materials, upholstered furniture, carpets, and automobile interiors (Walters and Santillo 2006; Lindstrom et al. 2011). These materials can be a particularly important exposure route for infants and children because of their hand-to-mouth behaviors.
- Cooking surfaces (PFOA)
- Toothpaste and dental floss, shampoos, cosmetics (PFOA)
- Polishes and waxes (PFOA)
- Paints, varnishes, sealants (PFOS, PFOA)
- Food containers and contact paper (PFOA and PFOS are impurities that can be found in some grease-proofing paper coatings [Begley et al. 2005])[6]
- Pesticides (PFOA)
- Textiles and leather (PFOS, PFOA)
- Plumbing tape (PFOA)
- Cleaning products (PFOS, PFOA).

Occupational Exposure

Occupational use of PFAS-containing products may result in potential exposure. Some examples are listed as follows (USEPA 2016c, d).

- Aqueous film forming foams (continuing use; used for firefighting) (PFOS, PFOA)
- Flame retardants (PFOS, PFOA)
- Aviation fluids (continuing use, PFOS)
- Metal plating and finishing (continuing use, PFOS)
- Lubricants/surfactants/emulsifiers (continuing use, PFOA)
- Semiconductor industry (PFOS)
- Oil and mining (PFOS)
- Electronics (PFOA)
- Photograph development (continuing use, PFOS).

Conclusions

As discussed, PFAS have been used in a variety of products and industrial applications, resulting in widespread exposure of the general population. Biomonitoring studies have estimated more than 95% of the U.S. population have been exposed to PFAS and have measurable concentrations in their blood. However, it should be noted these concentrations have been demonstrably decreased since the discontinuation of production of these chemicals in 2002. The greatest portion of chronic intake is likely from the ingestion of contaminated foods and drink-

[6] In January 2016, the Food and Drug Administration amended their food additive regulations to no longer allow for the use of perfluoroalkyl ethyl containing food-contact substances as oil and water repellants for paper and paperboard for use in contact with aqueous and fatty foods (USEPA 2016c, d).

ing water. Consumer products, recreational activities, ambient air, and soil exposures contribute to a lesser extent to the total chronic intake. Small children, however, experience higher exposure due to hand-to-mouth transfer of chemicals from treated carpets and indoor dust.

EXPOSURE OF ECOLOGICAL RECEPTORS

PFAS have been detected in the tissues of invertebrates, fish, birds, and mammals around the globe (Kelly et al. 2009; Butts et al. 2010; Houde et al. 2011; CONCAWE 2016). Much of the published tissue monitoring data for free-ranging wildlife are for PFCAs and PFSAs in fish-eating Arctic marine mammals (e.g., seals, dolphins, whales) and polar bears. Additionally, PFAS have been measured in multiple fish species from urban freshwater bodies in the U.S. (Delaware River Basin Commission 2009; Delinsky et al. 2011; Xiao et al. 2013), Korea (Lam et al. 2014), Germany (Holzer et al. 2011), Sweden (Ahrens et al. 2015), and numerous other countries. PFOS is the most frequently detected PFAS; has generally been measured at the highest concentrations; and is the dominant PFAS found in all species and locations around the world (Butt et al. 2010; Houde et al. 2011). PFOA, PFHpA, PFNA, and PFHxS have also been detected (Kelly et al. 2009; Houde et al. 2011; CONCAWE 2016). In the Arctic, PFNA (and perfluoroundecanoate) levels are generally second only to PFOS, with elevated levels of other longer-chain PFCAs observed in seabirds (Butt et al. 2010).

PFAS may be released to the aquatic environment from the discharge of effluent from wastewater treatment facilities, spills, commercial operations, or via groundwater seepage and surface water flow; however, the prevalence of PFOS and other PFAS in species such as polar bears, seals, and beluga whales is attributed to precursor volatilization and atmospheric degradation to these terminal stable species, followed by deposition to aquatic and terrestrial environments and food chain transfer (Houde et al. 2011; Government of Canada 2013).[7] The recent review by Houde et al. (2011) noted that PFAS accumulation in wildlife is common; long-chain PFCAs (C7-C12), especially the C8 PFOS and the C9 PFNA, have accumulated in seals, seabirds, and polar bears. These patterns have been observed in wildlife in Europe and Asia as well; in general, lower PFAS levels have been measured in wildlife from the Southern Hemisphere. The direct discharge of PFAS to the ocean from groundwater or surface water is partially mitigated by dilution and dispersion associated with tidal fluctuation, wave action, and currents. Additionally, the salinity of ocean water reduces the solubility of PFAS (USEPA 2014) and promotes its adhesion to sediments (Chen 2012), thus reducing its concentration in marine water. Consequently, emerging surface water criteria for marine waters are typically less stringent than for freshwater.

Wildlife Effects

PFOA wildlife tissue measurements made on samples collected from free-ranging wildlife species have made few correlations between tissue levels and adverse effects. The exceptions to this include Kelly et al. (2009) who calculated nursing beluga whale calves in Hudson Bay were exposed to PFOS via maternal transfer at concentrations (2.7×10^{-5}/8×10^{-4} mg/kg-d) that could be toxicologically significant, and Kannan et al. (2006). The latter established the mean concentrations of PFOA (69 ng/g) and PFOS (65 ng/g) in California sea otters were significantly associated with mortality from disease. Dietary exposures of mallard and quail to PFBS (100–900 mg/kg) had no effect on mortality, organ histology, or reproductive endpoints such as egg production, viability, hatchability, and hatchling success and survival (Newsted et al. 2008). In contrast, PFOS caused mortality when fed to mallards and quail at 50 and 150 mg/kg in the diet, and 10 mg/kg PFOS affected egg hatchability and survival of quail (Newsted et al. 2007). Substantially lower concentrations of PFOS (1 to 5 mg/kg) injected into the eggs of chickens elicited a spectrum of adverse effects including increases in spleen and liver weights, and developmental and immunologic effects such as shorter wings, brain asymmetry, and lowered antibody levels. Average serum PFOS levels (154 ng/g) in these chickens were within levels observed in wild birds, indicating environmental exposures of birds have the potential to cause biologically significant effects.

Table 3.3. Elimination half-lives for PFAS.

Species	Chemical					
	PFOS	PFOA	PFNA	PFHxS	PFHpA	PFBS
Human	4.5-7.4 years	2.3-10.1 years	2.5-4.3 years (estimated mean)	8.5 years	—	27.7 days
Primates	110-170 days	20.1-32.6 days	—	87-141 days	—	8-95.2 hours
Mice	731-1027 hours	408-456 hours	619-1653 hours	597-732 hours	—	—
Rats	179-1992 hours	1.9-322 hours	58.6-1128 hours	39-688 hours	—	0.64-7.42 hours

Source: PFNA data from Tatum-Gibbs et al. (2011); Ohmori et al. (2003); and NJDWQI (2015). All other values from ATSDR 2015 except for estimated elimination half-life of PFOA in mice (Lau 2015).

TOXICOKINETICS

For the general population, ingestion is likely the primary route by which humans are exposed to PFOA and PFOS (Trudel et al. 2008; Fromme et al. 2009); oral exposure may also be a significant exposure route for PFHpA, PFHxS, PFBS, and PFNA, but this has not been unequivocally established.

Following oral exposure, PFOA, PFOS, PFHxS, and PFBS are absorbed across the gastrointestinal tract and bind to albumin and other serum proteins. PFOA and PFOS are known to distribute from serum to organs via the action of several different classes of transporter proteins. The distribution of these transporter proteins—and thus the distribution of PFAS—varies between organs. The liver typically accumulates the greatest concentrations of PFAS, with lesser amounts in the kidneys and other organs (ATSDR 2015; Lau 2015; USEPA 2016f, g).

Due to the strength and stability of the carbon-fluorine bond, terminally stable PFAS are not metabolized. Their elimination varies with PFAS carbon chain length, species, and gender, with the longest half-lives for PFSAs > C4 and PFCAs > C6 in humans. Primates eliminate PFAS relatively slowly, and rodents tend to clear PFAS more quickly (Table 3.3). In general, males eliminate PFAS more slowly than females. PFAS are eliminated in the urine, with minor amounts also eliminated in the bile. Significant reabsorption from the kidney occurs in humans and primates, and to a much more limited extent in rodents, and is thought to be a key factor in the species-specific differences in elimination half-lives (ATSDR 2015; Lau 2015; USEPA 2016f, g).

TOXICOLOGICAL EFFECTS OF PFAS

PFOA and PFOS have been linked to a multiplicity of adverse effects including hepatic toxicity, reproductive and developmental toxicity, suppression of the immune system, and cancer. The majority of these findings come from animal studies, with supporting epidemiologic evidence for certain endpoints. The data for PFNA, PFHxS, and PFBS are much more limited, but suggest these compounds also affect the liver. PFNA caused developmental toxicity that was qualitatively similar to that associated with PFOS and PFOA; available data indicate PFBS and PFHxS do not cause reproductive or developmental effects. PFCAs and PFSAs do not appear to be genotoxic or mutagenic (USEPA 2016f, g; Butenhoff et al. 2014).

Reproductive and Developmental Effects

PFAS cross the placenta of humans and animals, and can also be transferred to offspring during lactation (Karrman et al. 2007; Fenton et al. 2009; Gutzcow et al. 2012).

PFOA. PFOA is one of the PFAS known to cross the mammalian placenta, and exposures during gestation have been tied to a range of reproductive and developmental effects (USEPA 2016e). Epidemiological studies of individuals exposed to PFOA-contaminated drinking water from industrial discharges ("highly exposed populations") have demonstrated an association between PFOA and pregnancy-induced hypertension (Darrow et al. 2013; USEPA 2016f). Although PFOA has not been linked to low birth weight in these highly exposed populations, there is some evidence associating PFOA exposure in the general population with documented small decreases in birth weight

(Verner et al. 2015), decreases in fecundity (Velez et al. 2015) and fertility (Fei et al. 2009). In mice, PFOA has a significantly longer half-life than in rats—a fact that likely contributes to the greater sensitivity of mice to the reproductive and developmental effects of PFOA (Lau 2015). In mice, PFOA (≥1 mg/kg administered dose) has caused decreases in pup body weight and decreased neonatal survival, whereas higher doses (> 5 mg/kg) increased litter resorption and numbers of still births. Rats also experience developmental effects of PFOA, albeit at larger doses than mice. Decreased body weight gain, delayed sexual maturity, and decreased viability were observed in rat offspring after gestational exposure to 30 mg/kg (Butenhoff et al. 2004). The USEPA identified reduced ossification of the fore- and hindlimbs in male and female mouse pups, and accelerated puberty in male mice pups administered 1 mg/kg PFOA as the critical endpoints used to derive the reference dose (RfD) (USEPA 2016e).

PFOS. In human populations, fetal PFOS exposure has been linked with lower average birth weights and with low infant body weight. Elevated serum PFOS levels have also been associated with decreased fertility and fecundity, manifested as greater time to pregnancy (USEPA 2016f). Several studies have shown effects of PFOS on semen quality, although the majority of studies that examined sperm parameters have not found a significant effect (USEPA 2016f). Additional evidence has linked serum PFOS with pre-gestational diabetes, and pregnancy-induced hypertension (USEPA 2016f). In rodents, PFOS has caused increased pup mortality, decreased body weight, and developmental delays. Exposure of rodents during gestation and lactation has been associated with abnormal glucose regulation in the offspring at maturity (USEPA 2016f). The EPA identified decreased body weights in newborn rats as the most sensitive endpoint observed from toxicity studies, and used the no observed adverse effect level (NOAEL) of 0.1 mg/kg-d as the basis of the RfD (USEPA 2016f).

PFNA. In mice, PFNA caused qualitatively similar developmental toxicity to PFOA and PFOS, with oral PFNA exposure causing dose-related effects in the number of live pups at birth and survival to weaning (Wolf et al. 2010) and neonatal mortality (Das et al. 2015). Surviving pups (1, 3, and 5 mg/kg) exhibited delayed eye opening and a delay in the onset of puberty (Das et al. 2015).

Other PFAS. Limited data indicate neither PFHxS nor PFBS are reproductive or developmental toxins, in that orally administered PFBS (30–1000 mg/kg) did not affect fertility, reproduction, or multiple indices of developmental toxicity in rats including litter size, mean pup birth weight, or pup survival (Lieder et al. 2009a). Similarly, PFHxS did not cause reproductive or developmental effects in rats given 0.3 to 10 mg/kg prior to mating, and during gestation and lactation (Butenhoff et al. 2009). However, increasing serum concentrations of PFHxS have been correlated to small decrements in human fecundity (Velez et al. 2015). There are no data on the reproductive or developmental effects of PFHpA.

Liver and Lipoproteins

PFOA. In PFOA-exposed workers and nearby "highly exposed" community members exposed via drinking water, multiple epidemiology studies have linked elevated PFOA serum concentrations with increases in total cholesterol and low-density lipoproteins (serum PFOA levels of 0.4 to 12 micrograms per milliliter [µg/mL] in workers, and an average of 0.08 µg/mL in community members). PFOA serum levels of 0.002 to 0.007 µg/mL were associated with elevated levels of triglycerides (USEPA 2016e). In animals, PFOA (and PFOS) tend to lower levels of total cholesterol, triglycerides, and lipoproteins (USEPA 2016e).

Epidemiology studies of PFOA-exposed workers and residents of communities affected by industrial discharges of PFOA have consistently shown a relationship between serum PFOA levels and the liver enzymes alanine aminotransferase and gamma-glutamyl transaminase. These results notwithstanding, epidemiology data have not provided evidence of PFOA-induced liver damage. Rodents exposed to PFOA frequently exhibit increased liver weight and hepatocellular hypertrophy. Unless there is concomitant necrosis or cellular degeneration however, these effects are generally not considered biologically significant as they tend to be reversible once exposure ends (USEPA 2016e).

PFOS. Data from epidemiology studies have demonstrated an association between serum PFOS levels (0.0084 µg/mL to 0.022 µg/mL) and increases in total cholesterol (USEPA 2016f). Multiple species of animals exposed to PFOS (0.098 to 1.56 mg/kg) have

exhibited a similar spectrum of hepatic effects to those induced by PFOA, including cellular hypertrophy, increased liver weight, and vacuolation (USEPA 2016).

Other PFAS. Limited data indicate the liver is also a target for PFNA, PFBS, and PFHxS, with hepatocellular hypertrophy, increased liver weight, and decreased lipoprotein synthesis observed. PFBS exposure elicited increased liver weight and adaptive hepatic hypertrophy in rats following doses of 300–1000 mg/kg (Lieder et al. 2009a). PFHxS caused increased liver weight and hypertrophy in rats (0.3–10 mg/kg); decreased triglyceride levels (rats, 3–10 mg/kg; mice, 30 mg/kg), and decreased levels of cholesterol and various lipoproteins in mice (6 mg/kg) were also features of PFHxS exposure (Butenhoff et al. 2009; Bijland et al. 2011). While PFBS exposure (30 mg/kg) has also been associated with impaired lipoprotein synthesis, the effects were limited to triglycerides (Bijland et al. 2011).

There are no data on the potential effects of PFHpA on the liver.

Immune System

PFOA and PFOS. Evidence from both human and animal studies indicate PFOA and PFOS adversely affect multiple components of the immune system and as a result, can alter immune function (National Toxicology Program [NTP] 2016). Both PFOA and PFOS suppressed the antibody response and increased hypersensitivity-related outcomes in humans and animals. In humans, there is also evidence PFOA decreased resistance to infectious disease and increased autoimmune disease (NTP 2016). Animal data also indicate PFOS suppresses disease resistance and natural killer (NK) cell activity (NTP 2016).

Other PFAS. PFNA was cytotoxic to the spleen and thymus of mice (key organs of the immune system), reducing populations of splenic T cells, impairing cell replication in the thymus, and impairing the production of cell-signaling molecules (Fang et al. 2008).

There are no data on the effects of PFHpA, PFBS, or PFHxS to the immune system.

Carcinogenicity

PFOA and PFOS. Available data indicate neither PFOA nor PFOS are genotoxic or mutagenic (USEPA 2016e, f). However, both PFOA and PFOS induce liver tumors in rodents after long-term high-level exposure; and PFOA also induces testicular and pancreatic tumors. Mechanistic data indicate that the rodent liver tumors develop following PFOA- or PFOS-induced activation of the peroxisome proliferator activated receptor alpha (PPARα), a mode of action that may also be relevant to rodent testicular and pancreatic tumors. PPARα-mediated hepatic tumors are generally not considered biologically relevant to humans given differences in both endogenous levels and responses of PPARα between humans and rodents (Corton et al. 2014; Kennedy and Symons 2015). The relevance of PFAS-induced rodent testicular and pancreatic tumors to humans is unclear.

The USEPA Office of Water determined that there is "suggestive evidence of carcinogenic potential" for PFOA (USEPA 2016c) and PFOS (USEPA 2016d). The International Agency for Research on Cancer (IARC 2016) found PFOA to be "possibly carcinogenic." Neither agency nor independent scientists have evaluated the genotoxicity, mutagenicity, or carcinogenicity of other PFAS.

Epidemiology studies from highly exposed populations exposed to PFOA in drinking water found associations between PFOA serum levels and kidney and testicular cancers (C8 Science Panel 2013). In rats, PFOA exposure led to liver, testicular, and pancreatic tumors (reviewed in USEPA 2016e). Based on the rat testicular data for PFOA, the USEPA (2016e) derived a cancer slope factor (CSF) of 0.07 (mg/kg-d-1).

The evidence regarding the potential carcinogenicity of PFOS is more limited than for PFOA, and consists of somewhat equivocal epidemiologic evidence linking human exposure to PFOS to bladder and prostate cancer. Animal data support an association between PFOS exposure and an increased incidence of several tumor types, with the strongest evidence for liver tumors (USEPA 2016f). The USEPA (2016f) found the PFOS tumor data insufficient to derive a CSF.

Other PFAS. The carcinogenicity of PFNA, PFHpA, PFBS, and PFHxS has not been evaluated.

Conclusions

Terminally stable PFAS are not metabolized; their elimination depends on carbon chain length, species, and gender. In humans, the longest half lives have been observed for PFSAs > C4 and PFCAs > C6.

Animal and/or epidemiologic data have linked

PFOA and PFOS to a range of adverse effects including hepatic, reproductive, developmental, and immune system toxicity. The data for PFNA, PFHxS, and PFBS are much more limited, but suggest that these compounds also affect the liver. PFNA, but not PFBS or PFHxS, appear to cause developmental effects in animals. PFCAs and PFSAs are not considered genotoxic or mutagenic. The USEPA considers that there is suggestive evidence of carcinogenicity of PFOA and PFOS.

For ecological species, bioaccumulation of PFAS is a key issue; the extent of bioaccumulation depends on whether the organism is aquatic or terrestrial; on the organism's trophic level; and on whether it has lungs or gills. A number of PFCAs and PFSAs are ubiquitous in the tissues of terrestrial and aquatic species of wildlife worldwide. Based on measured concentrations and the frequency of detection, PFOS is the dominant PFAS in wildlife, with PFNA and other PFCAs also common.

RISK ASSESSMENT OF PFAS

Many PFAS are environmentally persistent, bioaccumulate in living organisms, and have demonstrated toxicity in laboratory animals and humans.

The C8 Health Project, one of the most robust studies of PFOA exposure, provided data on approximately 70,000 exposed Ohio and West Virginia residents.

Drinking water exposure to PFOA was linked to serum PFOA concentrations and a range of specific adverse health outcomes. Additionally, national biomonitoring studies have shown that the majority of the U.S. population has been exposed to PFAS. It is therefore prudent to assess and potentially mitigate human and/or environmental exposures.

Available Toxicity Criteria and Screening Levels

Toxicity Criteria

Non-Cancer RfD: USEPA developed updated oral Reference Doses of 2E-05 mg/kg/day, applicable to both PFOS and PFOA. The RfDs were derived from developmental toxicity studies in mice (PFOA) (USEPA 2016e) and rats (PFOS) (USEPA 2016f). The RfD is an estimated daily exposure level for the human population (including sensitive subpopulations) that is likely to be without an appreciable risk of deleterious effects during a lifetime (USEPA 1989). USEPA recommends this value for both short-term (sub-chronic) and chronic (lifetime) exposures.

PFOA: The RfD for PFOA is based upon the Lau et al. (2006) study that evaluated six groups of timed-pregnant CD-1 mice that were given 1 to 40 mg/kg PFOA by oral gavage from gestational day 1 to 17, while controls received water. After 17 days, some dams were sacrificed for maternal and fetal exams, while the rest were dosed until birth. The study demonstrated a lowest observable adverse effect level (LOAEL) of 1 mg/kg/day for reduced ossification of the proximal phalanges (of the forelimb and hindlimb) and accelerated puberty in male pups (4 days earlier than controls). A human equivalent dose (HED) was calculated from the LOAEL using a volume of distribution (Vd) of 0.17 L/kg bw calculated by Thompson et al. (2010) and the half-life (t1/2) in humans of 2.3 years based upon Bartell et al. (2010) determination of a decline in serum levels among the general population exposed to drinking water near the DuPont Works plant in Washington, West Virginia. A total uncertainty factor of 300 (10 –variability within the human population, 3 – extrapolation from animal to human, and 10 – LOAEL to NOAEL extrapolation) was applied to the HED to obtain the RfD of 2E-05 (USEPA 2016e).

PFOS: The RfD for PFOS is based upon the Luebker et al. (2005) two-generation study. The parental (F0) generation were dosed 0.1 to 3.2 mg/kg PFOS by oral gavage for 6 weeks prior to and during mating. Females were treated throughout gestation, parturition, and lactation. Controls received water. The F1 generation pup viability was significantly reduced at the two highest groups, therefore only the 0.1 and 0.4 mg/kg/day dose groups were carried into the second generation. Dosing began at weaning and continued until sacrifice. All first (F1) generation females were allowed to deliver and were sacrificed on lactation day 21. The study demonstrated a NOAEL of 0.1 mg/kg/day for reduced pup body weight in the second generation off-spring. A HED was calculated from the LOAEL using a volume of distribution (Vd) of 0.23 L/kg bw calculated by Thompson et al. (2010) and the t1/2 in humans of 5.4 years based upon Olsen et al. (2007) determination of a decline in serum levels among a retired worker population followed for 5 years. A total uncertainty factor of 30 (10 –variability within the human population, and 3 – extrapolation from animal to human) was applied to the HED to obtain the RfD of 2E-05 (USEPA 2016e).

Other PFAS: USEPA has derived a provisional sub-chronic RfD (0.2 mg/kg/day) and a provisional chronic RfD (0.02 mg/kg/day) for perfluorobutane sulfonate (PFBS) based upon a sub-chronic and reproductive study in rats (USEPA 2014b). Lieder et al. (2009b) identified a NOAEL of 200 mg/kg/day in a sub-chronic duration study in rats based on histopathological findings in the kidney. Three groups of rats were dosed 60 to 600 mg/kg/day with potassium PFBS (K+PFBS) by gavage for 90 days. Controls received water. A HED for the study was calculated using a body weight scaling to the ¾ power (BW ¾) approach as a default method to extrapolate toxicologically equivalent oral doses in laboratory animals to humans for the purpose of deriving a RfD when there is no chemical specific data to calculate based upon toxicokinetic modeling (USEPA 2014b). A total uncertainty factor of 100 (10 –variability within the human population, 3 – extrapolation from animal to human, 3 – limited study database) was applied to the HED to obtain the RfD of 2E-01 (USEPA 2014b) for the provisional sub-chronic RfD.

In a two–generation reproductive study in rats, Lieder et al. (2009a) identified a NOAEL of 100 mg/kg-day in F0 and F1 generation animals based on increased incidence and severity of histopathological kidney changes in both sexes. Four groups of rats were dosed 30–1000 mg/kg/day K+PFBS by gavage, controls received water. The F0 generation received daily doses beginning at six weeks of age and lasting until at least 70 days prior to cohabitation. The F1 rats received the same dosing regimen as their respective sires and dams beginning at lactation day 22. A HED for the study was calculated using the BW ¾ approach (USEPA 2014b). A total uncertainty factor of 1000 (10 –variability within the human population, 3 – extrapolation from animal to human, 3 – limited study database and 10-to extrapolate from less than chronic duration exposure) was applied to the HED to obtain the RfD of 2E-02 (USEPA 2014b) for the provisional chronic RfD.

Non-Cancer RfC: At this time, there are insufficient data available to calculate an inhalation Reference Concentration (RfC) for PFOS and PFOA (USEPA 2016e, f).

Cancer Slope Factor: PFOA and PFOS have been classified as having Suggestive Evidence of Carcinogenic Potential in humans by USEPA (USEPA 2016e, f), while PFOA has also been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC) (IARC 2016). An oral cancer slope factor of 0.07 (mg/kg/day^{-1}) has been developed for PFOA by USEPA, based upon testicular cancer (Leydig Cell tumors) in rodents (USEPA 2016e). An oral cancer slope factor has not been calculated for PFOS since the available tumor data were determined to be inadequate for quantitative assessment (USEPA 2016f). PFBS is provisionally classified as "Inadequate Information to Assess Carcinogenic Potential" (USEPA 2014b). Cancer slope factors provide an upper-bound estimate of the probability of a response (i.e., cancer) per unit intake of a chemical over a lifetime (USEPA 1989).

Drinking Water Health Advisory

Currently there are no federal regulations under the SDWA or national recommended ambient water quality criteria under the Clean Water Act (CWA) for PFAS. In 2009, USEPA developed interim, provisional HAs for short-term exposure to PFOS and PFOA of 0.2 and 0.4 µg/L, respectively (USEPA 2009). HAs identify the concentration of a contaminant in drinking water at which adverse health effects are not anticipated to occur over specific exposure durations (e.g., 1 day, 10 days, a lifetime). HAs serve as informal technical guidance to assist federal, state, and local officials and managers of public or community water systems in protecting public health when emergency spills or other contamination situations occur (USEPA 2016c, d).

As of May 2016, the lifetime drinking water HA for PFOA and PFOS is 0.07 µg/L, which is applicable to either chemical individually or collectively. The HA is based upon the RfD of 2E-05 mg/kg discussed previously. Since the HA was developed based upon sensitive developmental effects, it is also protective of adverse effects seen in adults (liver and kidney toxicity). Because the HA is lower than the concentration derived for carcinogenic effects of PFOA, it is also protective of carcinogenic effects for the general population (USEPA 2016c, d).

Screening Levels

A summary of screening levels for PFOS and PFOA are provided in Tables 3.4 (Soil), 3.5 (Drinking Water/Groundwater), 3.6 (Recreational Sediment and Surface Water), and 3.7 (Fish Tissue). Note, these tables are not meant to be all inclusive and are provided to show some of the screening levels available for these compounds. Additional screening levels for PFBS and

Table 3.4. Soil screening levels for PFOS and PFOA (mg/kg).

Entity	Resident		Industrial Worker		Recreational User		Outdoor Commercial Worker		Excavation or Construction Worker	
	PFOS	PFOA	PFOS	PFOA	PFOS	PFOA	PFOS	PFOA	PFOS	PFOA
USEPA (USEPA 2016g)	1.26	1.26	16.4	16.4	NE	NE	18.2[1]	18.2[1]	NE	NE
Maine (ME DEH 2014)	11	0.80	NE	NE	18	1.3	82	6.2	19	1.4
US Navy (NAVFAC 2013)	4.9	12	49	123	NE	NE	NE	NE	NE	NE
Delaware (DNREC 2016)	6	16	NE	NE	NE	NE	NE	NE	NE	NE
Iowa (IDNR 2016)	1.8	1.2	NE	NE	NE	NE	NE	NE	NE	NE
Minnesota (MPCA 2009)	2.1	2.1	14	13	2.6	2.5	NE	NE	NE	NE
Texas (TRRP 2016)	1.5/1.5[2]	0.6/0.49[2]	15/14[2]	2.4/1.4[2]	NE	NE	NE	NE	NE	NE

NE = Not Established [1] Calculated with USEPA's RSL Calculator

[2] Total Soil Combined Protective Concentration Level for 0.5-acre/30-acre source area

Table 3.5. Drinking water/groundwater screening levels (µg/L) for PFOS and PFOA.

Entity	PFOS	PFOA
USEPA (USEPA 2016g). States that adopted USEPA HA: Alabama (ADEM 2016), Arizona (Liberty Utilities 2016), Colorado (CO DPHE 2016), Connecticut (CT DPH 2016), Delaware (DNREC 2016), Iowa (IDNR 2016), Massachusetts (MA DEP 2016), Maine (ME DEP 2016), New Hampshire (NHDES 2016), New York (NYS DOH 2016), West Virginia (WV DHHR 2016)	0.07	0.07
Alaska (AKDNC 2016)	0.4	0.4
Illinois (ASTSWMO 2015); Kentucky (NKWD 2016)	0.2	0.4
Michigan (MI DEQ 2016)	0.011	0.42
Minnesota (MN DOH 2017)	0.027	0.035
New Jersey (NJDEP 2007)	NE	0.04
North Carolina (NC DENR 2013)	NE	2
Texas (TRRP 2016)	0.56	0.29
Vermont (VT DOH 2016)	0.02 (combined) (a)	0.02 (combined) (a)
INTERNATIONAL		
Australia (AU DOH 2017)	0.07 (a)	0.56 (a)
Canada (Health Canada 2016)	0.6 (a)	0.2 (a)
Denmark (Danish MOE 2015)	0.1 (a,b)	0.1 (a,b)
Germany (Germany MOH 2006)	0.1 (combined) (a)	0.1 (combined) (a)
Italy (Valsecchi, et al. 2017)	NE	0.5 (a)
Netherlands (RIVM 2011)	NE	0.0053 (a)
Sweden (C0ncawe 2016)	0.09 (a)	0.09 (a)
U.K. (U.K. DWI 2009)	0.3 (a)	0.3 (a)

NE = Not Established (a) Drinking water value (b) Risk-based groundwater value

Table 3.6. Recreational sediment and surface water screening levels for PFOS and PFOA.

Entity	Recreational Sediment (mg/kg)		Recreational Surface Water (µg/L)	
	PFOS	PFOA	PFOS	PFOA
USEPA (USEPA 2016f)	NE	NE	NE	NE
Maine (ME DEH 2014)	20	1.5	1.2	0.05
Michigan (MI DEQ 2016)	NE	NE	0.012	12

NE = Not Established

Table 3.7. Fish Tissue screening levels for PFOS and PFOA.

Entity	Fish Tissue (ug/kg)	
	PFOS	PFOA
USEPA (USEPA 2017b)	32.7 - 334 (a)	32.7 – 334 (a)
Maine (ME DEH 2014)	175	13
Michigan (MI 2016)	< 9 (b)	NE
Alabama (ADPH 2017); Minnesota (MN DOH 2008)	<40 (c)	NE
Oregon (OR HA 2013)	0.2	0.2

NE = Not Established

(a) EPA RSL for fish tissue. Calculated using range of mean statewide survey intake levels of freshwater recreational fish intake using RSL calculator. Intake ranges 5–51 g/day (EFH 2011b, Table 10-5). USEPA recommends using site-specific fish ingestion levels when using the RSL calculator for fish tissue RSL calculations.

(b) Fish Consumption Advisory Level - 16 meals/month

(c) Fish Consumption Advisory Level - Unrestricted meal frequency

a number of other PFAS are available from USEPA (USEPA 2016g) and from other state agencies including Delaware (DNREC 2016), Indiana (IDEM 2016), Minnesota (MPCA 2009; MN 2016), New Jersey (NJDEP 2015, 2016), Nevada (NDEP 2015), North Carolina (NC DENR 2016), and Texas (TRRP 2016).

Relative Source Contribution in the Derivation of PFAS Risk-Based Criteria

A Relative Source Contribution (RSC) factor takes into account drinking water and non-drinking water exposures to a contaminant including food, soil, air, water, and consumer product use. The RSC is applied in the USEPA HA calculation to ensure an individual's total exposure from a contaminant (i.e., PFOA) does not exceed the RfD. The RSC accounts for the portion of the RfD attributed to drinking water (directly or indirectly in beverages like coffee, tea, or soup); the remainder of the RfD is allocated to other potential exposure sources. In the case of PFOA, other potential sources include ambient air, foods, incidental soil/dust ingestion and consumer products.

The USEPA's default RSC value is 20%, which means 20% of the total exposure is assumed to come from drinking water and 80% from non-drinking water sources. The USEPA determined there were insufficient data to develop a chemical-specific RSC for PFOA and PFAS, and therefore the default value of 20% was used to calculate the HA (USEPA 2016c, d).

Unique Receptors and/or Exposure Factors Used in the Derivation of PFAS Risk-Based Criteria

The lifetime HAs for PFOS and PFOA were calculated using drinking water intake and body weight parameters for lactating women in order to be protective of this critical exposure period for infants. Studies have shown significant exposure to infants through the ingestion of breast milk (Hag et al. 2011; Forns et al. 2015); consistent with this fact, studies have also shown breast feeding to be a potential excretion route for mothers (Mondal et al. 2014). The lactating woman provides the more protective scenario over the pregnant woman, given an increased

water intake is needed to support milk production. The use of these exposure factors to calculate the lifetime HA are specific to the most sensitive population and therefore are protective of pregnant and lactating women as well as the general population (USEPA 2016c, d).

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APPENDIX 1

PFAS Bioaccumulation Potential

Factor	Definition	Reported Values	Interpretation	References
Bioconcentration factor (BCF)	Ratio of chemical concentration in an organism to the concentration in water (at steady-state). Values > 2000 indicate bioconcentration	PFOA 1.8-27 (fish)	PFOA. Does not bioconcentrate in fish	ECHA 2013; CONCAWE 2016
		PFOS 830-26,000 (fish)	PFOS. Bioconcentrates in fish	
		PFBS <1 (fish)	PFBS. Does not bioconcentrate in fish	
Bioaccumulation factors (BAFs)	Ratio of chemical concentration in an organism to the concentration from all sources (water, diet, soil, air). Values > 2000 indicate bioaccumulation	PFOA. 0.9-292 (fish, mussels, phytoplankton)	PFOA. Does not bioaccumulate in fish, mussels, phytoplankton	ECHA 2013; CONCAWE 2016
		PFOS 240 (zooplankton); 1200 (mussels); 16,000-95,000 (fish)	PFOS. Bioaccumulates in fish	
Biomagnification factors (BMFs)	Ratio of chemical concentration in an organism to the concentration in the diet. Values >1 indicate biomagnification	PFOA. 0.02-7.2 (fish); 1.8-125 (dolphins, polar bears); 0.1-2.7 (whales, seals); 0.9-11 (wolves, caribou)	PFOA. Biomagnifies in multiple species	ECHA 2013; CONCAWE 2016
		PFOS. 4.6-8.7 (fish); 2.0-9.1 (caribou); 0.8-4.5 (wolves); 0.9 (dolphins); 4.0-8.4 (whales).	PFOS. Biomagnifies in fish, caribou, dolphins, whales	
Trophic magnification factors (TMFs)	The increase in chemical concentration in an organism with an increase of one trophic level. Values >1 indicate trophic magnification	PFOA 0.37-0.53 (fish); 1.2-13 (seals, dolphins); 0.3-2.64 (whales); 1.1-1.3 (wolves, caribou)	PFOA. Trophic magnification occurs in air- breathing aquatic mammals, not in gill-breathers	ECHA 2013



SOARING TO THE FUTURE

Barrow Comprehensive Plan 2015-2035

Prepared for the North Slope Borough

Adopted March 3, 2015

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BARROW
COMPREHENSIVE PLAN

ADOPTED MARCH 3, 2015

NSB ASSEMBLY ORDINANCE #75-06-64

NSB PLANNING COMMISSION RESOLUTION #2014-19

CITY OF BARROW RESOLUTION #34-2014

BARROW ZONING COMMISSION RESOLUTION #2014-04

NATIVE VILLAGE OF BARROW RESOLUTION #2014-12

UKPEAĠVIK INUPIAT CORPORATION RESOLUTION #2014-92

Prepared by

Community Planning Division
North Slope Borough Department of Planning & Community Services

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Abbreviations and Acronyms

°F	degrees Fahrenheit
AC	Alaska Commercial Company
ACTP	Arctic Coast Trading Post
ADEC	Alaska Department of Environmental Conservation
ADOT	Alaska Department of Transportation
ADOTPF	Alaska Department of Transportation and Public Facilities
AHFC	Alaska Housing Finance Corporation
ADLWD	Alaska Department of Labor and Workforce Development
AKILF	Alaska In-Lieu Fee
AMI	Area Median Income
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ARDOR	Alaska Regional Development Organization
ARM	Atmospheric Radiation Measurement
ASNA	Arctic Slope Native Association
ASRC	Arctic Slope Regional Corporation
ASTAC	Arctic Slope Telephone Association Cooperative
ATV	All-Terrain Vehicle
AWIC	Arctic Women in Crisis
BARC	Barrow Arctic Research Center
BEDC	Barrow Economic Development Committee
BEO	Barrow Environmental Observatory
BHS	Barrow High School
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BUECI	Barrow Utilities and Electric Cooperative, Inc.
BUS	Barrow Utilidor System
ccf	Hundred cubic feet
CCHRC	Cold Climate Housing Research Center
CEDC	Comprehensive Economic Development Center
CFR	Code of Federal Regulations
CO2	NSBSD Central Office 2
CIPM	Capital Improvement Program Management
CY	Cubic yard
CYS	Children and Youth Services
D.A.R.E	Drug Abuse Resistance Education
DERP	Defense Environmental Restoration Program
DEW	Distant Early Warning
DoD	Department of Defense
DOE	Department of Energy
DOTPF	Alaska Department of Transportation and Public Facilities
EDA	Economic Development Administration

EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FED	Federal
FMR	Fair Market Rental
FTE	Full-time employee
HDPE	High Density Polyethylene
HUD	Department of Housing and Urban Development
ICAS	Iñupiat Community of the Arctic Slope
IHS	Indian Health Service
IRA	Indian Reorganization Act
IRS	Internal Revenue Service
IRR	Indian Reservation Roads
IWC	International Whaling Commission
kW	Kilowatt
kWH	Kilowatt Hour
MBR	Membrane Bioreactor
MSW	Municipal Solid Waste
MW	Megawatt
NARL	Naval Arctic Research Laboratory
NAHASDA	Native American Housing Assistance and Self-Determination Act
Navy	U.S. Navy
NED	National Economic Development
NOAA	National Oceanic & Atmospheric Administration
NPR-A	National Petroleum Reserve – Alaska
NSB	North Slope Borough
NSBMC	North Slope Borough Municipal Code
NSBSD	North Slope Borough School District
NSBEP&CR	North Slope Borough Economic Profile and Census Report
NSSRR	North Slope Subsistence Rural Region
N.T.S.	Not to Scale
NVB	Native Village of Barrow
NWS	National Weather Service
PAR	Project Analysis Report
PFD	Permanent Fund Dividend
PDF	Planar Deformation Features
pp/pd	Per Person Per Day
PVT	Private
ROW	Right of Way
SOA	State of Alaska
SHR	Shareholder
SRB	Stephen R. Braund and Associates
SWOT	Strengths, Weaknesses, Opportunities and Threats
TDHE	Tribally Designated Housing Entity

TNHA	Tagiugmiullu Nunamiullu Housing Authority
TOS	Thermal Oxidation System
UIC	Ukpeaġvik Iñupiat Corporation
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USDOI	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VHF	Very High Frequency
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

Barrow is the northernmost community in the United States, at the base of the Point Barrow peninsula and is bordered by the Chukchi and Beaufort seas of the Arctic Ocean. It is a small rural community 320 miles above the Arctic Circle and within the North Slope Borough (NSB), the largest municipality in the United States.

Barrow is facing issues common to many small towns across the United States, such as aging infrastructure and government revenues that do not keep pace with need. However, Barrow is truly unlike other communities. Its remote location makes access and transportation logistically difficult and expensive. It is considered to be one of the coldest and driest places in the United States, with an annual average temperature of about 12 degrees Fahrenheit (°F) and less than five inches of annual precipitation. Barrow is also the borough seat of government where diverse issues converge, among them Native Iñupiat subsistence rights, oil and gas development activity and study of climate change in the Arctic.

1.1 Purpose of the Barrow Comprehensive Plan

The Barrow Comprehensive Plan is a long-range document intended to guide the physical and economic growth and development of Barrow and its Area of Influence (Figure 1) over the next 20 years, through 2035. The plan is a consolidated, cohesive and coordinated approach to community planning that can guide decision making for preservation, investment and development of future community resources and infrastructure. Community residents, major landowners, public officials and government staff among others have participated in the comprehensive planning process.

Upon adoption, the plan will become the primary land use policy document for Barrow and thus provide guidance on a variety of planning issues that are critical to the future of the community. It also contains a vision statement for the future and goals, objectives and strategies that are designed to implement that vision. The plan should be reviewed annually and updated as needed to reflect changing conditions and monitor implementation.

1.2 Basis for Comprehensive Planning

The authority for comprehensive planning in Alaska is provided by Title 29 of the Alaska Statutes. As a home rule borough, the NSB is responsible for planning, platting, land use regulation, and development of a Borough-wide comprehensive plan.

Alaska Statute 29.40.030 states:

> (a) The comprehensive plan is a compilation of policy statements, goals, standards, and maps for guiding the physical, social, and economic development, both private and public, of the first or second class borough, and may include, but is not limited to, the following:
>
> (1) statements of policies, goals, and standards;
>
> (2) a land use plan;

(3) a community facilities plan;

(4) a transportation plan; and

(5) recommendations for implementation of the comprehensive plan.

(b) With the recommendations of the planning commission, the assembly shall adopt by ordinance a comprehensive plan. The assembly shall, after receiving the recommendations of the planning commission, periodically undertake an overall review of the comprehensive plan and update the plan as necessary.

1.3 Barrow Governance

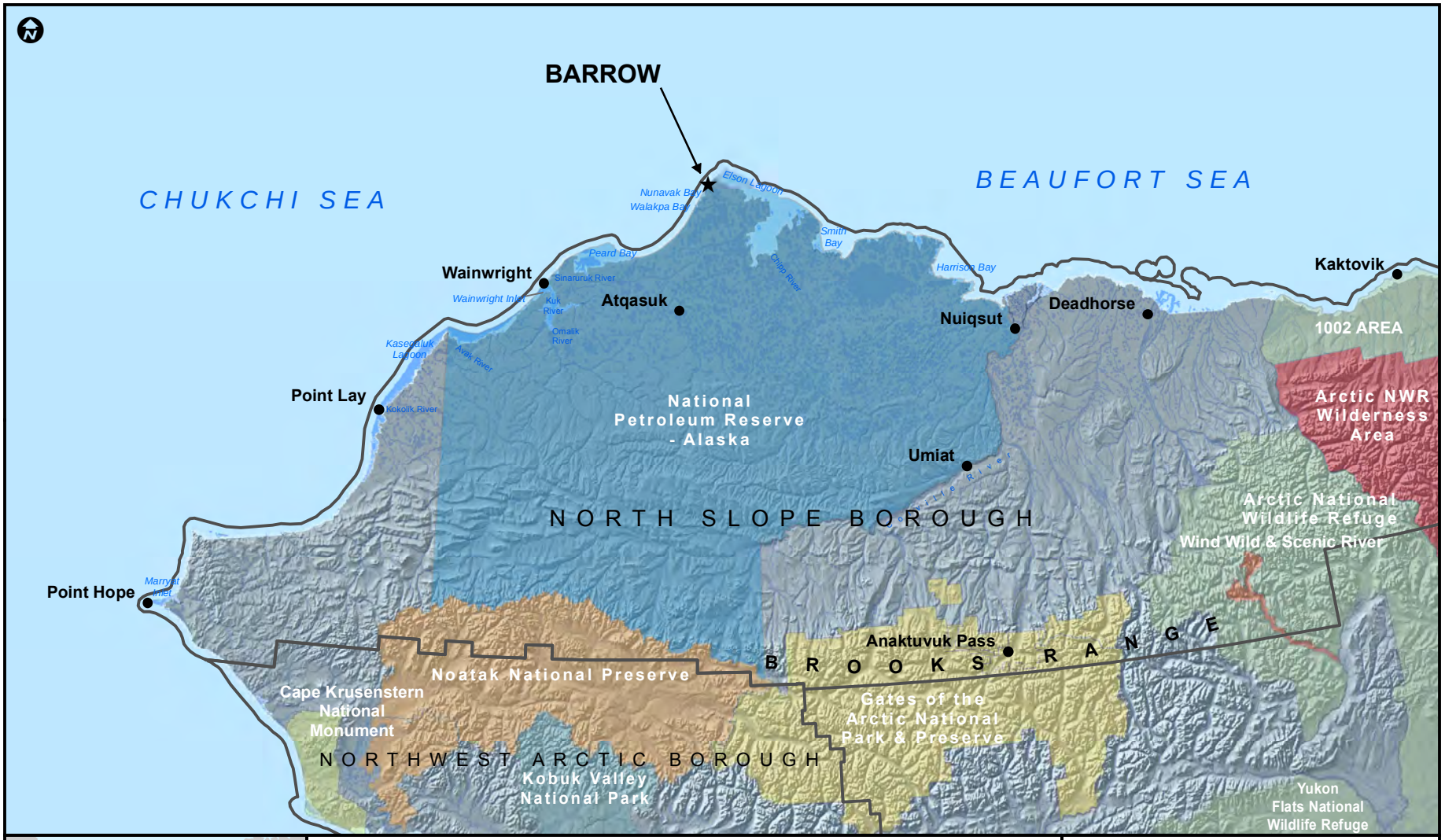
Barrow has four primary governing bodies. There are two regional governments, the NSB (non-tribal) and Iñupiat Community of the Arctic Slope (ICAS, tribal); and two local governments, the City of Barrow (non-tribal) and Native Village of Barrow (NVB, tribal).

Regional Governance. The NSB is the regional government and political subdivision of the State of Alaska (SOA) and was incorporated in 1972. The NSB has a mayor and seven-member assembly and is a strong mayoral form of government. The NSB has taxation authority of oil and gas infrastructure. The majority of funding for government services are from this tax source.

ICAS is the regional tribal government for all the North Slope villages. It was established in 1974 and is one of only two regional sovereign tribal governments in Alaska recognized by the United States government.

Local Governance. The City of Barrow was incorporated in 1958 as a first class city and political subdivision of the SOA. The City of Barrow has a seven-member council that is elected by the voters. Six council members are elected to specific seats (A through E) and the Mayor is elected at large.

The Native Village of Barrow Iñupiat Traditional Government (NVB), is the governing body for tribal matters and is a sovereign government recognized by the U.S. NVB has a seven-member council and provides services to its members related to health, safety, education and preservation of the Iñupiat culture.



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BARROW, ALASKA VICINITY MAP

Scale: 0 25 50 75 100 125 Miles

Figure: 1

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The NSB municipal code (NSBMC) outlines the process for developing the borough-wide comprehensive plan and the contents of the plan in §2.12.170: "The Comprehensive Plan…shall be a compilation of policy statements, goals, standards and maps for guiding the physical, social and economic development, both private and public, of the Borough, and may include, but is not limited to, the following: statements of policies, goals, standards, a land use plan, a community facilities plan, a transportation plan and recommendations for plan implementation." The NSBMC also calls for the Planning Commission to consider amendments to the comprehensive plan from time to time (§19.30.050), undertake an overall review of the plan at least once every two years (§2.12.170), and review and report to the Assembly the location, design, construction, demolition or disposition of any public building, facility, collector or arterial street, park, greenbelt, playground or other public facility based on the comprehensive plan and the capital improvements program (§19.30.050).

The NSBMC states in §19.30.020 that the Barrow Zoning Commission is responsible for implementing the comprehensive plan for Barrow: "…The purpose of the Zoning Commission is to implement the Comprehensive Development Plan for Barrow and aid in fire prevention and the delivery of emergency medical services…" In §19.30.060, the NSBMC also requires that the Barrow Zoning Commission shall "develop, adopt and recommend to the Assembly a Comprehensive Plan for Barrow."

Within the NSB, the Department of Planning and Community Services is responsible for updating and maintaining the Borough Comprehensive Plan and supporting community-level decision making in social, economic and development issues. The Department's Community Planning Division oversees development and updates of the Borough-wide Comprehensive Plan and village comprehensive plans.

The Community Planning Division is also responsible for capital planning and developing the NSB Six-Year Capital Improvement Plan. The purpose of the Six-Year Plan is to plan for adequate capital facilities to serve anticipated growth and development in the current year and the next five years. It provides information for decision makers about the timing and costs of constructing capital facilities.

1.4 Comprehensive Planning Process

The framework for the plan was determined through a series of interviews with stakeholders from a wide variety of organizations to capture different perspectives. The process to develop this plan focused on gathering local knowledge and community input. (Figure 2 depicts a flow chart that illustrates the planning process). The planning process included the following tasks:

1. Gather data and input through a series of stakeholder interviews within the community to identify common community issues, needs and goals.

2. Develop conceptual plans based on stakeholder prioritization of community facility needs and future development and redevelopment.

3. Develop a draft vision statement that reflects values and aspirations for the future.

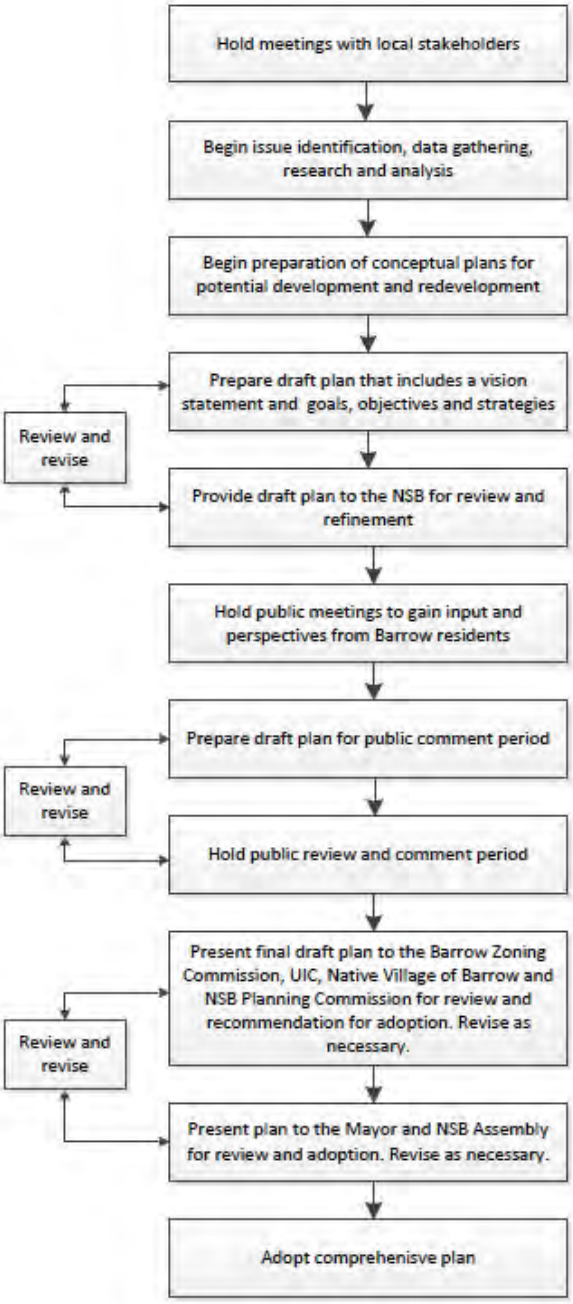
4. Provide the conceptual plans, vision statement and goals to stakeholders for review, modification and refinement.

5. Present the conceptual plans, vision statement and goals to Barrow residents for their perspective and input.

6. Present the final draft to the City of Barrow, Native Village of Barrow, Ukpeaġvik Iñupiat Corporation, Barrow Zoning Commission and NSB Planning Commission for review and recommendation for approval.

7. Present the final plan to the NSB Mayor and Assembly for review and approval.

Figure 2 Planning Process



Stakeholder Meetings. Stakeholders were asked to identify major issues that they believe Barrow is facing or would face in the future. Stakeholders identified challenges and issues in Barrow as well as strengths and positive attributes about the community. The issues outlined in the following list were determined to be of primary importance to the future of the community. The list is not in priority order.

Housing

- Create housing opportunities, both market-rate and affordable to meet current need and accommodate future growth; and
- Provide provisions for the homeless population.

Planning for Growth

- Locate affordable gravel to support development;
- Maximize the use of existing infrastructure through infill development where possible and expand roads and utilities to accommodate new development when necessary;
- Identify potential rezoning opportunities to better accommodate anticipated community growth;

- Study the potential for renewal, especially at community sites with functionally and technically outdated infrastructure and make recommendations for replacement, relocation, repurposing or demolition; and
- Identify possible solutions for the NSB police station facility, whose lease is set to expire in the near future.

Maintaining Traditional Rights and Values

- Maintain Native subsistence rights; and
- Preserve Native ownership and control of lands.

Social Services

- Reestablish adult substance abuse treatment in the community potentially including an adult detox facility and juvenile justice and treatment, possibly as a component of police functions;
- Reinstitute daycare services to support employment;
- Consider alternatives for displaced children, including expanding foster care; and
- Create recreational facilities and educational programs to promote healthy family living and activities and community festivals such as Kivgiq.

Economic Development

- Expand tourism opportunities, including the need for additional visitor accommodations; and
- Encourage additional commercial enterprises, such as restaurants and coffee shops.

Land Use

- Create a harbor for barge unloading and small boat and U.S. Coast Guard (USCG) activities;
- Manage U.S. Army Corps of Engineers (USACE) wetlands provisions as they affect development; and
- Manage coastal erosion in a cost-effective manner.

Government

- Encourage flexibility in responding to current issues and challenges through participatory policy creation or modification.

Public Meetings and Workshops. To solicit input from Barrow residents, four community meetings and four workshops were held on July 7 and 8, 2014 at the City of Barrow City Council Chambers. The public meetings and workshops provided an opportunity for interested residents to view a model of the Barrow community with several different development and redevelopment possibilities.

Residents were also invited to provide input on plan contents through Strengths, Weaknesses, Opportunities and Threats (SWOT) workshops. Through the workshop, focused attention was given to those issues identified by residents to enhance, protect, exploit or mitigate for the

beneficial growth of Barrow. The strengths, weaknesses, opportunities and threats presented here are an amalgamation of the four workshops; only the five issues that were most often mentioned within each category are included in this section; all public input during the SWOT exercises are provided in Appendix A.

Strengths identified by Barrow residents were:

S1: Traditional family and multi-generational knowledge and sharing;

S2: Iñupiat values;

S3: Iḷisaġvik College and it's responsiveness to the changing needs of employers and the community;

S4: Tourism, specifically wildlife and birding as a tourist attraction; and

S5: Teamwork and a willingness to work together.

Weaknesses identified by Barrow residents were:

W1: A lack of activities for youth and families;

W2: Lack of housing availability, including a lack of housing contractors;

W3: Lack of freight and transportation competition and options and the high cost of having materials delivered to Barrow;

W4: The cost of maintaining aging infrastructure and planning for needed infrastructure; and

W5. The NSB permitting process does not always adequately require for oil and gas development to provide additional infrastructure to residents; potential revisions to the NSBMC may be needed.

Opportunities identified by Barrow residents were:

O1: Foster new economic development and training opportunities including both mainstream businesses, such as a hardware store, and traditional ones such as reindeer herding and tanning. Establish a Chamber of Commerce;

O2: Provide recreational activities for families and youth, including a snow park, shooting range, paddle boat and skate park;

O3: Fiber optics and other technological advancements that are becoming or may become available in the arctic;

O4: Renewable energy; and

O5: Increased maritime traffic through the Northwest Passage.

Threats identified by Barrow residents were:

T1: Coastal erosion;

T2: Climate Change;

T3: Potential environmental, cultural and health impacts of increased oil and gas activity;

T4: Issues related to increased maritime activity, including a breach of the international boundary, biological agents entering the community and international visitors without the ability to enforce customs regulations; and

T5: Lack of housing.

1.5 Barrow Vision Statement

Identifying and establishing a community vision is an important part of the process of creating goals and objectives. The following vision statement was devised during the comprehensive planning process and guided the development of goals and objectives that implement this plan.

> *Barrow is and will continue to be a village that fosters and values a strong sense of community through diversity, an active subsistence lifestyle, multi-generational traditional knowledge and traditional Iñupiat values while also embracing new technological advancements and contemporary knowledge. Residents and community leaders will guide community growth and development in a coordinated, cost effective, efficient and environmentally sensitive manner that respects and protects local wildlife habitats and the area's abundant natural resources. Barrow's education system will prepare its youth through training opportunities and college programs tailored to meet the employment needs of the local community, science research and industry. There will be a diversity of safe and affordable housing opportunities and well-maintained and reliable utilities and other public infrastructure and community facilities. Residents will have a variety of recreational opportunities, especially for families and youth that facilitate healthy living and an active lifestyle. Community cooperation, transparency and resident involvement will provide a high quality of life.*

1.6 Community Goals

In a broad sense, goals are general statements concerning an aspect of community's desired physical, social and economic environment. They establish priorities for a community and help

leaders make decisions that affect the future of the community and quality of life for its residents. The goals prioritize the need for orderly, cost-effective and sustainable development for Barrow. Objectives are more specific approaches to achieving community goals. The strategies encourage specific courses of action for the community to undertake to achieve its goals and objectives. Goals, objectives and strategies are presented in Chapter 18.

Goal 1: Protect the community's natural resources.

Goal 2: Protect existing infrastructure from flooding, erosion and other natural disasters.

Goal 3: Minimize construction of facilities and other land uses in hazard prone zones.

Goal 4: Protect the health and welfare of the Barrow community through safe and efficient management of contaminated sites and hazardous waste.

Goal 5: Ensure effective community emergency preparedness.

Goal 6: Use community demographics to plan for future needs.

Goal 7: Understand the complexities of the housing issues in Barrow and coordinate planning activities.

Goal 8: Ensure an adequate supply of housing to meet the needs of current and future Barrow residents.

Goal 9: Facilitate availability of a variety of housing types and prices to provide current and future Barrow residents with greater choice in both rental and ownership opportunities.

Goal 10: Improve the condition of housing stock in Barrow to ensure safe and sanitary living conditions.

Goal 11: Guide development toward a cohesive, cost-effective and orderly development of the community.

Goal 12: Provide reliable utility service to Barrow residents.

Goal 13: Provide emergency services to ensure the safety and welfare of Barrow residents.

Goal 14: Provide medical services to ensure the health and wellbeing of Barrow and North Slope Borough residents.

Goal 15: Maintain and improve Barrow's transportation system to consistently provide mobility for people and goods in a safe and efficient manner.

Goal 16: Offer a variety of recreational opportunities to meet the needs of Barrow residents, especially for families and the youth.

Goal 17: Facilitate adequate communication and telecommunications systems for Barrow residents and businesses.

Goal 18: Barrow has a strong and diversified local economy that provides employment opportunities for residents.

Goal 19: Continue to develop coordinated educational and training opportunities.

Goal 20: Protect and enhance traditional, historical, cultural and subsistence resources and activities.

Goal 21: Guide development toward a cohesive, cost effective and orderly development of the community.

1.7 Community Planning Challenges and Options

Issues raised during stakeholder interviews and subsequent research form the basis for four future development perspectives or Options. All the Options are described in detail in Chapter 17, including diagrams depicting the Options. General descriptions of the challenges and Options are provided below.

1. Option 1 - Status Quo. A community map of Barrow in 2035 was prepared to show a potential development scenario. The Status Quo Option is a scenario in which each entity seeks a location for its facility to meet its specific service needs based on what is available and conducted independently from other community and organizational interests.

2. Option 2 - Renewal Option. Under Option 2, the age, changing functionality and land status of Barrow, focusing particularly on old Barrow were examined.

   Perspectives, in part, include the changing nature of transportation through an ever increasing vehicular oriented community. Several older members of the community reminisced about when there were few vehicles in Barrow. Elsie Itta (born in 1952) talked about as a child crossing a challenging creek flowing out of Lower Isatkoak Lagoon to visit the Brower's before Browerville existed. Elsie's husband, Edward, also spoke of growing up in Barrow. He stated, "I grew up without running water. We burned whale blubber for heat." Morrie Lemen, Jr. spoke of 1968 when there were less than 400 residents in Barrow and the long trip to the Naval Arctic Research Laboratory (NARL) to see a movie. Gordon Brower talked about his first kiss in the Home of the Whalers gym – now the roller rink at the old Ipalook School. Allen Nesteby also spoke of times when there were very few vehicles in Barrow.

   The hospital has now moved and the old facility is vacant except for nurse housing and support buildings. The Greist Center, the dental wing of the old hospital, is now closed and its original services have been moved to the new hospital or the Wellness

Center. The weather station has now moved and the weather station housing is vacant.

Many restricted properties in old Barrow are now vacant and encumbered in multigenerational ownership issues. Some properties are burned or otherwise dilapidated and dot the landscape with charred remains.

Most recently, Pepe's North of the Border Restaurant was completely destroyed by a fire that also rendered the Top of the World Hotel unoccupiable.

The Alaska Department of Transportation and Public Facilities (DOTPF) has completed a new master plan for the Wiley Post – Will Rogers Memorial Airport to accommodate community growth and changing technology of the aircraft serving Barrow.

The old Bureau of Indian Affairs (BIA) School has long moved and has been replaced by the Ipalook Elementary School, Barrow High School, and Hopson Middle School. The NSBSD Central Office 2 (CO2) continues to house school district administration space and teacher housing in building elements that were poorly constructed in the BIA era that now absorb increasing maintenance dollars.

The Renewal Option intends to restimulate old Barrow and capitalize on the existing roads and utilities infrastructure investment and key locational value in the community.

3. Option 3 - New Town Center. Growth beyond Barrow and current Browerville was examined. Option 3 recognizes the new hospital as a driving force of community development.

   Evaluation of the current housing indicates a shortage of approximately 267 houses and another 248 houses by 2035 without oil and gas development. New residential development is most likely to advance toward the east end of the airport and in Browerville. Access around the airport to a south side industrial area could serve as a draw for development as roads are expanded. Infrastructure is expensive; development is needed to amortize its cost.

Stakeholder input and perspectives regarding Options 1 thru 3 led to the development of Option 4 that combines the other Options.

4. Option 4 - Consolidated Option. A combination of Options 1, 2 and 3 provides another perspective to accommodate growth in a meaningful way to 2035 and beyond by incorporating the hospital's new location and extending development toward the east end of the airport while considering the revitalization of old Barrow and the benefits of infill development.

   The goal is to have a substantial consensus for Option 4 as a "Guiding Community Planning Option" to assist orderly and cost effective development through the year 2035 and beyond.

Option 4 forms the basis of the Implementation Plan and provides a platform from which stakeholders can be involved in planning for community growth, such as the NSB Public Works Department planning for new roads and Barrow Utilities and Electric Cooperative, Inc. (BUECI) planning for utility expansion.

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2.0 COMMUNITY OVERVIEW

2.1 Population and Community

2.1.1 Setting

Barrow is the northernmost community in the U.S., uniquely situated on a point of land that is bordered by the Chukchi and Beaufort Seas of the Arctic Ocean. The landscape surrounding Barrow is characterized by tundra spotted with lakes and permafrost soils underlying almost the entire region.

Figure 3 Barrow, Alaska



Barrow's climate is cold and dry, classified as a polar desert. Winter weather can be extremely dangerous because of the combination of exceedingly cold temperatures and wind, while summers are cool even at their warmest. Weather observations are available for Barrow dating

back to the late nineteenth century. A National Weather Service (NWS) office and a National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory operate in Barrow. The U.S. Department of Energy (DOE) has a climate observation site in Barrow as part of its Atmospheric Radiation Measurement (ARM) Climate Research Facility.

The educational facilities servicing Barrow include Ipalook Elementary School, Hopson Middle School, Barrow High School, Kiita Learning Community alternative high school and Iḷisaġvik College. During the academic year Barrow High School swimming pool, weight room and gymnasium are available for public use during the evenings and on weekends. Residents are also permitted to use the City of Barrow's recreation center, Piuraaġvik.

The majority of Barrow homes are heated by natural gas from nearby Barrow gas fields. Most homes also have modern water and sewer systems. Barrow Utilities and Electric Cooperative, Inc. (BUECI) is a member-owned cooperative that provides electricity, natural gas and water/sewer services. Water is also delivered by truck for those homes not connected to the water and sewer system. The NSB provides trash pick-up and disposal.

As the Borough seat of government, Barrow functions as the regional center for many health and social services. The public facilities include Samuel Simmonds Memorial Hospital, a senior citizen center, Arctic Women in Crisis (AWIC) women's shelter, Children and Youth Services (CYS) center and Tuzzy Consortium Library. The NSB also provides public safety and fire protection.

Communications in Barrow include telephone, mail, internet, cable television and a public radio station (KBRW). The community also has three hotels, six restaurants, a dry cleaner, fur shop and a bank. Barrow has one large grocery store, Alaska Commercial Company (AC) and three smaller convenience stores, Arctic Coast Trading Post (ACTP), Arctic Grocery and AC Quick Stop.

Barrow is a "damp" community, meaning that the sale of alcohol is banned but limited amounts may be imported for personal use. Alcohol is shipped to Barrow by holders of city-issued permits that have been approved by the NSB Police Department following a background check.

Diesel, propane, marine gas, aviation fuel and all grades of auto gas are available.

Daily passenger jet service serves Barrow from Anchorage and Fairbanks. Freight arrives via air cargo year-round and via barge during the summer months.

2.1.2 People

The majority of Barrow residents are Iñupiat, an indigenous Inuit ethnic group. Iñupiat translates as "the real people." The Iñupiat have thrived for thousands of years in the Arctic and have relied on their intimate knowledge of the environment and the values of sharing and cooperation. Iñupiat subsistence hunting, fishing and whaling traditions remain an integral way of life in Barrow.

Barrow is the most diverse community in the NSB. Thirty-five percent of Barrow's population is comprised of Caucasians, Asians, South Pacific Islanders, Hispanics and African Americans.

Some of these are long-term (more than ten years) residents of Barrow, while others are short-term residents, sometimes living in Barrow three years or less.

The population of Barrow has changed significantly over the last 25 years. The overall population grew during the 1990s. Beginning in 2001 the population began to decline. The population decline continued until in 2008 when it began to increase again. The current population for Barrow, based on the 2010 North Slope Borough Economic Profile and Census Report (NSBEP&CR), is 4,974 people.

Of Barrow's 4,974 residents, approximately 65% are Iñupiat Eskimo, an increase from approximately 50% in 1998. Subsistence hunting, fishing and whaling are very important to the local culture and economy. Many residents who work full-time or part-time continue to hunt and fish for much of their food. They rely upon subsistence food sources because transporting food to the city is very expensive and because it has been a way of life for generations. Whale, seal, polar bear, walrus, waterfowl, caribou, and fish are harvested from the coast or nearby rivers and lakes.

In 2010, approximately one-quarter of the working population of 1,790 was employed in the private sector. Only a few of those were working for oil companies at Prudhoe Bay. The NSB and NSBSD are Barrow's primary employers. As the borough seat of government, a large percentage of its employment is the government sector: twenty-six percent of the workforce is employed by the North Slope Borough and a total of 43% is employed by the government, including the NSB, NSBSD, City of Barrow, State of Alaska and federal agencies. The regional corporation and native village corporation and their subsidiaries are major employers as well: Arctic Slope Regional Corporation (ASRC) and Ukpeaġvik Iñupiat Corporation (UIC), are both Alaska Native corporations headquartered in Barrow and employ over 10% of the workforce in Barrow. Additionally, Native arts and crafts provide cash income for some residents. There are also some jobs associated with tourism, such as hotel staff.

2.1.3 Community History

The city derived its name from Point Barrow, which was named after Sir John Barrow of the British Admiralty by Frederick William Beechey in 1825. The location has been home to the Iñupiat for more than 15,000 years. Barrow's original Iñupiat name is Ukpeaġvik or "place where snowy owls are hunted".

The portion of Barrow located to northeast of the Tasigarrok and Lower Isatkoak lagoons is called Igluqpauraq, later it was also named Browerville after Charles D. Brower, a New York native and Yankee Whaler that settled in Barrow to work at the Rescue Aid Station. He married a local Iñupiaq woman, Asianggataq, and raised a large family in Barrow.

An important historic site in the Barrow area is the Birnirk archaeological site which contains 16 dwelling mounds of a culture believed to have existed from 500 to 900 A.D. The archaeological findings are considered a key link between the prehistoric cultures of Alaska and Canada.

In 1881, the United States Army established a meteorological and magnetic research station in Barrow. Magnetic research continues today by the United States Department of Interior (USDOI) at another location close to Point Barrow.

In 1888, a Presbyterian church was built at Barrow. A U.S. post office was opened in 1901.

The Cape Smythe Whaling and Trading Station, a historic site, is located in Browerville. Cape Smythe was built as a whaling station in 1893 and is reportedly the oldest frame-construction building in the Arctic.

In 1935, the famous humorist Will Rogers and pilot Wiley Post made an unplanned stop at Walakpa Bay 15 miles south of Barrow while en route to Barrow. As they took off again, their airplane stalled and plunged into a river, killing them both. There are two memorials in the Barrow area: the crash site near Walakpa Bay and another near the airport at the corner of Momeganna and Ahkovak Streets that was dedicated on August 15, 1982. The airport was also renamed the Wiley Post – Will Rogers Memorial Airport.

In 1940, the NVB Iñupiat Traditional Government organized as a federally recognized Native American tribe. NVB wrote a constitution and by-laws under the provisions of the Indian Reorganization Act (IRA) of 1934.

During the 1940s and 1950s, the military played an influential role in the area. Construction of the Distant Early Warning (DEW) Line, a system of radar and communication stations stretching from Western Alaska across the Canadian Arctic to Greenland to provide early warning of any sea-and-land invasion. In addition, oil and gas exploration in the National Petroleum Reserve – Alaska (NPR-A) brought new people to the region. During the same time, the Naval Arctic Research Laboratory (NARL) was built near Barrow to provide a laboratory for scientific study of the arctic environment. South of NARL is a natural gas field that serves the Barrow community and was originally developed by the NARL staff. For many years, this gas field was the only hydro-carbon producing field within the NPR-A.

The Barrow Gas Field is also the only known location of an impact crater (meteor strike) in Alaska, known as the Avak crater. The impact took place between 95 million and 3 million years ago. The Avak structure was first recognized from seismic and gravity surveys in the NPR-A by the U.S. Navy during 1943 to 1953. The Avak structure provides the structural trap for the natural gas in the adjacent South Barrow and East Barrow Gas Fields. These fields have accumulated about 37 billion cubic feet of natural gas.

Barrow was incorporated as a First Class City in 1958.

Residents of the North Slope cast the lone vote in opposition to passage of the Alaska Native Claims Settlement Act (ANCSA), which passed in December 1971. UIC, a for-profit village corporation, was set up by the Iñupiat shareholders of Barrow as a result of the Act.

In 1972, the NSB was established. With millions of dollars in new revenues from property taxes on the oil and gas industry, the NSB created sanitation facilities, water and electrical utilities,

roads, fire departments and health and educational services in Barrow and the villages of the North Slope.

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3.0 NATURAL ENVIRONMENT

3.1 Geography

The predominant land type in Barrow is tundra, which is low lying, characterized by hundreds of lakes, swampy areas and drained thaw-lake basins. The tundra is formed over a continuous region of deep permafrost. According to the U.S. Census Bureau, the City of Barrow has a total area of 21 square miles; 18 square miles which is land and the remaining three square miles are water.

3.2 Soils

Undisturbed permafrost is generally found outside the developed areas of Barrow, approximately 1,000 feet inland from the beach. Undisturbed permafrost areas have tundra vegetation covering ice-rich frozen soils. The permafrost layer may be up to several hundred feet deep. The median depth of bedrock measured in the Barrow quadrangle is approximately 72 feet. The surface is comprised of marine/coastal sand and gravel with some bedrock exposures.

3.3 Wetlands

The areas in and around the City of Barrow are rich in wetland resources. When planning future development, careful siting can minimize impacts to higher value wetland areas, where disruptions may adversely affect the habitat of sensitive and important wildlife species, or functions benefitting the community such as water purification, flood protection, shoreline stabilization, or groundwater recharge and streamflow maintenance. Focusing wetland development in areas that minimize these disruptions and impacts has the added benefit of reducing the financial costs of mitigation, which for a high value area may be on the order of 800% when compared with a lower value area.

The wetland classifications described in Table 1 are found in and around the City of Barrow.

Table 1 National Wetlands Inventory Classifications

NWI Classification	Definition
E2EM1P	Estuarine Intertidal Emergent Persistent Irregularly Flooded
E2US/EM1P	Estuarine Intertidal Unconsolidated Shore / Estuarine Intertidal Emergent Persistent Irregularly Flooded
M1UBL	Marine Subtidal Unconsolidated Bottom Subtidal
PEM1/SS1B	Palustrine Emergent Persistent / Palustrine Scrub-Shrub Broad-Leaved Deciduous Saturated
PEM1/SS1E	Palustrine Emergent Persistent / Palustrine Scrub-Shrub Broad-Leaved Deciduous Seasonally Flooded/Saturated
PEM1/UBH	Palustrine Unconsolidated Bottom Permanently Flooded
PEM1B	Palustrine Emergent Persistent Saturated
PEM1E	Palustrine Emergent Persistent Seasonally Flooded/Saturated
PEM1F; PUBH	Palustrine Emergent Persistent Semipermanently Flooded; Palustrine Unconsolidated Bottom Permanently Flooded
PEM2/UBH	Palustrine Emergent Non-Persistent / Palustrine Unconsolidated Bottom Permanently Flooded
PEM2H	Palustrine Emergent Non-Persistent Permanently Flooded
PUB/EM2H	Palustrine Unconsolidated Bottom / Palustrine Emergent Non-Persistent Permanently Flooded

Environmentally sensitive/important areas, such as PEM1/SS1B around the Upper Isatkoak Lagoon, or less common areas such as those classified as PEM1/UBH, PEM1E or PUBH are likely of higher value (see Figure 5). Development in these areas may require higher mitigation compensation rates, adding additional costs to development projects. The Army Corps of Engineers (USACE) determines mitigation/compensation rates, approves proposed developments on a case-by case basis and has the authority to block development of certain parcels.

There are three mechanisms available for providing compensatory mitigation, listed in order of the USACE preference: (1) mitigation banks; (2) in-lieu fee for mitigation; and (3) permitee-responsible mitigation. In general, the required compensatory mitigation should be within the same watershed as the affected site. Hence, choosing a common wetland classification site over a rare one, facilitates finding a mitigation site within the same watershed.

As of March 2014, no Alaska District Approved Mitigation Banks are available that serve arctic areas, including the City of Barrow. Currently The Conservation Fund is the sole in-lieu fee sponsor serving Arctic Alaska and the Barrow area. The Conservation Fund Alaska In-Lieu Fee (AKILF) Compensatory Mitigation Program Instrument outlines the typical cost per credit by

physical setting and wetlands category. Table 2 reflects the current costs for credits that are subject to change at any time and without notice.

Table 2 Current Mitigation Land Type Valuations

Arctic Service Area	Slope/Flat Depressional Wetlands	Riverine/ Lacustrine Wetlands	Estuarine/ Marine Wetlands
Urban (Barrow and Prudhoe Bay)	$22,000	$33,000	$44,000
Rural (all other towns and villages on the North Slope)	$11,000	$22,000	$33,000
Remote	$5,500	$11,000	$22,000

Development activities and potential impacts to wetland areas should focus on those areas of lower environmental sensitivity and those that are in greater abundance. Focusing development in these areas will improve the likelihood for project approval, lower costs and preserve the most important areas of the local ecology. Wildlife, the plants they depend on and Barrow residents all benefit.

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CHUKCHI SEA

BARROW

BROWERVILLE

UIC NARL

RUNWAY

Lower Isatkoak Lagoon

Upper Isatkoak Lagoon

South Salt Lagoon

Middle Salt Lagoon

Imikpuk Lake

North Salt Lagoon

US Navy

USGS

NOAA CMDL

North Meadow Lake

Science Research District

South Meadow Lake

Central Marsh

CHUKCHI SEA

Barrow

Wainwright

Atqasuk

Point Lay

0 50 100 150 200 Miles

ELEVATION IN FEET

High : 28

Low : -3

FEDERAL LANDS

SCIENCE RESEARCH DISTRICT

NSB GIS PARCELS & ROWs

WATER

SOURCES:
Barrow Area LiDARTopography - U.S. Geological Survey - Draft. LiDAR Acquired July 28, 2010. Used with permission for display purposes only.

Date: 6/13/2014 UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_ LIDAR_TOPO_r01.mxd

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USGS LiDAR TOPOGRAPHY
BARROW

Scale:
0 0.25 0.5 Miles

Figure:
4

UMIAQ

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E2EM1P
E2US/EM1P
M1UBL
PEM1/SS1B
PEM1/SS1E
PEM1/UBH
PEM1B
PEM1E
PEM1F; PUBH
PEM2/UBH
PEM2H
PUB/EM2H

UIC NARL

Chukchi Sea

BROWERVILLE

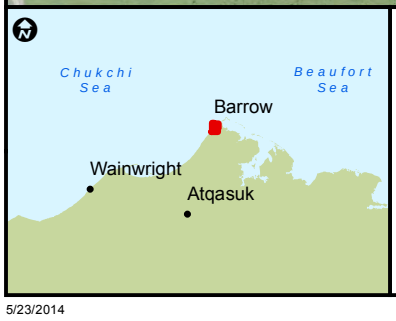
BARROW

NUNAVAK BAY

Middle Salt Lagoon
South Salt Lagoon
Upper Isatkoak Lagoon
Lower Isatkoak Lagoon
Emaiksoun Lake

R U N W A Y

PEM1/SS1E
PEM1/SS1B
PEM1E
PEM1F
PUBH
PEM1/UBH
E2EM1P



EXISTING ROADS

SOURCES:
USFWS: National Wetlands Inventory
UMIAQ: Existing Roads
NSB - GIS: Barrow Boundary

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WETLAND CLASSIFICATION
BARROW

Scale:
0 1,000 2,000 3,000 4,000 Feet

Figure:
5

UMIAQ

5/23/2014

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3.4 Vegetation

The dominant vegetation type in the area surrounding Barrow is wet graminoid tundra. The next most dominant land cover types are dry meadow, moist meadow dominated by Carex grass and emergent aquatic vegetation dominated by Carex grass.

The actual vegetation types within the Barrow developed areas are difficult to characterize and are considered a disturbed landscape due to the construction of gravel roads and building pads that alter the natural function of the tundra and wetlands.

3.5 Climate

Temperatures in Barrow are moderated by the surrounding topography and proximity to marine waters. The flat and treeless tundra stretches for several hundred miles to the south. There are no natural wind barriers or protected valleys where dense cold air can settle as commonly happens in the Interior between the Brooks and the Alaska ranges. Nevertheless, Barrow has the lowest average temperatures of any city in Alaska. Temperatures often remain below freezing from early October through late May with February typically being the coldest month, averaging -14 °F. July is usually the warmest month of the year, with an average high of 47 °F. The sea is usually ice-free in late July and remains that way until late October.

Barrow averages less than five inches of rainfall equivalent[1] annually and is considered a polar desert. Snow that does accumulate in Barrow usually blows in from other locations. Whiteout conditions from blowing snow and extremely cold wind chills are common during the winter months. Temperatures can fall below freezing any day of the year. Each year, on November 18 or 19, the sun sets and remains below the horizon for about 65 days. It rises again on January 22 or 23. On May 10 or 11 each year, the sun rises and does not set again until about August 1 or 2. There are 82 days of continuous daylight during the summer months.

3.6 Wildlife, Birds and Fish

3.6.1 Wildlife

Barrow area wildlife is indicative of the species found across much of the North Slope. Table 3 lists the species commonly found in the Barrow area.

Polar bears are listed as a threatened species by the U.S Endangered Species Act. In 2008, the U.S. Fish and Wildlife Service determined that the polar bear is likely to become an endangered species and faces the threat of extinction within the foreseeable future. Polar bears became the first species to be added to the endangered species list due solely to the threat to their habitat from global climate change. The habitat includes the coastal areas within the North Slope, including the Barrow area. However, the polar bear critical habitat excludes the Barrow townsite.

In 1973 the bowhead whale was listed as endangered under the U.S. Endangered Species Act. Both the pacific walrus and bowhead whale are protected under the Marine Mammal Protection Act. The pacific walrus is also a candidate species; the U.S. Fish and Wildlife Service (FWS)

[1] Twelve inches of snow contains approximately equal water content to one inch of rain.

has determined that there is a sufficient threat to the walrus's biological status to potentially be included as a threatened or endangered species under the Endangered Species Act but there are other higher priority listings.

Table 3 Common Wildlife Species in Barrow Area

Wildlife Type	Species	Habitat Type	Habitat Use
Pinnipeds	ringed seal, bearded seal, spotted seal, pacific walrus**	marine	feeding, breeding, hunting
Whales	bowhead*, beluga	marine	feeding, breeding
Other	musk ox, caribou, Arctic fox, squirrel, lemming, vole, brown bear, wolf, polar bear*, wolverine	tundra (and marine in the case of the polar bear)	feeding, breeding, hunting

*Listed as a Threatened or Endangered species under the Endangered Species Act (ESA)
**Listed as a candidate species under the ESA

3.6.2 Birds

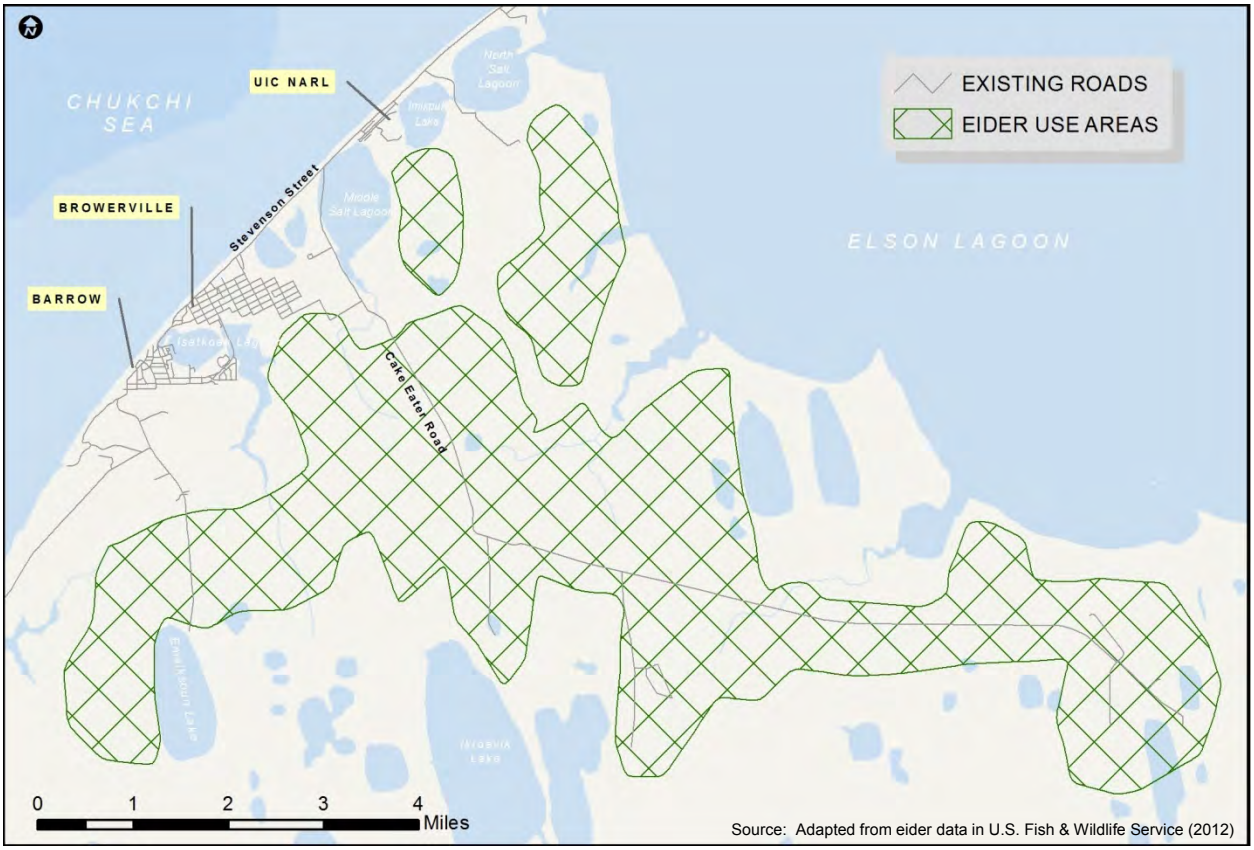
Much of the Barrow area and surrounding lands are considered high-density nesting and staging habitat for shorebirds and passerine birds. The lakes, freshwater ponds and freshwater emergent wetlands are used for breeding by tundra swans and molting and staging waterfowl. Both the spectacled eider and Steller's eider are listed as threatened under the Endangered Species Act. The yellow-billed loon is a candidate species under the ESA. Bird species found in the Barrow area are listed in Table 4. Figure 6 depicts eider use areas in the vicinity of Barrow.

Table 4 Common Bird Species in Barrow Area

Bird Type	Species	Habitat Type	Habitat Use
Ducks	northern pintail, American wigeon, greater scaup, oldsquaw, common eider, king eider, spectacled eider*, Steller's eider*	estuarine and marine wetlands, lakes	breeding, molting, staging
Seabirds	pomarine, parasitic and long-tailed jagers, glaucus and Sabine's gulls, Arctic tern, black guillemot, shearwaters, murres	freshwater emergent wetlands	nesting, feeding
Shorebirds	pectoral and semi-plamated sandpipers, lesser golden plovers, red-necked and red phalaropes, ruddy turnstones, long-billed dowitchers, bairds, stilt and buff-breasted sandpipers, dunlin, black-bellied and semi-palmated plovers, wandering tattlers, snipes, whimbrels, yellow-billed loon**	freshwater emergent wetlands, estuarine and marine wetlands	nesting, feeding
Geese	Canada geese, black brant, greater white-fronted geese, lesser snow geese	estuarine and marine wetlands	feeding

*Listed as a Threatened or Endangered species under the ESA
**Listed as a candidate species under the ESA

Figure 6 Eider Use Areas



3.6.3 Fish

The most common fish species in the Barrow area waters include broad whitefish, least cisco, Arctic grayling, burbot and lake trout. All five species of Pacific salmon have been observed in the Alaskan and Canadian Arctic but are relatively rare by contrast to the more abundant species. The most abundant fish of the Arctic region are listed in Table 5.

The presence of anadromous populations of sockeye salmon, broad whitefish, and least cisco have been documented in Ikroavik Lake and Avak Creek. No other anadromous fish or essential fish habitat areas are identified in the Barrow area.

Table 5 Common Fish Species in Alaskan Arctic

Type of Fish	Common Name
Anadromous Fishes	Arctic cisco, Arctic char (Dolly Varden), least cisco, broad whitefish, humpback whitefish, rainbow smelt, chum salmon, pink salmon, sockeye salmon, chinook salmon, coho salmon
Freshwater Fishes	lake whitefish, inconnu, ninespine stickleback, Arctic grayling, round whitefish, slimy sculpin, northern pike, burbot
Marine Fishes	Arctic cod, Arctic flounder, fourhorn sculpin, Pacific herring

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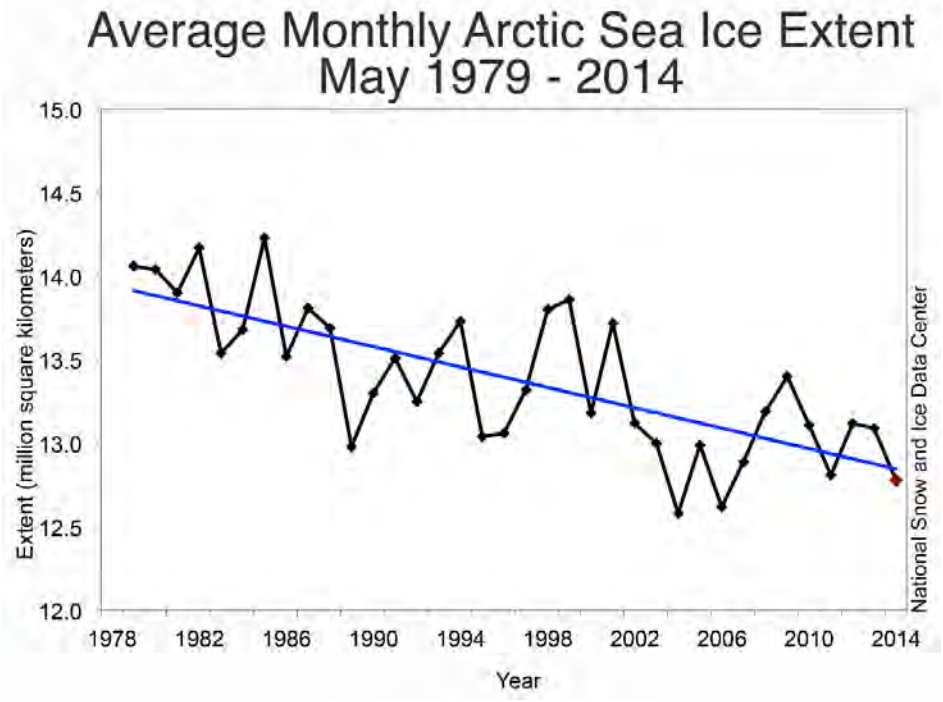
4.0 HAZARDS

4.1 Impacts of Climate Change

Temperatures across Alaska have increased over the past 50 years by an average of 3.4 ºF. Winter warming has been even greater, rising by an average of 6.3 ºF (EPA 2014). These temperature increases are twice the national average over the same time period. Projections indicate that average annual temperatures in Alaska will increase an additional 3.5 to 7 ºF by 2050 (U.S. Global Change Research Program 2009).

The associated impact of this change is evident in Barrow and across the Arctic. The extent of sea ice is declining throughout the Arctic. Some sea ice persists from year to year and is known as perennial sea ice. Other sea ice melts during the warmer season and then refreezes as temperatures decrease. The extent of perennial sea ice has been measured and documented for decades and its extent has been declining. The melting rate is impacted by warmer temperatures and extended above-freezing periods. Sea currents and wind also diminish the ice by moving the ice out of the Arctic basin. Figure 7 depicts the average Arctic sea ice extent from 1979 to 2014 based on data from the National Snow and Ice Data Center and provided by the EPA (Arctic Sea Ice News and Analysis 2014).

Figure 7 Average Arctic Sea Ice Extent 1979 to 2014



The diminishing extent of the Arctic sea ice has led to potential new economic activities such as oil and gas exploration and alternate shipping routes through the Northwest Passage that may reduce travel time between Asia and Europe. Connecting new Arctic ports to existing ones could mean more opportunities for invasive species to enter the Arctic and other northern ports. Diminished sea ice may cause loss of critical habitat for a variety of ice-dependent species, including walruses, spotted seals and polar bears. The changes in sea ice and warmer water can

also affect the timing and location of plankton blooms, which can in turn affect the areas where commercial fisheries thrive. Coastal shorelines and human development along them are protected by land fast ice (sea ice that has frozen along the shoreline). With less land fast ice, coastal areas are subject to increased flooding and erosion caused by storms, wind and waves (U.S. Global Change Research Program 2009; U.S. Arctic Research Commission 2003; National Research Council 2011; Intergovernmental Panel on Climate Change 2007).

Increasing temperatures, often attributed to climate change, are threatening ice cellars in Barrow and many other North Slope villages that are commonly used to store traditionally harvested subsistence food, such as whale and caribou meat. Ice cellars have been in use in Barrow and across the arctic for thousands of years. Some ice cellars are failing, threatening both food security and food safety. (Brubaker et al 2010)

4.2 Flooding and Storm Surges

Coastal storms occur with regularity and have been the major contributors to shoreline damage. Factors occurring in nature that contribute to the high rate of erosional damage along the shoreline in Barrow are storms, resulting storm surges and diminishing shore protection from a shrinking polar ice pack. The coastline is in a northeast and southwest orientation, making it susceptible to storms from both the north and west. Winter storms caused by low pressure systems in the upper atmosphere bring high winds and wave action. Over the years, several studies have been conducted to address the past and future storm damage and continued threat. Although less documented, the loss of polar sea ice is leaving the shoreline vulnerable to the storms and surge for a greater period of time during each year. In generations past, ice was packed into the shoreline creating an ice shelf one-half mile wide. This ice pack was present from fall until late spring. More recently, there is open sea later into the fall and earlier in the spring. If this trend continues, it is anticipated that waves and storm surges will increase in size and strength, causing increasingly more damage.

Local traditional knowledge on seasonal shorefast sea ice indicates that as the sea ice attaches to the shore, the beach is protected against storm surge events that might otherwise cause coastal flooding. Recent fall storm surge events that occur when there is no shorefast ice verifies that flooding will occur without shorefast ice in the Barrow area.

4.2.1 October 3, 1963 Storm

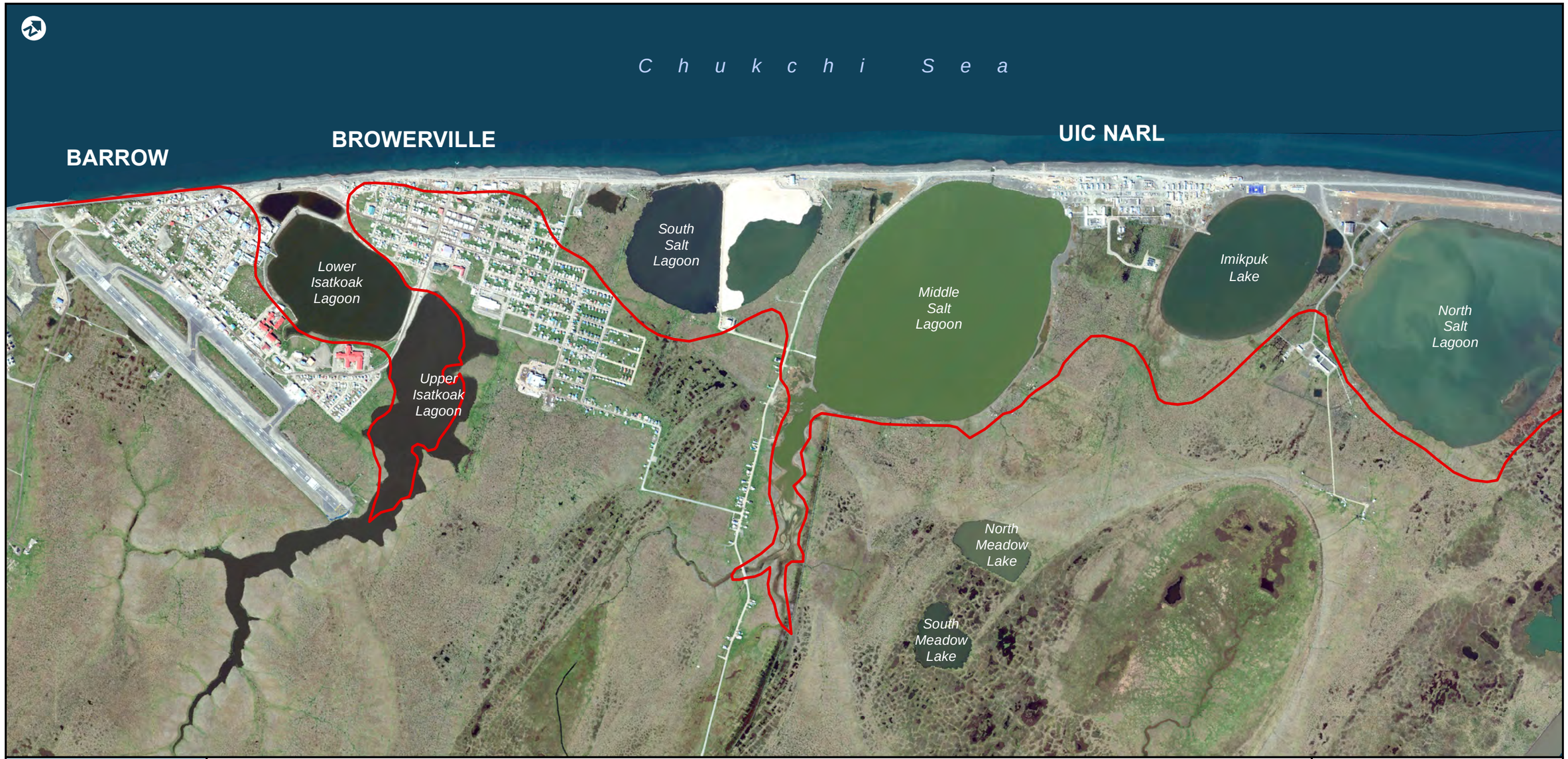
Episodic erosion can result in more extensive losses with large storms. In addition to storm action produced by the wind and wave damage, is the accompanying storm surge. A 10-year storm event can produce an estimated sea level surge of 7.3 feet with a maximum wave height of 5.8 feet. (North Slope Borough 1987). A storm in October of 1963 produced a storm surge that flooded Stevenson Road, isolating Naval Arctic Research Laboratory (NARL) from Browerville and Barrow for several days. The October 1963 storm was the worst storm in Barrow area recorded by the US Weather Bureau and estimated in the *Bluff and Shoreline Protection Study for Barrow* to be a 100-year event. During this storm event, an average of 14 feet of bluff eroded and as much as 35 feet in some areas. (U.S. Army Corps of Engineers (2007b). The USACE estimated in this same assessment that Barrow and the adjacent bluffs experienced as much erosion during this one storm as they have over the past five decades.

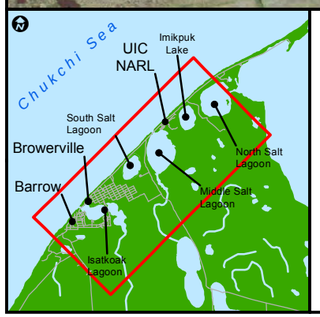
What made the storm of October 3, 1963 unique is the manner and speed in which it hit Barrow, giving little warning to the residents of Barrow. This storm originated over the northern coast of Siberia and began migrating toward the northern coast of Alaska, gathering wind speeds of 40 mph and gusts over 60 mph. The storm's low pressure continued to worsen and by the time it reached Barrow, the wind had changed to a west-northwesterly direction with wind speeds reaching 75-80 mph.

The winds caused a storm surge and extensive wave action (Brunner 2004). The storm surge reportedly was as high as 12 feet (Hume and Schalk 1967). The storm system traveled up to 44 mph, close to the speed of the surge itself. The storm peaked in the afternoon when the majority of the damage occurred. The storm "moved over 200,000 cubic yards of sediments, which is equivalent to 20 years' normal transport" (Hume and Schalk 1967: 86). The combined strength of the winds and storm surge caused significant erosion to the coastal environment. South of Barrow, the bluffs were eroded up to 10 feet, exposing ice rich areas and, in some areas, causing bluffs to collapse.

The flooding was more extensive in and near the NARL than Barrow itself. NARL was cut off from Barrow for several days without a safe route into town. Reportedly, the fresh water source was contaminated; six buildings were lost and the remaining ones had significant structural damage. The NARL airstrip, which was the primary airstrip in use at the time, was also significantly damaged (Hume and Schalk 1967). In Barrow, 32 homes were damaged with 15 of those totally destroyed and 250,000 gallons of fuel were lost as well as three small airplanes (Hume and Schalk 1967). Amazingly, there was no loss of human life. The extent of the 1963 storm surges is depicted in Figure 8.

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1963 FLOODLINE

1963 Floodline as depicted by Hume and Schalk in their paper "Shoreline Processes near Barrow, Alaska: A Comparison of the Normal and Catastrophic. AND digitized from the following reference: Lestak, L.R., J.A. Maslanik, A.H. Lynch, R.D. Brunner and W.F. Manley. 2004. Topography, Flooding and Location Planning Maps for the Barrow Global Climate Change Research Facility, Alaska. Boulder, CO: Cooperative Institute for Research in the Environmental Sciences. Digital media.

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Date: 5/28/2014 UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_63FLOOD_r00.mxd

Title:
BARROW, ALASKA
OCT. 3rd 1963 STORM FLOODING

Scale: 1 inch = 2,000 feet
0 1,000 2,000 3,000 4,000 Feet

Figure: **8**

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4.3 Erosion

Erosion does not occur at an even rate along the shoreline of the Chukchi Sea. The coast is characterized by bluffs 30 feet tall fronted with narrow beaches. Over the years, the bluffs have become more susceptible to erosion because the beaches fronting them have become narrower and less protected from storm and wave action. Along the shoreline toward the north, the bluffs decrease in height until they flatten out into wider beaches at elevations of the adjacent tundra. Annual bluff erosion is estimated to be occurring at a rate of 1.02 feet per year, based on aerial photography analysis for the period 1948 to 2003 (U.S. Army Corps of Engineers 2007a).

There are some areas along the shoreline that have been identified as areas prone to higher erosion rates ("hot spots"). In part, the areas identified as hot spots are critical because they front densely populated areas of Barrow and are located in areas that have not been stabilized. In addition, the USACE reports indicate that if the present net rate of erosion of 2.2 feet per year continues in the hot spots (as documented for the period 1984 to 2003), a significant number of buildings and infrastructure will be lost. Figure 9 and Figure 10 illustrate the “hot spot” areas within Zones 1 and 2, respectively, and the estimated erosion lines for 2025 and 2035. If these areas, specifically the areas identified as “hot spots” are not mitigated against the erosion or the structures are not relocated, a total of 31 buildings along with the associated roads and utilities could be impacted or lost.

4.3.1 Mitigation

The NSB has funded erosion mitigation for many years. Some of the specific mitigation techniques used by the NSB and others over the years include:

- Offshore dredging with beach nourishment;
- Construction of sacrificial berms;
- Shoreline road maintenance; and
- Construction/use of HESCO Concertainers.

More than $28 million has been spent by the NSB over a decade to place 100,000 cubic yards (CY) of gravel on the beach. Flood waters have overtopped Stevenson Street multiple times since 2000, with prolonged disruption of access to NARL, leaving residents and Iḷisaġvik students stranded and without access to emergency medical services for several days (State of Alaska Department of Transportation and Public Facilities 2012). During a storm in 2000, floodwater overtopped Stevenson Street, washing out four sections of the road to NARL. The NSB spent over $330,000 dollars to repair the road during this incident. Historically the road needs repairs such as this every three years.

Other mitigation measures have been incorporated with varying degrees of success: large supersacks placed along the beach bank slopes; surplus wooden utilidors filled with material to create a seawall; old tar barrels laid along the upper beach slope; and placement of geotextile tubes along berm bases (U.S. Army Corps of Engineers 2007b). Based on the USACE 2007

Erosion Information Paper, an average amount of 15,000 cubic yards of material is placed along the shoreline annually to protect the community.

The USACE Coastal Storm Damage Reduction Technical Report dated July 2010 has estimated average annual damage at approximately $1.2 million. This amount is estimated, in part, by calculating the cost to repair the damaging effects of storms on roads, structures, protective berms and utilities. The report also states that ten structural measures and five non-structural measures were considered to reduce erosion and flood damages. These possible preventive measures were pared down to five basic alternatives with scale variations:

- Rock revetments;
- Beach nourishment;
- Joining the National Flood Insurance Program;
- Elevating and relocating buildings; and
- Lagoon filling.

The report then generated 16 cost estimates for alternatives to compare with the estimated effectiveness in reducing storm damage. In all cases, the costs of implementing all alternatives far exceed the National Economic Development (NED) benefits, resulting in a negative NED benefit.

4.3.2 At Risk

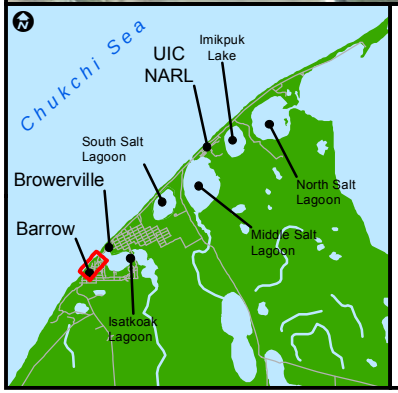
Much of the existing infrastructure is in danger of being lost due to the diminishing shoreline and increased flooding. Not all of the at-risk infrastructure can be addressed here, but a few larger impacts are noted. In Barrow, Stevenson Street is the main road access to points north of Barrow and Browerville and is at risk of damage due to erosion. Flooding and damage occurs most years and costs the NSB thousands of dollars in repairs. On many occasions, access to NARL is cut off, sometimes for days at a time, as well as areas north of NARL used for subsistence activities. There are fuel and electric utilities parallel to Stevenson Street that are also at risk.

The South Salt Lagoon is also at risk due to continued erosion. The lagoon has been used for years as a sewage dumping site. If the lagoon were to be breached, contaminates would threaten wildlife and subsistence activities. In addition, the South and Middle lagoons are integral components of the existing sewage treatment process. To compromise either would impact the treatment systems and cause the loss of process functionality, potentially leaving the community without sewage treatment facilities.

The old Barrow Landfill located at the South Salt Lagoon is at risk and, although closed and capped now, breaching would allow large amounts of solid waste to be carried into the sea.

Sections of the utilidor system along Agvik Street (specifically Pump Station [PS] 4) could be breached and flooded with encroaching water. Associated damage would include loss of utility service, freezing damage and impacts to many residents.





POTENTIAL EROSION

Shoreline was digitized from 2012 satelite imagery and is subject to interpretation. Historic erosion along the bluff is divided into two "hot spots", identified as most critical fronting the most densely populated area. A net shoreline erosion rate of 2.2 ft. per year, "Coastal Storm Damage Reduction Technical report", USACE, July 2010

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YEAR 2012 YEAR 2035
YEAR 2025 Pumpstations

Title: BARROW, ALASKA POTENTIAL EROSION ZONE 1

Scale: 1 inch = 300 feet

0 150 300 450 600 Feet

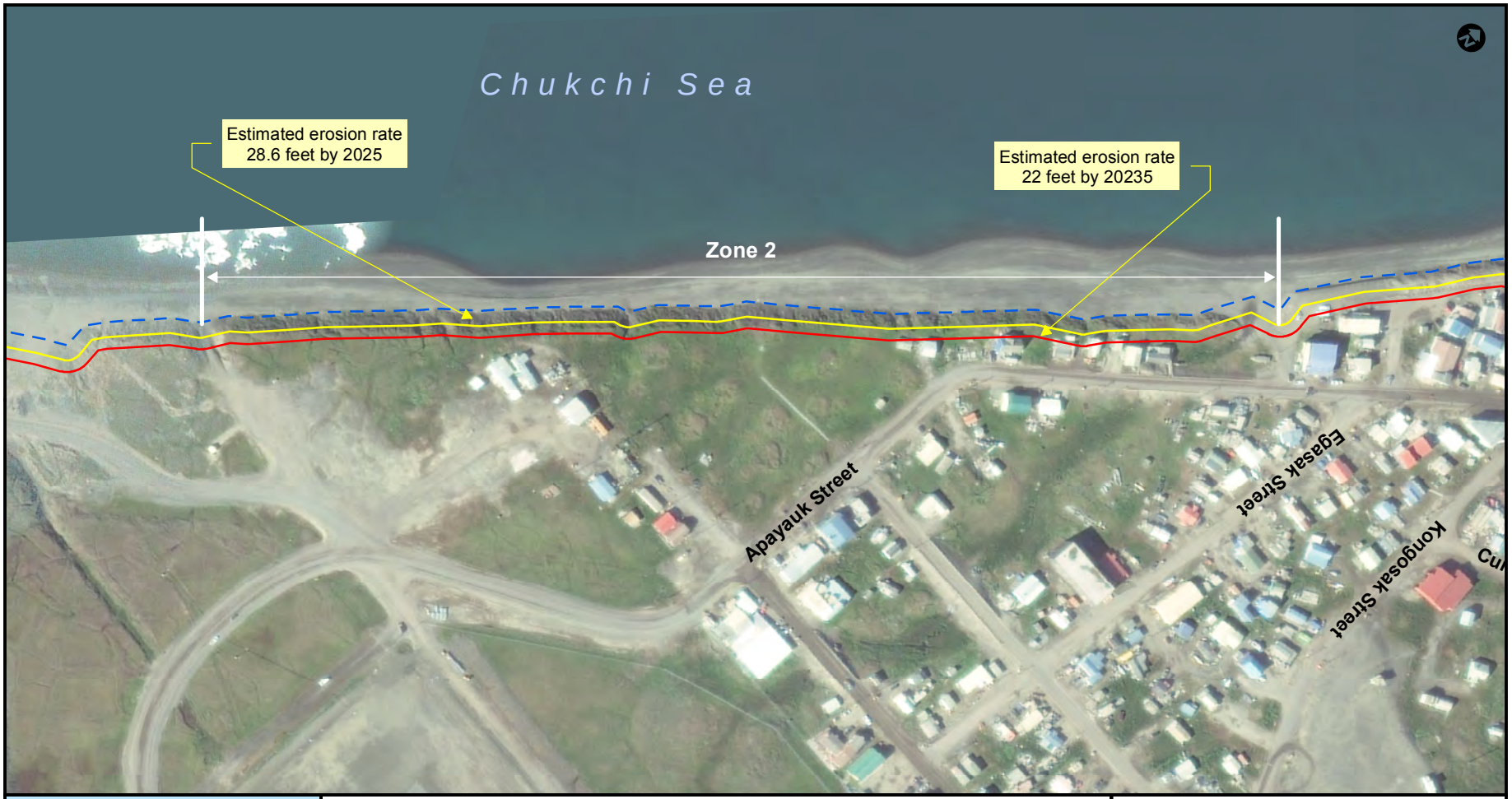
Figure: 9

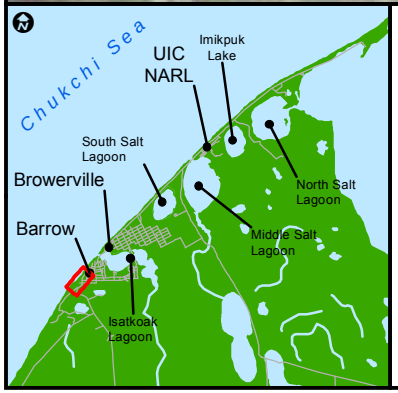
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Date: 4/29/2014

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POTENTIAL EROSION

Shoreline was digitized from 2012 satelite imagery and is subject to interpretation. Historic erosion along the bluff is divided into two "hot spots", identified as most critical fronting the most densely populated area. A net shoreline erosion rate of 2.2 ft. per year, "Coastal Storm Damage Reduction Technical report", USACE, July 2010

YEAR 2012
YEAR 2025
YEAR 2035

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Title: BARROW, ALASKA
POTENTIAL EROSION
ZONE 2

Scale: 1 inch = 300 feet

0 150 300 450 600 Feet

Figure: **10**

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4.3.3 Community Cultural and Social Impacts

There are impacts to social and cultural conditions from increased storms, flooding and erosion. Storms and erosion impacts cause flooding in lower elevations, impacting access to fishing and hunting sites, boat launching, and recreational activities. Increased erosion of archeological sites could expose burial sites and historic artifacts, some that date back more than 4,000 years.

4.3.4 Appropriate Responses

Recognizing and controlling the impacts of erosion can be categorized into three possible responses:

- Prevention. The most appropriate response is prevention. The City of Barrow and the NSB should consider not constructing new facilities within in a 50-year flood hazard zone. If construction of a facility is necessary, then design should be incorporated to allow for ease in relocation if it were to become necessary.
- Mitigation. Some facilities threatened by erosion are important components to the infrastructure system and the cost benefit to spend funds to protect them may be necessary.
- Abandonment. In some cases, it becomes a losing battle to continue to spend capital funds to save a property or facility. Either physically relocating vulnerable facilities or abandoning them altogether in favor of a new facility farther from erosion danger may become a better financial choice.

4.4 Permafrost Thaw

4.4.1 Permafrost Characteristics

Permafrost is rock or solid soils that have remained continuously below 32 degrees for two or more years. In the Barrow area, permafrost is known to extend to depths of 1,000 feet (McCarthy 1994). The layer above the permafrost thaws during summer months and refreezes again in winter. This layer is called the “active layer” and it typically varies in depth, up to 1.5 to 2.0 feet depending on vegetative cover in undisturbed soils. In areas of disturbance, the active layered depth can be greater.

Ice-rich permafrost is a soil that is comprised of a significant amount of water as part of the soil matrix. While some permafrost is "thaw stable," ice-rich permafrost is not. This type of soil, which in undisturbed conditions may be stable, does not have the ability to support surface loads when the active layer is thawed because of its very high water content.

4.4.2 Permafrost Thaw

Subsurface failures cause significant damage to both surface infrastructure development and the underlying and adjacent permafrost. The thermal gain in the development area exceeds the insulating property of the tundra and permafrost below. Where there is damage to the vegetative layer or compaction of the top soils and vegetation mat, its insulating capabilities are diminished

causing more subsurface thawing to the permafrost layers. In addition, permafrost is less permeable than unfrozen soils and limits the flow of subsurface water. In areas of lakes and the ocean, warmer temperatures of the water can infiltrate and thaw adjacent permafrost layers.

Permafrost is very sensitive to any surface changes that alter the existing insulating characteristics of the surface vegetation or tundra. Any kind of surface construction such as buildings and roads on this type of permafrost will modify the surface vegetation's insulating properties. If proper engineering techniques to replace the tundra's insulating characteristics are not implemented, developments are subject to damage or overall failure.

The presence of permafrost also impacts surface drainage and can impede surface drainage patterns. The permafrost impedes active flows within the active layer from any deeper regional subsurface flows. In areas of added snow drifts such as along snow fences, plugged streams and culverts can seriously impact surface erosion and drainage patterns. Also related, a report addressing failure modes of thawing permafrost bluffs along the Chukchi Sea Coast in 2009 provided preliminary analysis that increasing temperatures are resulting in accelerating thawing of permafrost and even linked it to coastal erosion. (Collins et al 2009).

4.5 Contamination/Hazardous Waste

Contaminated Sites. ADEC defines a contaminated site as "a location where hazardous substances, including petroleum products, have been improperly disposed." Existing contaminated sites have the potential to threaten public health or the environment and can cause economic hardship to people and communities. ADEC identified 32 contaminated sites in the Barrow area (Figure 11). These sites include former landfills and dump sites, NARL facilities and DEW Line facilities. All the contaminated sites are listed in Table 6. More information on these sites including closure details and cleanup chronology can be found on the ADEC Contaminated Sites Program website.

Legacy Wells. Between 1944 and 1982, the U.S. Navy and the U.S. Geological Survey (USGS) conducted a program of exploratory and scientific drilling of 136 oil wells on Alaska's North Slope in the National Petroleum Reserve in Alaska (NPR-A). The Bureau of Land Management (BLM), given the responsibility of managing the NPR-A in 1976, became responsible for assessing, plugging and cleaning up the wells.

The NPR-A 2013 Legacy Wells Summary Report indicates that 68 wells require no additional BLM action; 18 wells are currently in use by USGS; and 50 wells currently require BLM remediation (citation). In 2013, the federal government allocated an additional $50 million to address well remediation within the NPR-A. In response, the BLM is planning to address the highest priority wells first and those that are clustered to maximize spending. There are several clusters of wells: the Umiat cluster that includes six wells; the Barrow cluster that includes seven wells; and a Simpson Peninsula cluster of seven wells.

The new infusion of federal funds for cleaning up the legacy wells will likely require staging areas for equipment, supplies and short and/or long term storage for contaminated materials. Because there is a cluster of wells in the Barrow area and because it is the largest community strategically

located along the coast, Barrow will likely see some of this remediation and staging activities. There are several laydown areas that may be used for this work, including the gravel pads south of the airport and at NARL.

Table 6 Contaminated Sites, Barrow Area

No.	ADEC Hazard ID	Site Name	Location	Status	ADEC File ID
1	163	Brower Property	4211 Karluk Street Barrow, AK 99723	Cleanup Complete	310.38.020
2	193	Skull Cliff LORAN DEW Line / DERP	23 Miles SW of Barrow	Open	320.38.003
3	556	NARL - Powerhouse Fuel Spill	5.5 Miles NE of Barrow	3	556
4	557	NARL - Airstrip Fuel Spill	Near Airstrip Barrow, AK 99723	Open	310.38.012
5	558	NARL - Bulk Fuel Tank Farm	North Salt Lagoon	5	558
6	559	NARL - Middle Salt Lagoon	Middle Salt Lagoon Barrow, AK 99723	Open	310.38.008
7	566	NARL - Naval Arctic Research Lab	5.5 Miles NE of Barrow Barrow, AK 99723	Open	310.38.008
8	567	NARL - Old Waste Disposal Area	0.5 Mile South of NARL Barrow, AK 99723	Cleanup Complete - Institutional Controls	310.38.015
9	568	NARL - Former Dry Cleaning Facility	NARL Facility Barrow, AK 99723	Cleanup Complete	310.38.014
10	569	NARL - Elson Lagoon	7 Miles NE of Barrow Barrow, AK 99723	Open	310.38.008
11	570	NARL - Radiation Laboratory	5.5 Miles NE of Barrow Barrow, AK 99723	Cleanup Complete	310.38.008
12	763	Peard Bay DEW Line Site / DERP	50 Miles SW of Barrow Barrow, AK 99723	Cleanup Complete	320.38.006
13	766	Cape Simpson / DERP	50 Miles SE of Barrow Barrow, AK 99723	Cleanup Complete - Institutional Controls	320.38.002
14	768	Point Barrow POW-M DEW Line Site Vehicle Maintenance Facility Area	Point Barrow Long Range Radar Station Barrow, AK 99723	Open	310.38.004
15	1392	Barrow UIC Block 19	Hopson Street Barrow, AK 99723	Open	310.38.003
16	1400	IHS Barrow PHS Hospital	1296 Agvik Street Barrow, AK 99723	Open	310.38.002
17	1432	Barrow Drum Ravine	1.5 miles SW of Barrow Barrow, AK 99723	Open	310.38.005

No.	ADEC Hazard ID	Site Name	Location	Status	ADEC File ID
18	1602	FAA Barrow Vortac Facility	Barrow	Cleanup Complete - Institutional Controls	310.38.009
19	2325	MarkAir - Barrow	Barrow Airport Barrow, AK 99723	Cleanup Complete - Institutional Controls	310.38.010
20	2651	BLM East Simpson #2	52 Mile SE of Barrow Barrow, AK 99723	Open	300.38.109
21	3232	Barrow Gas Station Tank Farm	Stevenson & Ahkovak Streets Barrow, AK 99723	Cleanup Complete	310.38.021
22	3238	Barrow Elson Former Nike Facility	5 Miles NE of Barrow Barrow, AK 99723	Open	310.38.022
23	4269	Barrow Airport Lease Lot 2A Block 300	1737 Ahkovak Street Barrow, AK 99723	Cleanup Complete	310.38.018
24	25372	Spenard Builders Supply Barrow	40 NARL Road Barrow, AK 99723	Cleanup Complete - Institutional Controls	310.38.025
25	25761	Point Barrow POW-M DEW Line Site Air Terminal Area (SS003)	Point Barrow Long Range Radar Station Barrow, AK 99723	Open	310.38.004
26	25762	Point Barrow POW-M Dew Line Site Radome Area	Point Barrow Long Range Radar Station Barrow, AK 99723	Open	310.38.004
27	25763	Point Barrow POW-M DEW Line Site Transformer Stand Area	Point Barrow Long Range Radar Station Barrow, AK 99723	Open	310.38.004
28	25764	Point Barrow POW-M DEW Line Site Vehicle Fueling Station Area	Point Barrow Long Range Radar Station, Barrow, AK 99723	Open	310.38.004
29	25916	NSB South Pad	Nunavaaq Street, ~1 Mile from West End of Airport Runway, Barrow, AK 99723	Open	310.38.028
30	25996	Oliktok DEW Line Fuel Tank Farm (Fuel Storage Area) SS009b	Oliktok Long Range Radar Station Barrow, AK 99723	Open	300.38.013
31	25997	Oliktok DEW Line Soil Cell LF001a	Oliktok Long Range Radar Station Barrow, AK 99723	Open	300.38.013
32	26125	NPR-A Legacy Wells General	23 Million Acre Area 200 Miles North of Arctic Circle Barrow, AK 99723	Informational	320.38.010

Source: ADEC 2014

CONTAMINATED SITE STATUS

- Active
- Cleanup Complete
- Cleanup Complete - Institutional Controls
- Informational

UIC NARL

BROWERVILLE

BARROW

Nunavak Bay

Chukchi Sea

North Salt Lagoon

Imikpuk Lake

Middle Salt Lagoon

South Salt Lagoon

Lower Isatkoak Lagoon

Upper Isatkoak Lagoon

Emaiksoun Lake

Ikroavik Lake

STEVENSON STREET

CAKE EATER ROAD

NUNAVAK ROAD

FRESH WATER ROAD

Alaska Department of Environmental Conservation - Contaminated Sites Program



EXISTING ROADS

BARROW BOUNDARY

SOURCES:
Alaska Department of Environmental Conservation
Contaminated Sites Program

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CONTAMINATED SITES

Scale:
0 0.25 0.5 0.75 1 Miles

Figure: **11**

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5.0 POPULATION

5.1 Changes in Population

Barrow's population growth had been remarkably robust until the early 2000s, when the population declined. The community experienced overall positive sustained population growth for over 70 years. The positive growth contributed to Barrow becoming the largest population center of all North Slope communities.

5.1.1 Declining Population 2001-2007

The decline in population appeared to be based on two primary factors:

- declining revenue to the NSB from the property taxes collected from the oil and gas industry for real property improvements in the Prudhoe Bay/Deadhorse area and Kuparuk and its surrounding fields; and
- a significant decline in major capital improvement project expenditures in North Slope communities funded by the NSB due to reduced revenue.

The reduction in population appears to have been a combination of non-Native people leaving Barrow because of the loss of job opportunities and a statewide trend of rural residents moving to the urban centers of Alaska. This is partially evidenced by the increase of Barrow's percentage of Iñupiat population that accounted 61% of the total population in 2003 to about 65% in 2010.

5.1.2 Growing Population 2008 – Present

The turnaround in population was likely due to:

- increased activity by the oil and gas industry in exploration of the Chukchi Sea; and
- new legal determinations on the value of the properties in the Prudhoe Bay/Deadhorse area and Kuparuk and its surrounding fields that resulted in additional revenue to the NSB.

There appears to be a strong relationship between the tax revenue coming into the NSB coffers, the growth of the NSB capital budget and the overall growth of the Barrow population. Since 2006, the NSB revenue has grown about 7% annually while the number of NSB full-time employees (FTEs) has grown by about 5%. The Barrow population has averaged slightly over 1% growth since 2008.

Disputed Population Numbers. The SOA and the NSB frequently disagree on the census counts developed by the State. The NSB has been able to routinely refute the SOA's count by showing that NSB communities, including Barrow, had a larger population than accounted for by the State by conducting its own census. The undercount was significant in 2010. The SOA indicated 762 fewer Barrow residents than the NSB's 2010 census. Some of this difference can be attributed to the State's reliance on the federal decennial census and applications for the Alaska Permanent Fund Dividend (PFD). These two sources for estimating population fail to account for people that:

- did not participate in the federal census (a historic and chronic issue in rural Alaska), and
- are not eligible for a PFD because of either length of time required to be considered an Alaska resident or status as a convicted felon, that are nonetheless residents.

This dispute between the SOA and the NSB is usually resolved by compromising on the final population count but the State rarely revises the original number in official records.

The reason this is important is because population drives funding for many services provided by the State of Alaska and the federal government. The difference of 762 residents can result in a significant underfunding of programs and therefore a diminished capacity to provide adequate services.

5.1.3 Poverty

According to the U.S. Department of Health and Social Services, approximately 17.7% of Barrow residents are living at or below the poverty level. The 2013 guidelines for determining poverty in Alaska are listed below in Table 7.

Table 7 2013 Guidelines for Determining Poverty Level

Persons in Family/Household	Poverty Guideline
For families/households with more than 8 persons, add $5,030 for each additional person.	
1	$14,350
2	$19,380
3	$24,410
4	$29,440
5	$34,470
6	$39,500
7	$44,530
8	$49,560

5.1.4 Diversity

Barrow's population is the largest of any of the North Slope communities and has the most complex racial mix. While Barrow remains racially an Iñupiat-dominant community, Barrow is also home to other Alaska Natives, Native Americans, Caucasians, Pacific Islanders, African Americans and several Asian communities, the largest being Filipino. Despite its isolation from the Alaskan road system and its remoteness, Barrow is remarkably diverse. Table 8 outlines the 2010 census ethnic/racial breakdown for Barrow.

Table 8 2010 U.S. Census Ethnic/Racial Breakdown

Ethnicity	Total (percent)
Iñupiat	65.1
Caucasian	15.8
Athabascan	0.3
Tlingit	0.1
Haida	0.1
Yup'ik	0.4
American Indian	0.5
Asian Indian	0.2
Filipino	7.6
Thai	0.4
Hawaiian	0.3
Korean	0.2
Pacific Islander	2.4
African American	1.1
Vietnamese	0.1
Other	5.5

5.2 Implications Based on Population Projections

Population projections for Barrow are needed to determine the level of services and infrastructure needed to sustain the community for the next 20 years. There are two sets of population projections based on oil and gas industry activity:

1. Without oil and gas industry development on the Chukchi Sea leases; and

2. With oil and gas industry development on the Chukchi Sea leases. The population projection with oil and gas industry activity was developed using basic information that the NSB has collected for past population growth.

5.2.1 Barrow Population Without Oil and Gas Development

Table 9 2010 Population Details Without Oil and Gas Development

Population	Age Group	Total	Male	Female	Ratio of Male to Female
Pre-school	0-4	395	206	189	1.09
Primary school	5-9	327	171	156	1.10
Secondary school	10-19	625	326	299	1.09
Adults	20-49	2,221	1159	1062	1.09
Retiring adults	50-64	1,194	623	571	1.09
Seniors	65-90+	211	110	101	1.09
	Total	4,973			

Table 10 2015 Population Details Without Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2010	Ratio of Male to Female
Pre-school	0-4	476	242	234	+1.14	1.03
Primary school	5-9	383	195	189	+1.11	1.03
Secondary school	10-19	585	307	278	-0.89	1.11
Adults	20-49	2,202	1,422	780	-0.94	1.82
Retiring adults	50-64	1,298	930	369	+1.03	2.52
Seniors	65-90+	284	158	126	+1.28	1.25
	Total	5,228				

Table 11 2020 Population Details Without Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2015	Ratio of Male to Female
Pre-school	0-4	458	233	226	-0.91	1.03
Primary school	5-9	472	238	233	+1.17	1.02
Secondary school	10-19	675	348	327	+1.10	1.06
Adults	20-49	2,197	1,423	774	-0.95	1.84
Retiring adults	50-64	1,279	924	354	-0.93	2.61
Seniors	65-90+	414	236	179	+1.39	1.32
	Total	5,495				

Table 12 2025 Population Details Without Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2020	Ratio of Male to Female
Pre-school	0-4	437	220	217	-0.90	1.01
Primary school	5-9	456	229	227	-0.91	1.99
Secondary school	10-19	840	455	384	+1.17	1.18
Adults	20-49	2,293	1,548	746	-0.99	2.08
Retiring adults	50-64	1,196	818	378	-0.88	2.17
Seniors	65-90+	553	293	260	+1.26	1.13
	Total	5,775				

Table 13 2030 Population Details Without Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2025	Ratio of Male to Female
Pre-school	0-4	457	231	226	-0.99	1.02
Primary school	5-9	433	218	215	-0.90	1.02
Secondary school	10-19	930	473	457	+1.05	1.04
Adults	20-49	2446	1,571	875	+1.01	1.79
Retiring adults	50-64	1,151	890	260	-0.91	3.42
Seniors	65-90+	653	346	306	+1.12	1.13
	Total	6,070				

Table 14 2035 Population Details Without Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2030	Ratio of Male to Female
Pre-school	0-4	528	266	261	+1.11	1.02
Primary school	5-9	452	227	225	+1.00	1.01
Secondary school	10-19	883	448	435	-0.91	1.03
Adults	20-49	2,626	1,681	945	+1.03	1.78
Retiring adults	50-64	1,233	930	303	+1.03	3.07
Seniors	65-90+	658	345	313	-0.97	1.10
	Total	6,379				

While the overall population for Barrow continues to grow, certain age cohorts are projected to decline while other age cohorts are projected to increase. For example, the Adults and Retiring Adults cohorts show an overall decline in both scenarios. One reason may be the lack of employment opportunities and conveniences that one can have in an urban community. For the Retiring Adults, the decrease could be that living in a community like Barrow with a high cost of living is simply too expensive for someone on a fixed income. The rise in the seniors' age cohort could be attributed to seniors moving back to Barrow to live with their family.

5.2.2 Barrow Population With Oil and Gas Industry Development

Table 15 2010 Population Details With Oil and Gas Development

Population	Age Group	Total	Male	Female	Ratio of Male to Female
Pre-school	0-4	395	202	193	1.05
Primary school	5-9	327	167	160	1.05
Secondary school	10-19	625	325	300	1.08
Adults	20-49	2,221	1431	790	1.81
Retiring adults	50-64	1,194	867	327	2.65
Seniors	65-90+	211	119	92	1.29
	Total	4,974	3,111	1,862	

Table 16 2015 Population Details With Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2010	Ratio of Male to Female
Pre-school	0-4	485	246	239	+1.14	1.03
Primary school	5-9	391	199	192	+1.11	1.03
Secondary school	10-19	596	313	283	-0.89	1.11
Adults	20-49	2,246	1450	796	-0.94	1.82
Retiring adults	50-64	1,324	948	376	+1.03	2.52
Seniors	65-90+	289	161	128	+1.28	1.25
	Total	5,331	3,317	2,014		

Table 17 2020 Population Details With Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2015	Ratio of Male to Female
Pre-school	0-4	516	262	254	-0.91	1.03
Primary school	5-9	531	268	262	+1.17	1.02
Secondary school	10-19	760	391	368	+1.10	1.06
Adults	20-49	2,471	1601	870	-0.95	1.84
Retiring adults	50-64	1,438	1040	398	-0.93	2.61
Seniors	65-90+	466	265	201	+1.39	1.32
	Total	6,181	3,827	2,353		

Table 18 2025 Population Details With Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2020	Ratio of Male to Female
Pre-school	0-4	504	254	250	-0.90	1.01
Primary school	5-9	526	264	262	-0.91	1.99
Secondary school	10-19	968	525	443	+1.17	1.18
Adults	20-49	2,644	1784	860	-0.99	2.08
Retiring adults	50-64	1,379	943	435	-0.88	2.17
Seniors	65-90+	638	338	300	+1.26	1.13
	Total	6,658	4,108	2,550		

Table 19 2030 Population Details With Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2025	Ratio of Male to Female
Pre-school	0-4	530	268	262	-0.99	1.02
Primary school	5-9	502	253	249	-0.90	1.02
Secondary school	10-19	1,078	548	530	+1.05	1.04
Adults	20-49	2,834	1,820	1,014	+1.01	1.79
Retiring adults	50-64	1,333	1,031	302	-0.91	3.42
Seniors	65-90+	756	401	355	-1.12	1.13
	Total	7,033	4,231	2,712		

Table 20 2035 Population Details With Oil and Gas Development

Population	Age Group	Total	Male	Female	Change from 2030	Ratio of Male to Female
Pre-school	0-4	612	309	303	+1.11	1.02
Primary school	5-9	524	264	261	+1.00	1.01
Secondary school	10-19	1,024	519	505	-0.91	1.03
Adults	20-49	3,046	1,950	1,096	+1.03	1.78
Retiring adults	50-64	1,430	1,079	352	+1.03	3.07
Seniors	65-90+	763	400	363	-0.97	1.10
	Total	7,400	4,521	2,880		

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6.0 HOUSING

The community of Barrow, like many other communities across the North Slope and throughout Alaska, struggles with housing issues – safe, sanitary, available and affordable housing for residents. Barrow is experiencing a shortage of housing of all types. The lack of affordable housing is exacerbated by the lack of rental housing and homeownership opportunities.

Housing is a complex issue in Barrow and across the entire North Slope. It is the convergence of many factors including land ownership and Barrow's remote location that contribute to the lack of availability, lack of affordability and overcrowded conditions. The population is expected to grow by 1,203 people by the year 2035 without oil and gas development and by 2,224 people with oil and gas development, an increase of 23% and 42% respectively. With this anticipated increase, the complexity of housing issues should be addressed to comfortably accommodate both the current and future populations.

This section of the Comprehensive Plan identifies and describes the current housing issues and those related to the projected growth. It does not substitute the need for a holistic housing study that investigates housing issues in depth and provides an array of potential solutions.

6.1 Existing Housing Conditions

According to the NSB 2010 Economic Profile and Census Report (NSBEP&CR), there are 1,644 total dwelling units in Barrow of which 1,507 are occupied, a 91.7% occupancy rate. The majority of Barrow residents, 61%, live in single family homes while 7% live in mobile homes or trailers. The remaining 32% of residents live in buildings with two or more dwelling units. Forty-three percent of families own their home and of those, 51% own their home free of a loan obligation or mortgage (North Slope Borough 2010).

Housing construction was a thriving industry in Barrow during the 1980s. Nearly 38% of the total housing stock was constructed between 1980 and 1989. The estimated 597 residential units built during the 1980s accounts for more than all the housing stock constructed prior to 1980 (34%) and more than has been built in the last nearly 25 years (28%) (U.S. Census Bureau 2010). More recently, approximately 43 housing units have been constructed in Barrow since 2010 - one duplex and 41 single family homes (Moore 2014).

Natural gas fuels approximately 93% of all households in Barrow. The nearby Barrow Gas Fields make heating homes in Barrow one of the least expensive areas in the state. Nearly all (94.4%) Barrow homes have running water and 85.6% of homes are connected to the utilidor water and sewer system. Of the homes that are not connected to the utilidor system, they either rely on holding tanks (7.5%) or honey buckets (6.2%) (North Slope Borough 2010).

6.2 Overcrowding

The rate of overcrowding is a frequently used indicator to assess housing affordability, economic health and the quality of life within a community. A commonly accepted definition of overcrowding and one used by the United States Census Bureau is more than one person per room; severe overcrowding is defined as one and a half people per room. The 2008-2012 American Community

Survey 5-Year Estimates indicate that 13% of households in Barrow are overcrowded, 4% of which are severely overcrowded. By comparison, the combined national average for overcrowding and severe overcrowding is 3.2% (U.S Census Bureau 2012). At community meetings, residents voiced concern about the lack of housing availability for rent or purchase and the prevalence of two and three generations living together in one home.

6.3 Vacancy

Vacant housing units are integral to a healthy housing market because they help maintain stable prices. Without a sufficient number of vacant units, competition creates upward pressure on both rental and for sale housing prices. The 2010 NSBEP&CR indicates that there were 137 or 8.3% vacant dwelling units in Barrow[2]. The 2010 U.S Decennial Census indicates that vacant housing rates within Barrow were higher, with an estimated 274 vacant housing units and an overall vacancy rate of 17.6%.[3] Of the total housing units in Barrow, the U.S Census indicated that 5.3% were reserved for seasonal, occasional or recreational use; 6.6% were other vacancies; 5.2% were available for rent; and .1% were for sale. By comparison, the State of Alaska reportedly had less than half (2.2%) the rental housing availability of Barrow and the U.S. percentage of vacant rentals was 3.1. The proportion of available rental housing units to total number of rental units in Barrow, known as the rental vacancy rate, was 9.7%; the homeowner vacancy rate was .4%. In comparison, the rental vacancy rate in the U.S was 9.2% and the homeowner vacancy rate was 2.4%[4]. Those familiar with Barrow are cognizant of the difficulty in finding rental housing yet the Census numbers indicate adequate rental housing availability and a healthy rental market.

The high occurrence of overcrowding and the low homeowner vacancy rate are indicators that housing options are limited. Yet, the 2010 NSBEP&CR rental vacancy rate of 5.2% indicates that there should be rental housing available. Contradicting the rental vacancy rates is the long waiting lists for TNHA Low-Rent Housing and TNHA Fair Market Rental Programs, which has over 300 people on the waiting list for both programs (Tagiugmiullu Nunamiullu Housing Authority 2014b). NVB also maintains a waiting list for their home construction and home renovation programs. Those waiting lists are also long and corroborate that finding opportunities for homeownership is difficult (Okakok 2014). Additionally, the homeownership rate in Barrow is below the national average, at 41.1% and 65.1% respectively. Homeownership is also lower in Barrow than Alaska as a whole, which is at 63.1%.

6.4 Condition

Housing condition is also an issue in Barrow. There are some residential properties in Barrow that are clearly not suitable for occupancy for a variety of reasons, including significant structural

[2] The NSBEP&CR relied on residents to indicate to field workers which housing units were vacant and which were occupied.

[3] The U.S. Census Bureau considers a housing unit vacant if no one is living in it at the time of interview, unless its occupants are only temporarily absent or have a usual residence elsewhere. New units not yet occupied are classified as vacant if the home has all exterior windows and doors and flooring. Vacant units are excluded if they are exposed to the elements, such as the roof, walls, windows or doors no longer protect the interior or if there is positive evidence that the unit is to be demolished / condemned. Also excluded are quarters being used entirely for nonresidential purposes. (https://www.census.gov/housing/hvs/files/qtr413/q413def.html)

[4] The proportions of the homeowner inventory or rental inventory that is vacant and "for sale" or “for rent.”

damage from fires or poor maintenance that may require major renovations or demolition. In addition to being a safety hazard, these unlivable houses do not take advantage of being within an already developed area. In 2012, to simply connect a single home to the water and sewer system in Browerville cost an estimated average of $123,000; to develop a new subdivision that includes roads, water and sewer connections, natural gas and electricity cost an average of $302,000 per home. Developing a subdivision on Cakeeater Road ranged from $350,000 to $436,000 per home for utilities and road access (North Slope Borough 2012). Additionally, 2012 data from the NSB Assessing Division indicates that of the 1,332 residential lots within Barrow and Browerville, there are potentially 292 available for infill development (North Slope Borough 2012). Not taking full advantage of properties that have existing utility connections and road access could potentially lead to significant funding expenditures to develop that infrastructure elsewhere.

6.5 Housing Values

Because Barrow does not have for-profit realty services and many home sales are informal, it is difficult to determine housing values. However, the 2008-2012 American Community Survey 5-Year Estimates indicate that the median home value was $183,000; the cost to construct a home is much greater. In Alaska, building materials cost more in rural areas than urban ones and more in northern Alaska than southern Alaska, primarily due to added transportation expenses. The lack of roads to Barrow and other North Slope villages requires that construction materials be transported via barge or airplane (or by personal vehicle on informal ice roads via Prudhoe Bay). The Alaska Housing Finance Corporation (AHFC) releases a Construction Cost Survey annually which provides the cost of a "market basket" of construction materials for communities throughout Alaska. The market basket represents approximately 30% of the materials used in the construction of a sample home that is just under 2,000 square feet. In 2013, the market basket of materials ranged from a low of $23,854 in Anchorage to a high of $51,041 in Barrow (Alaska Housing Finance Corporation 2013). Because the market basket only accounts for 30% of the materials needed to construct the sample home, the total cost of materials in Barrow would cost $170,136 compared to $79,513 in Anchorage. Labor and land costs could easily bring the total cost of home construction to $300,000 to $350,000 or more.

6.6 Current Housing Activities

The NVB is currently building 20 homes in Barrow, some of which are already constructed and others that are either in the planning or construction phases. The program includes nine two-bedroom homes, three three-bedroom homes, and eight four-bedroom homes. The total contract including materials and construction for the twenty homes is $7.18 million, an average of $369,000 per home. Material costs for each home are $107,980 for the two-bedroom; 832 square foot home; $164,564 for the three-bedroom, 1,260 square foot home; and $191,561 for the four-bedroom, 1,576 square foot home. Total labor cost for 20 homes will be approximately $4.11 million, or an average of $205,500 per home. The NVB also purchased lots from UIC for $23,500 each, all with road access. At this time, none of the homes will have municipal water and sewer connections. Instead, they will rely on holding tanks until services are extended (Okakok 2014).

6.7 Affordable Housing

The U.S. Department of Housing and Urban Development (HUD) defines affordable as housing that costs no more than 30% of a household's monthly income. The average household income estimated by the NSBEP&CR in 2010 was $76,395 (North Slope Borough 2010). Based on HUD's 30% affordability threshold, the average family would spend no more than $22,919 annually or $1,910 per month on housing. In Barrow in 2010, the average monthly mortgage payment was $1,066 and the average monthly rent was $799. The NSBEP&CR does not provide information on the percentage of households that are housing cost burdened. However, the 2008-2012 American Community Survey 5-Year Estimates indicate that 14% of Barrow renters and 8% of Barrow homeowners pay more than 30% of their income in housing costs. Interestingly, over 21% of those homeowners *without* a mortgage are housing cost-burdened, meaning they pay more than 30% of their income on housing.

Although housing affordability is complex, a general rule of thumb is that a family can comfortably afford a house up to three times their gross annual household income. A Barrow household earning the median household income of $76,395 should be able to afford a house that cost approximately $290,000. However, the Construction Cost Survey 2013 reveals that a household in Barrow can afford the construction materials and perhaps land for a moderately sized home but will not have enough within their budget to construct the home. The figures provided by the NVB further substantiate that a three bedroom home would cost nearly $400,000. There are very few existing homes available for purchase while housing construction costs often exceed what a typical household can afford. The combined effect of these two factors puts homeownership out of reach of many Barrow residents.

As of February 2014, there were 137 individuals/families on the TNHA Low-Rent Housing Program waiting list and 172 individuals/families on the TNHA Fair Market Rental Program waiting list for a one-, two-, three-, and four-bedroom home or apartment. For both waiting lists, one and two bedroom units are the greatest in demand. The vast majority of names have been added to the list between 2011 and 2013 (Tagiugmiullu Nunamiullu Housing Authority 2014b). TNHA's programs that are restricted by income use the HUD income limits to qualify potential program participants for subsidized housing. A family of four would need to earn no more than $63,050 annually to be considered Low Income (80% of the Area Median Income) (HUD FY 2014 Income Limits Documentation System 2014).

Table 21 Housing Affordability

Income Range	Number of Barrow Households	Percent of Barrow Households	30% of Household Income Available for Monthly for Rent/ Mortgage		Approximate Home Mortgage Affordability*
$0-15,000	38	5%	up to $375		$0 - $60,390
$15,001 - 29,999	63	9%	$375	$750	$60,391 - $120,776
$30,000 - 39,999	62	8%	$750	$1,000	$120,777 - $161,036
$40,000 - 49,999	46	6%	$1,000	$1,250	$161,037 - $201,296
$50,000 - 59,999	50	7%	$1,250	$1,500	$201,297 - $241,556
$60,000 - 69,999	46	6%	$1,500	$1,750	$241,557 - $288,817
$70,000 - 79,999	60	8%	$1,750	$2,000	$288,818 - $322,076
$80,000 - 89,999	48	7%	$2,000	$2,250	$322,077 - $362,337
$90,000 - 99,999	34	5%	$2,250	$2,500	$362,338 - $402,597
$100,000 - 124,999	107	15%	$2,500	$3,125	$402,598 - $503,247
$125,000 - 149,999	62	8%	$3,125	$3,750	$503,248 - $603,897
$150,000 +	118	16%	$3,750 and up		$603,898 +

*assumes 5% downpayment, 36% debt-to-income ratio, 5% interest rate and 30 year mortgage. Source: calculator.net

6.8 Platted Subdivisions

There are several subdivisions in Browerville that have been platted that are without roads or utilities that are likely areas of future expansion. The first is generally bordered by existing Ahgeak Street and Sakeagak Street and where Uula Street and Sakeagak Street extensions would intersect. This subdivision has 243 lots that could be developed in the future; 24 of those have existing road access. The remaining platted subdivisions for future development are off Cakeeater Road between Laura Madison Street and past Kaleak Street. This area would have approximately 397 parcels; 81 of those have existing road access. Unless they have been otherwise conveyed, all the undeveloped parcels in these subdivisions are owned by Barrow's native village corporation, UIC.

6.9 Housing Roles

6.9.1 North Slope Borough

The NSB has historically played a large role in housing in Barrow. However, in 2004, the NSB turned the management of 99 of its housing units borough-wide over to TNHA through a memorandum of understanding (Kooley 2014). Sixty of these units are in Barrow. The NSB still retains ownership of these properties that, in Barrow, include the twelve 12-plexes located on Herman Street and Karluk Street between Ahkovak Street and C Avenue[5].

[5] The twelfth 12-plex located at 5220 Karluk Street is the TNHA Maintenance and Operations building that was never used as housing. There are eight housing units in 5155 Herman Street, not twelve.

The Borough retains use of several of the 12-plexes for non-housing purposes: 5200 Karluk Street is the NSB Health and Social Services Department administrative building and 5115 is AWIC. Buildings B and C at 5125 and 5135 Herman Street are both abated shells and do not have a current use. TNHA manages six of the 12-plexes and the NSBSD manages two. Of the original eleven 12-plexes and 128 housing units, there are 80 currently available for housing. The Borough has retained the right to request housing for out-of-town permanent hires for hard to fill positions. The NSB lease with UIC for the 12-plexes expires in the year 2027.

The NSB also owns residential property that is used by Health Department: 5306 and 5328 are single family homes between Karluk Street and Laura Madison Street that are used by the NSB Health Department as itinerant housing. 4470 North Star Street is the location of AWIC before it was relocated to 5125 Herman Street. It is currently used for infant daycare. The NSB building that houses the Public Works and CIPM departments located 1689 Okpik Street, was formerly a 29-unit apartment building that was converted for office use in 2006. The repurposing of apartment buildings and homes into other uses throughout Barrow and Browerville has removed approximately 112 units from the housing market.

The North Slope Borough has a need for housing for off-slope hires. These include pilots and police officers, among others.

6.9.2 North Slope Borough School District

The NSBSD owns and rents housing for teachers. In Barrow, the NSBSD directly controls 59 housing units as follows: eight units at 5155 Herman Street (12-plex); 12 units at 5250 Karluk Street (12-plex Building G); and 39 units that are part of the NSBSD CO2 administrative complex. The NSBSD also rents 38 units from private homeowners within the community. Because housing is important to acquiring and retaining qualified teaching staff, the NSBSD is always actively seeking teacher housing. Some Barrow residents have indicated that the cost and availability of rental housing for residents is greatly affected by the NSBSD's ability to pay more. Some feel like residents are in competition with the school district for housing.

6.9.3 North Slope Borough Housing Solutions Group

NSB Mayor Charlotte Brower created the Housing Solutions Group after entering office in 2011 in response to concerns raised by both the NSB Assembly and citizens regarding short term and long-term housing issues in Barrow and all the North Slope villages. After over a year of research and planning, the focus on the Housing Solutions Group in the near term is to assist individuals and families in overcrowded housing conditions and to assist renters in purchasing a home. Specifically, the Group is providing technical assistance for all North Slope residents in three areas: financing, land purchase, and home construction. Over the long term, the Housing Solutions Group will be playing a role in community planning and development in an effort to address the variety of housing issues including the potential need for staff housing for the development of industry-related infrastructure.

6.9.4 Tagiugmiullu Nunamiullu Housing Authority

TNHA is a TDHE, established in 1974 by State statute to address housing needs of Tribal citizens and other residents of the North Slope. The TDHE designation allows TNHA to receive federal grant funds and provide housing assistance under Native American Housing Assistance and Self-Determination Act (NAHASDA). The passage of this 1996 legislation reorganized housing assistance provided by HUD by replacing separate housing assistance program with one block grant program.

TNHA currently has four housing programs:

1. TNHA Fair Market Rental (FMR) Program. Rent schedules are established and subject to change with market values. These rentals are available to all Barrow residents subject to availability.

2. TNHA Low-Rent Housing Program. Provides affordable housing to qualified low-income Alaska Native/Indian families at a cost within their means. Non-Indian families may receive this assistance if they are "essential to the well-being of Indian families" in the community. HUD defined annual income limits for a family of four in 2014 are: $63,050 at Low (80%) of the Area Median Income (AMI); $39,400 for Very Low (50% AMI); and $23,650 Extremely Low (30% AMI).

3. TNHA Mutual Help NAHASDA Lease-Purchase Homeownership Program. Provides homeownership opportunities for qualified lower income Alaska Native/Indian families at a cost within their means.

4. North Slope Elder Housing Program. TNHA, through a memorandum of understanding with the NSB, manages one bedroom elder housing five-plexes in several North Slope villages. Elder housing through TNHA is not offered in Barrow because the NSB Health Department offers senior apartments.

In order to address the need for affordable, sustainable, energy efficient homes, the Cold Climate Housing Research Center (CCHRC), in partnership with the TNHA, designed a prototype home for construction in Anaktuvuk Pass. CCHRC is a nonprofit corporation that facilitates the use of energy-efficient and cost-effective building technologies for the circumpolar regions. The home was designed to utilize lightweight materials, energy efficient plumbing and heating systems to reduce energy costs by an estimated 40%. The Anaktuvuk Pass home was constructed in 2009. TNHA plans to build a total of forty-two homes across the North Slope. Indian Housing funds were used to construct the CCHRC homes in the villages; TNHA cannot use Indian Housing funds to construct new homes in Barrow so they are currently looking for funding and land to construct several of these homes in Barrow.

Currently, TNHA manages a total of 589 housing units throughout the North Slope and 217 in Barrow alone. Within Barrow, TNHA manages rental properties for NSB; five of eleven 12-plexes are managed by TNHA: buildings A, H, F, E, and I located at 5210, 5230, 5240 Karluk Street and 5105 and 5145 Herman Street, respectively. These 12-plexes are on UIC land that is leased to the NSB. In turn, the NSB has provided the rental units to TNHA for management. TNHA also

manages other rental properties: the 32-unit apartment building at 3421 Boxer Street located next to the vet clinic; the 29-unit apartment building behind Barrow High School at 1961 Takpuk Street; and approximately 96 single family homes or attached homes.

All the 12-plex units and the 32-unit apartment complex are rented at market rate. The 29-unit apartment complex and the majority of single family and attached homes are part of TNHA's Low Rent Housing Program. Because the funds for this program come from HUD's Indian Housing Block Grant Program only Native Americans or Native Alaskans are eligible for assistance.

TNHA is interested in constructing additional housing but is limited by land availability. Much of the land that is available for new housing construction is located along Cakeeater Road. TNHA is hesitant to build many homes in this area because of the distance to services, such as the grocery stores, and the lack of reliable public transportation (Kooley 2014).

6.9.5 Native Village of Barrow

Like TNHA, the NVB is a TDHE that administers a NAHASDA program. The NVB has three housing programs: new construction, housing renovations and emergency repairs. The new construction program assists village members with constructing new homes for homeownership. There are approximately 39 people on the waiting list and some families wait ten years or longer to purchase new homes. Approximately four new homes are constructed each year.

There are also nine people on the waiting list for housing renovations. The need and extent of renovations vary by house. NVB offers transitional housing for those whose home is undergoing renovations. The emergency repair program is on a first-come first-serve basis. Many of the homes that have been repaired by NVB were deteriorated, often with little to no insulation, dated electric systems and single pane windows (Okakok 2014). This assistance positively contributes to maintaining the current housing stock so that families are safe and healthy.

All of the NVB programs are designed for those that make 80% or less of the AMI as defined by U.S. HUD. Under those guidelines, a family of four can earn no more than $60,100 to qualify. Additionally, homeowners do not pay more than 30% of their income for housing regardless of the cost of a newly constructed home or renovation.

NVB also has a Realty Department that provides assistance with housing-related issues in Barrow. These include: Barrow townsite restricted lands; U.S. Bureau of Land Management (BLM) Native allotment lands; probate and pending probate for heirs of landowners; lease agreements on both restricted and unrestricted lands; and revocable use permits on Native allotments and restricted parcels.

6.9.6 Arctic Slope Native Association

Like many entities in Barrow, ASNA has a significant need for staff housing. To support hospital staff, ASNA currently has 78 housing units, 44 of which are located at the old hospital location; the remaining are rentals within the community. As ASNA's role in health care expands especially with the new hospital, so will staffing and related housing needs. ASNA projects a need of 100 additional housing units.

6.9.7 Ukpeaġvik Iñupiat Corporation

ANCSA became law on December 18, 1971. The intent of ANCSA was to settle land claims by Alaska's indigenous population. ANSCA divided land into 13 regional corporations, twelve of which are land-based, and approximately 200 village corporations. The regional corporation for the North Slope is ASRC. There are eight village corporations within the NSB. UIC is the village corporation for Barrow. UIC has a Homesite Lot and Property Sale Program that offers land for home construction and sale of existing homes to UIC shareholders and descendants of shareholders. There are approximately 731 UIC shareholders that have rural lots in three rural subdivisions that lack road access or utility service: Nunavak Bay, East Barrow Gas Field and Walakpa. Because these homes lack road access, shareholders are unable to build homes because of the inaccessibility of public safety and fire protection services. These lots are used for subsistence purposes. In late 2012, UIC announced that it had has developed a new 332 homesite lot subdivision plan so that shareholders who had originally received lots in more remote subdivisions may have an opportunity to build homes within Browerville (UIC 2012).

Per UIC's right-of-first-refusal option, a parcel owner may not transfer any interest of his or her lot without first consulting with UIC and offering the interest in writing to UIC with the only exception for immediate family members. In 2012, UIC approved a total of 27 land sales, gift deeds and mortgages and exercised their right of first refusal in five sales. In 2013, UIC approved a total of 41 land sales, gift deeds and mortgages and exercised their right of first refusal in three sales (UIC 2014).

UIC has been viewed by some Barrow residents as reluctant to sell lots, contributing to the housing crisis. UIC's mission is to provide social and economic resources to over 2,500 Iñupiat shareholders and their descendants. Perhaps it is with this in mind that UIC has met with NSB staff and other interested entities to discuss the housing situation and has been receptive to the idea of land exchanges as well as negotiations that allow unrestricted ownership for public and private development that benefit the needs of the community as a whole in exchange for shareholder lot development that sustains the indigenous culture. While UIC's Board of Directors have not released an official position on its land policy, UIC must function as both a profitable corporation for its shareholders and one that advances the social interests including preserving the indigenous lifestyle of its shareholders. Figure 47 depicts the UIC corporate boundary.

6.10 Housing Needs

This analysis of the need and demand for housing, both present and in the future, relies on population projects presented in Chapter 5. Barrow's anticipated population growth will result in more households and an increased demand for housing of all types. There are several characteristics that provide insight into a household's housing choices that include age of household head, size of household and income. However, much of the data needed to examine those relationships to establish solid housing projections are not readily available at the community level. This information would also provide insight into demand for specific types of housing (e.g., single-family housing, duplexes or apartments) and could be collected at the next NSB Census to contribute to a more accurate picture of future housing demand. Lacking this

data, current and future housing need and demand has been determined based on housing vacancy and overcrowding rates.

6.10.1 Current Housing Need

Housing vacancies are essential to a healthy housing market and a 5% vacancy rate is often considered a fair balance between a tenant and landlord interests or homebuyer and homeowner interests. The vacancy rate is also useful in identifying current housing demand and the number of additional housing units required to reach healthy rental and for sale markets. The current percentage of homeowner vacancy is 0.4. Increasing this to a 5% vacancy rate would require approximately 27 additional housing units. Assuming the rental market is as tight as the for sale market (contrary to the NSB Census and U.S. Census but consistent with resident observation), Barrow needs an additional 38 rental housing units to reach a 5% vacancy rate.

In addition to reaching healthy rental and for sale vacancy rates, alleviating overcrowded housing conditions is necessary to a strong housing market. To relieve overcrowded and severely overcrowded conditions, one housing unit per incidence of overcrowding and two per incidence of severe overcrowding would need to be added to the current housing market. This would total 203 additional units.

The total number of additional units to assuage overcrowded conditions and raise the vacancy rate to a healthy level is 268 or a total housing stock of 1,548 occupiable housing units, an increase of 20% of what currently exists.

6.10.2 Future Housing Need

To meet future demand, Barrow will need approximately 37 additional housing units per additional 100 people. Beyond the immediate need for 268 housing units, the population increase to 5,495 in 2020 will require an additional 191 units. If demand is continually met, the Barrow community will still need an additional 211 units beyond the 191 needed in 2020 and the 267 needed immediately, to accommodate a projected population of 6,070 in 2030. An estimated 515 units will be needed beyond the 268 already needed, for a total of an additional 783 units by 2035.

Based on the existing housing type distribution, by 2035 Barrow will need approximately 479 single family homes (61% of the new units); 90 duplex units (12%); 141 apartment units, condos, or other multiplex units (18%), and 73 other housing units, including mobile homes (9%). These projections assume a 5% vacancy rate and an average of 2.7 persons per household. Given the demand for one and two bedroom apartments through TNHA and the transient nature of many newcomers to Barrow, there could a greater demand for smaller units than illustrated here.

With oil and gas development, housing demand would be much greater. Based on population projections presented with oil and gas development in Chapter 5, there will be 6,181 residents in Barrow in 2020, increasing the need for housing by 443 units if current needs have been addressed. In 2030, the population is projected to increase to 7,033 and the need for housing at 755 units above the current need. In 2035 the population is projected to be 7,400 with a need for an addition 889 housing units beyond the current need. With oil and gas development, Barrow would need an additional 1,157 housing units beyond the current amount by 2035, nearly double

the supply. Based on the existing housing type distribution, there will be a need for 708 single family homes, 133 duplex units, 208 apartment units and 108 other units, including mobile homes.

6.10.3 Infill

There is potential to encourage infill within the existing Barrow utilidor system area to minimize the expense of expanding infrastructure. There are approximately 292 lots available within Barrow and Browerville for development. Additionally, fully utilizing already developed areas preserves vulnerable eider nesting areas. A study of potential infill opportunities would be a worthwhile exercise to determine the status of each parcel and possible incentives for development.

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7.0 PUBLIC FACILITIES AND SERVICES

The available utilities in Barrow include water, sewer, electricity, telephone, natural gas, and solid waste disposal. The primary providers are listed in Table 22. There are still some homes that are not serviced with buried utilities so their water needs are provided by private potable water carriers, and sewage pumping services provided by truck by the NSB.

Table 22 Major Utility Providers in Barrow

Utility	Utility Provider
Water	BUECI
Sewer	BUECI
Electric Service	BUECI
Natural Gas	BUECI
Telephone	ASTAC
Data	ASTAC
Solid Waste Disposal	NSB

Source: Barrow Airport Master Plan, 2013
ASTAC = Arctic Slope Telephone Association Cooperative
BUECI = Barrow Utilities & Electric Cooperative, Inc.

Barrow Utilities & Electric Cooperative, Inc. (BUECI) is a member owned cooperative created in 1964. It provides the majority of Barrow with water, sewer and electric service. It operates under an elected nine member board of directors and has an average of 55 full-time employees. Although most of the facilities are owned by the NSB, the coop operates the facilities. The NSB subsidizes all capital infrastructure improvements to the facilities by including upgrade projects in the NSB capital planning program.

Figure 12 BUECI Office



7.1 Water

Water is pumped from Lower Isatkoak Lagoon Reservoir into the BUECI water treatment plant. Once in the plant, the water is treated using a highly efficient two stage filtration process. In the first stage, the raw untreated water is filtered through a microfilter, consisting of 48 filters, processing 300 gallons per minute. Each filter has a pore size 0.2 microns, which is about 200 times finer than a human hair. This filtration process does not require chemical pretreatment. Every 30 minutes the filters are backwashed with high pressure air and water to flush accumulated buildup from the membranes (Barrow Utilities and Electric Co-op 2014). Figure 13 and Figure 14 depict the water utilities for Barrow and Browerville, respectively.

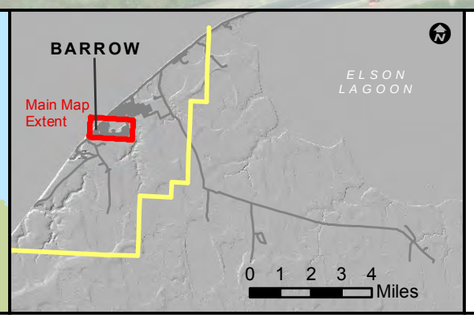
The second stage of the filtration process is completed using a nanofiltration system. The nanofiltration process is a three-stage, 12-filter process that removes molecular size contaminants such as minerals, salts, solids, potentially pathogenic bacteria and other impurities (Barrow Utilities and Electric Co-op 2014). As an 85% efficient system, for every 100 gallons of water processed, 85 gallons of potable water is produced with the remaining 15 gallons rejected. The rejected water is stored in the raw water storage tank which is used to flush the Barrow Utilidor System (BUS). The raw water is phased through heat exchangers until a certain temperature is reached to help maintain warmer temperatures in the utilidor.

The water system distributes potable water throughout the community. The water in Barrow is distributed using a circulating water piping network. Portions of the system are direct buried, a portion is contained in the BUS and a portion is located on above ground supports connecting Barrow to Browerville on the Dam Road between Lower and Upper Isatkoak Lagoons. For the portions of the system that are direct buried and prevalent to freezing, a small circulation pump is located at residences and commercial buildings structures to keep water from freezing. The pump is located in a “service barrel” outside the structures and powered by a control panel situated adjacent to the building. The control panel is visible from the road so that operations and service personnel can easily determine if the unit is operating correctly. Even a short lapse of operations can cause the water to stop circulating and freeze.

BUECI has a water storage capacity of 1.5 million gallons of water and the water treatment plant can process up to 345,000 gallons per day. Based on employee interviews, the plant is currently processing 290,000 gallons per day with current limitations. During interviews with BUECI personnel in March 2014, the water meter reading for a 24 hour period (midnight to midnight) of water pumped into the distribution system at the water processing plant was recorded at 277,000 gallons. In calculating the water usage per capita for Barrow in 2014, the population count is 5,176 based on demographics prepared for this comprehensive plan. Considering just the water pumped, the per capita water use is 53 gallons per person per day (pp/pd).







WATER DISTRIBUTION

BARROW WATER FACILITIES

Inset Map

BARROW BOUNDARY

MANHOLES

PARCELS & ROWS

ROADS

UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_BRWH20_r05.mxd Date: 6/10/2014

SOURCES:
Satellite Imagery: July/August 2012
NSB GIS: Barrow Streets & Parcels
NSB GIS/UMIAQ: Water Distribution

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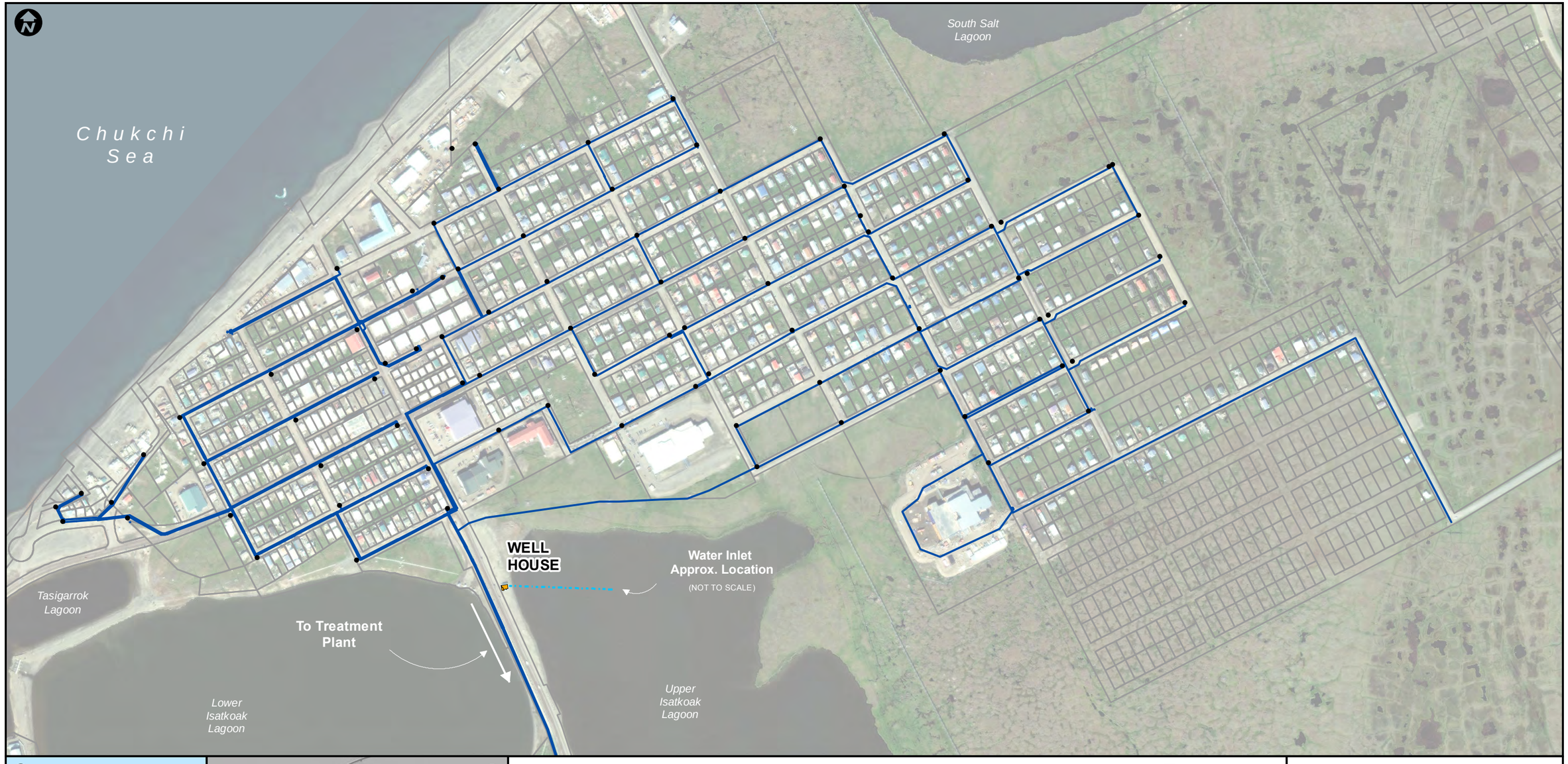
WATER UTILITIES
BARROW

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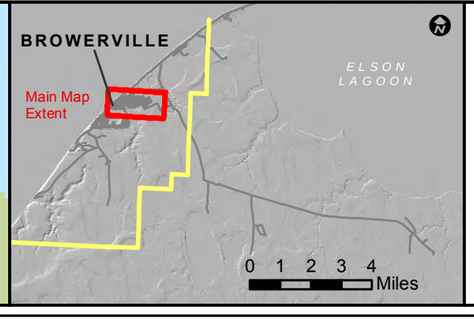
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WATER DISTRIBUTION

BARROW WATER FACILITIES

MANHOLES

PARCELS & ROWs

Inset Map

BARROW BOUNDARY

ROADS

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SOURCES:
Satellite Imagery: July/August 2012
NSB GIS: Barrow Streets & Parcels
NSB GIS/UMIAQ: Water Distribution

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WATER UTILITIES
BROWERVILLE

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7.1.1 Annual Water Pumping Rates

The annual water pumping rate currently is about 80,000,000 gallons per year. The following volumes were reported during personnel interviews with BUECI staff for this plan:

- December 16 – January 15, 2014 5,699,900 gallons
- January 16 – February 15, 2014 6,438,300 gallons
- February 16 – March 15, 2014 6,011,500 gallons

For planning purposes, to calculate an annual maximum average pumping capacity, if in one month the plant pumps 6,500,000 gallons, then a reasonable assumption is that 78,000,000 gallons can be pumped in one year. If the current water treatment plant is run at the capacity rate of 345,000 gallons per day, then 124,200,000 gallons can be processed in one year. This is adequate to meet future needs well past 2025 and into 2035.

7.1.2 Surface Water Hauling

Buried water lines distribute most of the water used in Barrow, but there are still homes and businesses in the community that depend on surface water hauls. The water is hauled by a private commercial business by truck and stored in above ground tanks located at homes and businesses. Currently in Barrow and Browerville there is one private water hauler. UIC also purchases potable water from BUECI and hauls to the UIC storage tank located in NARL for use there. For loading of water, the water haulers pull trucks under an overhead insulated water line located near the BUECI office. The following are statistics learned during personnel interviews with haulers and BUECI personnel:

- From January 16, 2014 through February 15, there were 418,500 gallons sold; of this volume, 308,900 gallons were sold to the private hauler.
- The private hauler reported deliveries to 225 customers/households.
- For the same time period, 109,600 gallons were sold to UIC for delivery to NARL.
- The daily rate of surface potable water sold is 13,950 gallons per day (418,500 gallons in 30 days).

7.1.3 Water Saving Changes

Originally, the water inlet was located in Lower Isatkoak Lagoon and all water was pumped into the lagoon. Once the inlet pump was relocated to Upper Isatkoak Lagoon, all water was routed for water treatment from the upper location and the lower inlet was used only occasionally for raw water needs. Recently, this was modified to allow raw water pumping at the lower inlet site. The water is pumped into tank storage and ultimately bypasses the water treatment plant. This water is stored in a raw water tank and used to flush the utilidor system. Before this change, treated water was used to flush the BUS system. By incorporating this change, the potable water available for public use was increased by over 156,000 gallons per day.

There are also upcoming modifications planned for utility upgrades in the next few years. Plans include expansion and upgrades for pump houses, new heat exchangers for flushing water and a new line to handle expansions.

7.1.4 Anomalies in Calculation of Usage Rates

Typically, people who have their water hauled and stored in tanks demonstrate more conservative with water use than those connected to the distribution system. In addition, there are facilities in Barrow such as the high school and the hospital that draw much more water than homes. This makes it difficult to calculate the per capita water use rates with any precision. The usage rate of 53 gallons pp/pd is a lower estimate for distribution system users, while it is high for those on a surface water haul schedule. Due to limited actual data for analysis, the methodology and results are for planning purposes only. There are characteristics of the end users and usage history that are not known and the individual breakdowns are not available for inclusion in this plan analysis.

7.1.5 Forecast Summary - With and Without Oil and Gas Development

Based on Barrow demand calculations and for planning purposes, typical demand is calculated at 53 gallons pp/pd. Table 23 (without oil and gas development) and Table 24 (with oil and gas development) present the estimated usage rate utilizing the population forecast calculated for this plan. As shown, the community of Barrow is estimated to use just over 103,578,200 gallons in 2014, with an increase to just over 125,742,848 in 2025, to over 125,742,200 in 2035. If the current water treatment plant is run at the capacity rate of 345,000 gallons per day, then 124,200,000 gallons can be processed in one year. This is adequate to meet future needs well past 2025 and into 2035. Based on projected population estimates expected with oil and gas development, water treatment capacity would begin to become an issue before 2025.

Table 23 Barrow Water Usage – Without Oil and Gas Development

Forecast Year	Population Count (each)	Daily Usage (gallons pp/pd)	Proposed Usage (gallons/year)
2014	5,176	279,504	100,621,440
2025	5,661	305,694	110,049,840
2035	6,379	344,466	124,007,760

Table 24 Barrow Water Usage – With Oil and Gas Development

Forecast Year	Population Count (each)	Daily Usage (gallons pp/pd)	Proposed Usage (gallons/year)
2014	5,176	279,504	100,621,440
2025	6,658	359,532	129,431,520
2035	7,400	399,600	143,856,000

When discussing future community needs, modifications to the existing system is one answer to the increased future demands. For example, current filtration water treatment is 85% efficient. Improvements to this might yield larger treatment capacities. Another way to prepare for a larger population and increased water demand is to consider a redundant water source.

7.1.6 Redundant Water Source

In Barrow, there is currently only one water source and water treatment facility. If the current system was to become incapacitated or the source contaminated, the community would be without a reliable water source. If water were to be discontinued in the distribution system for any reason, the system itself would be prone to freezing, causing damage and system shutdown. In this situation, the entire community would face freezing damage and failure of the distribution system to dispense water to homes.

An alternative water source could provide an emergency water supply. In addition, an alternative water source could also be developed to allow water production simultaneously from two locations, increasing the water capacity to meet the needs of a larger population and community expansion. Although investigations into probable water source locations have not been completed at this time, an alternative location that might be considered is Ikroavik Lake located south of Barrow. This location does not currently have road access.

7.2 Power

The power plant is operated by BUECI and generates the power for the community of Barrow. The power plant is located near the water treatment plant on the BUECI campus. The electric utilities are depicted in Figure 15 (Barrow) and Figure 16 (Browerville). There are seven generators in the power plant with maximum production capacity of 20.5 megawatts (MW). To achieve this maximum capacity the plant would run at 100%. Typically, the turbines are run at 90%. The generators are natural-gas fired but can be operated on diesel if the natural gas supply were to be cut off in an emergency situation. Table 25 lists the existing power generated for Barrow.

Table 25 Power Generation – Barrow

Unit	Make/Model	Capacity
1	Solar Turbine Centaur	2.5 MW
2	Solar Turbine Centaur	2.5 MW
3	Solar Turbine Centaur	2.5 MW
4	Solar Turbine Taurus	4.75 MW
5	Solar Turbine Taurus	5.3 MW
6	Caterpillar 3608	1.5 MW
7	Caterpillar 3608	1.5 MW

At this time there are no known deficiencies and all seven engines are in good working order. The turbines are under a constant maintenance schedule and all of the turbines are running in peak condition. The two Caterpillar 3608 generators are not normally used and have not been used for about four years other than for testing. They are maintained on standby and can be used as backup if the need arises. During the winter season the two larger Taurus turbines are run in tandem to meet peak demands. In the summer months one of the large Taurus turbines is run with one of the smaller Centaurs, because the peak demands are lower in summer than in winter.

During personnel interviews, it was learned that on January 17, 2014, the peak power output was recorded at 8.465 MW. In establishing a daily usage rate per person, the peak amount is divided by the population to obtain the daily peak usage rate per person is 1.63 kilowatts (kW).

The Barrow power plant has evolved over the years to meet the power demands of the community. The existing power plant facility itself was originally built in 1981 and underwent interior modifications and building expansion in 1994 and 1999 to its current configuration. The NSB Barrow 6-Year Capital Plan discusses the upgrades that are necessary to the older section of the generator building (power plant) in 2013 (14 years past its life span) and modifications to the later building additions as needing upgrades as soon as 2018.

7.2.1 Forecast Summary - With and Without Oil and Gas Development

Table 26 and Table 27 list the power usage of the community for the scenarios assuming with oil and gas development and without oil and gas development, respectively. To forecast future peak use with future anticipated population growth, a rate of 1.63 kW pp/pd is used. This rate of usage was calculated from the measured peak usage in January 2014 and a population count of 5,176 as established in this plan. For average winter load calculations, the Taurus turbines load share and produce 8.4 MW. This analysis uses 8.4 MW, which is 90% of the total maximum of the two Taurus turbines producing the expected 8.4 MW load share. With a population of 5,176, this calculates to an average rate of 1.62 kW pp/pd.

Table 26 Barrow Power Usage – Without Oil and Gas Development

Forecast Year	Population Count (each)	Daily Peak Usage (MW/PD)	Average Winter Usage (MW/PD)
2014	5,176	8.437	8.385
2025	5,775	9.413	9.356
2035	6,379	10.398	10.334

Table 27 Barrow Power Usage – With Oil and Gas Development

Forecast Year	Population Count (each)	Daily Peak Usage (MW/PD)	Average Winter Usage (MW/PD)
2014	5,176	8.437	8.385
2025	6,658	10.853	10.786
2035	7,400	12.062	11.988





FEEDER 1
FEEDER 2
FEEDER 3
FEEDER 4
FEEDER 5

LIGHT POLE
UTILITY POLE

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SOURCES:
NSB GIS: Electric lines & Utility Poles
Satellite Imagery: July/August 2012

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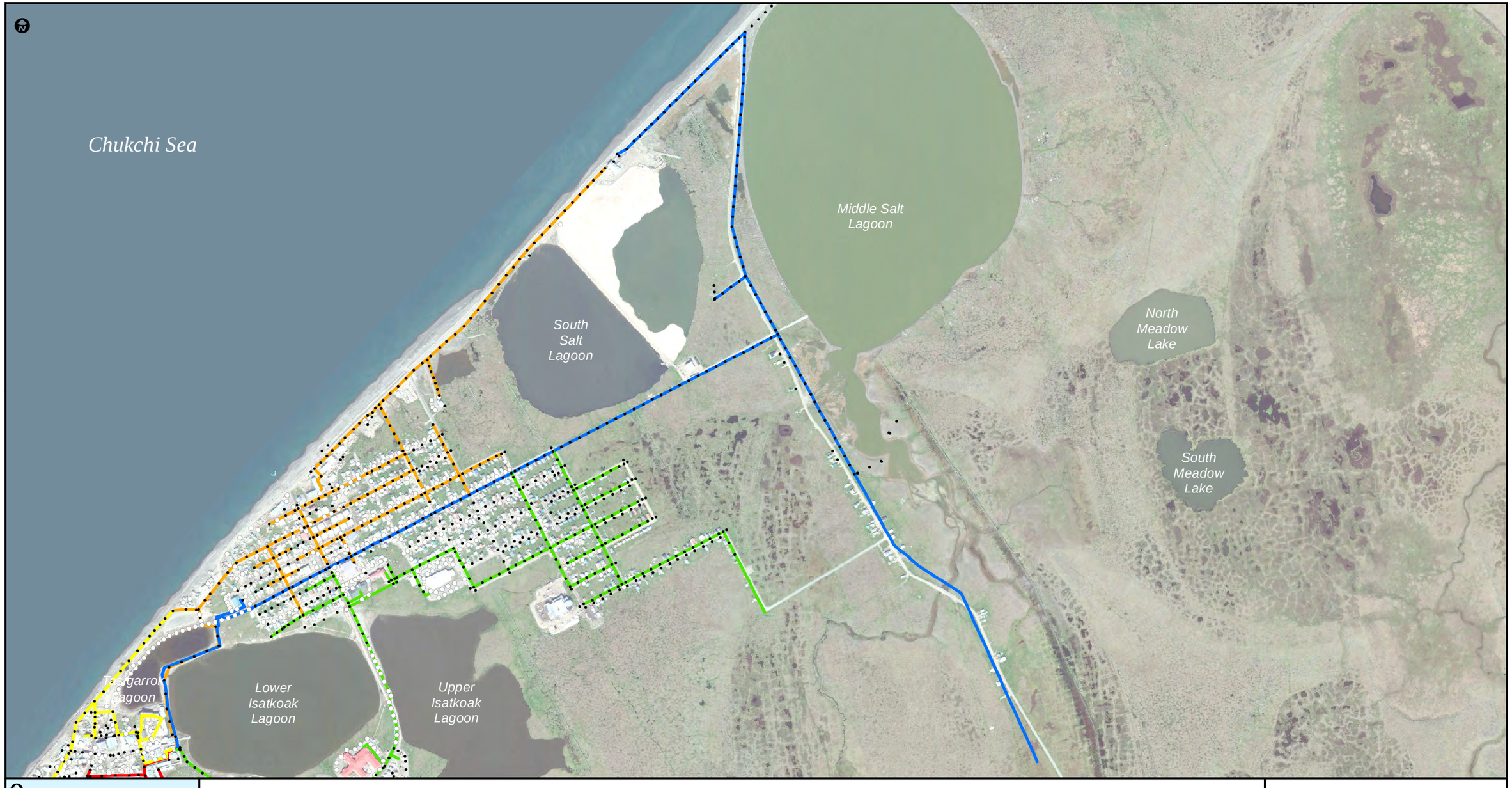
ELECTRIC UTILITIES
BARROW

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FEEDER 1
FEEDER 2
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FEEDER 5

LIGHT POLE
UTILITY POLE

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SOURCES:
NSB GIS: Electric lines & Utility Poles
Satellite Imagery: July/August 2012

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ELECTRIC UTILITIES
BROWERVILLE

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To be able to supply the additional power requirements of the community, the existing capacity at the power plant seem to be capable of meeting the proposed future output necessary to meet both the with and without oil and gas development scenarios. The current capacity of the power plant is 20.5 MW. 90 percent of 20.5 MW is 18.45 MW, well above the anticipated requirements of the anticipated community growth.

7.2.2 Redundant Power Systems

The existing power system in Barrow is currently the only system available to provide power to the community. If the current system were to become incapacitated, the community would be without power for heating or lighting. For example, if a fire destroyed the power plant's ability to provide power, water systems and homes would freeze. The distribution system would freeze and the system would shut down. In this situation, the entire community would be struggling to heat and dispense water to homes.

An alternative power source would allow a backup energy generation system that could provide alternative power. In addition, an alternative power plant located in a well situated location would provide power to a growing area base in addition to a back-up power source. A general rule of thumb learned during BUECI interviews is that power is most efficiently distributed over a five-mile radius around the initial power source. If a site were located for a second plant, such as closer to NARL or east of the runway, the second plant could help dispense power to areas of Barrow that are expecting growth. This would also alleviate the issue of over-capacitated feeder lines and associated issues. Although an investigation into probable alternative power source locations has not been completed at this time, two alternative locations that were discussed during scoping meetings with stakeholders are: 1) The existing WWTP by the intersection of Laura Madison and Cakeeater Road; and 2) the area south of the airport.

7.2.3 Feeder Lines

Although the power plant has the capacity to meet the expected power requirements, the feeder lines are not adequate to meet any new additional power expansion in Barrow today. There are five existing feeder lines (Figure 15, Barrow; Figure 16, Browerville). According to interviews with utility personnel, all five feeder lines are operating at maximum capacity.

- Feeder 1 – (yellow) Supplies the downtown area of Barrow.
- Feeder 2 – (green) Supplies Barrow High, Barrow City Hall, Fred Ipalook Elementary School, and the southern portion of Browerville.
- Feeder 3 – (red) Supplies the southern portion of Barrow, Barrow Airport area and area south of airport.
- Feeder 4 – (blue) Supplies an arterial down Laura Madison, Cakeeater Road and on to NARL.
- Feeder 5 – (orange) Supplies the northern portion of Browerville.

On the Barrow side of the community, feeders 1, 2, and 3 distribute the power to different portions of the city. For example, Feeder 3 carries power from the plant to the area south of the airport. Without increasing capacity of Feeder 3, lines are unable to support any new development in the area south of the airport. This is an issue that should be addressed to allow for growth in the community.

7.3 Natural Gas

Between 1944 and 1952, the U.S. Navy conducted exploration within the NPR-A which led to the discovery of natural gas south of Barrow. The South Barrow Gasfield was developed in 1949 to support federal complexes in Barrow, namely the Naval Arctic Research Laboratory (NARL). Then in 1965, the program was expanded to supply the Barrow community with gas in addition to the federal facilities. Additional test wells by the U.S. Navy resulted in the discovery of the East Barrow Gasfield in the mid-1970s. In 1976, management authority of the NPR-A was transferred to the U.S. Geological Survey (USGS). Wells at a third field, Walakpa, were initially drilled by the U.S Navy and USGS during the mid to late 1970s. Then, in 1984, the federal government, under the Barrow Gas Fields Transfer Act, conveyed entitlement of 19 existing wells and subsurface resources to the North Slope Borough for community use (North Slope Borough 2014a).

7.3.1 Drilling Program

During the first half of 2011, the South Barrow Gasfield produced 1,115,000 cubic feet of gas per day (Coffman 2014). In 2013, gas production began dwindling; additional well drilling in Walakpa made up for much of the declining productivity of South Barrow. The Walakpa Gasfield is located southwest of Barrow. A drill program for the Barrow community began in the early 1990s, resulting in the construction of eight wells, infield pipelines, a gathering facility, a field generation facility and 16 mile aboveground transmission lines connecting the gasfield to BUECI. During the winter of 2011, five horizontal wells were drilled: Savik 1 and Savik 2 at East Barrow and Walakpa wells 11, 12, and 13 in Walakpa (Petroleum News 2013). Figure 17 depicts gas pipelines in Barrow and Browerville and location of gas wells. Production at the East Field continues today through an upgraded six inch aboveground transmission pipeline to the gas handling facility at South Field.

There were concerns about aging infrastructure so the drilling program included upgrades to pipelines and well houses, increasing both the production pressures and the amount of gas that can be safely delivered. The 2011 program upgraded the six inch pipeline from East Field and established new well houses on all the wells drilled under this program. The wells in both East Barrow and Walakpa are connected with six-inch diameter pipe terminating at the gas handling processing facility located at the South Barrow Gasfield.

7.3.2 Existing Pipelines

Currently, the gas is distributed through the community by steel and high density polyethylene (HDPE) pipe. The existing six-inch pipe leaves the gas handling facility in South Gasfield, follows Cakeeater Road to the southeast corner of the population center, west of Kaleak Street, north on Uula Street, past Samuel Simmonds Memorial Hospital, west on Yugit Street, following existing infrastructure across the Lower Isatkoak Lagoon dam to ultimately tie into the BUECI facility.

From the facility, gas is used for power generation and is routed to the distribution facility on the Lower Isatkoak Lagoon.

7.3.3 Alternative Pipeline Routes

A study is being conducted by the NSB to investigate alternative routing of the natural gas pipeline. The reasoning for the alternative route is to allow a redundant route to provide for natural gas for the community in the event of damage to the main line. In addition, there are pigging and inspection procedures that are required as part of pipeline maintenance and U.S. Department of Transportation (USDOT) regulatory requirements. With only one line, gas would have to be shut down at certain intervals to allow the testing to be completed. With two lines, one can be shut down while the other continues to supply gas to the community.

There are three alternative lines being considered:

- Base Route - Same as the existing route currently supplying Barrow. This does not really cover a redundancy of the line because if there were an explosion to one line and the redundant line was adjacent, both would be damaged.

- Alternate 1 - Beach Route. Similar as the Base Route, following a route through the populated portion of Browerville and Barrow and the final portion along Stevenson Street, which is susceptible to erosion.

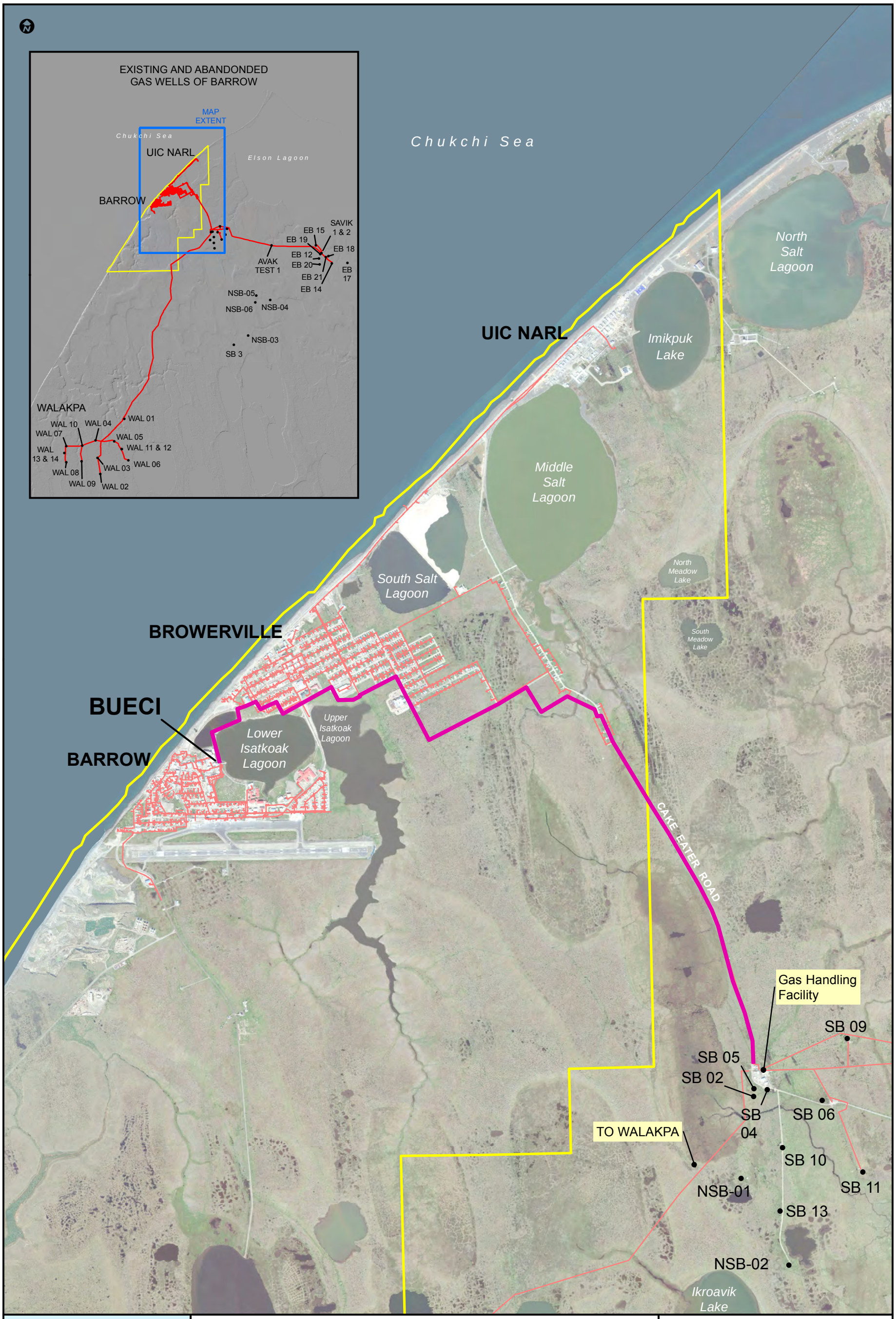
- Alternate 2 - Cross-Country Route. This route proceeds from the South Gas Field gathering center west across the tundra, turning north along an existing gravel road south of the airport. From there the route travels around the west end of the runway into Barrow terminating at the BUECI facility. This route would help expand gas distribution into an area south of the airport that currently does not have gas provided.

- Alternative 3 - Existing BLM Route. This route follows an abandoned in-place pipeline, turning northwest after crossing a stream on Isatkoak Lagoon and running around the west end of the runway.

The rate for natural gas charged to residents in Barrow is $18.05 for a basic charge per month. If a customer uses between 0 to 55 hundred cubic feet (ccf) there is no additional charge. If greater than 56 ccf is used an additional $0.2882 per ccf is levied. The bulk of the power generation to produce electricity is fueled by natural gas. The electric service rates are also reasonable, with single-phase service basic charge of $14.55 and an additional $0.0961 per kilowatt hour (kWH). Three-phase is basic $89.67 with an additional charge of $0.0956 per kWH.

Capital contributions by the North Slope Borough have greatly subsidized natural gas production and deliverability, providing an inexpensive and efficient way to heat and light the community. While future demand can be predicted based on projected population growth, without adequate and scheduled well testing, it is difficult to project how much gas remains and what the deliverability may be to meet the anticipated demand. One of the best guards against future natural gas shortages is incorporating conservation measures whenever practicable in facilities and by consumers.

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7.4 Barrow Utilidor System

There are many services that are distributed in Barrow with the use of a subsurface utilidor. Utilidors are common in cold climates where direct buried lines are prone to freezing when buried below the frostline. In Barrow, the frostline is deep enough that freezing sewer and water lines is a concern. The existing BUS began operation in 1984 when buried utilities were first introduced to Barrow. BUS is large enough to house the following utilities:

- Potable Water
- Sewer Lines
- Telephone Lines
- TV Cable Lines
- Fiber Optic and NSB Communication Lines
- Electric Services Lines.

The BUS system is a wooden structure, six feet wide at the base, six feet high, tapering to five feet on the top. The air temperatures are regulated using waste heat to keep the services from freezing. Maintenance of the services is easier because of greater accessibility and avoids disruption that is associated with recurring construction, repair and upgrading of cables and pipes placed in a direct bury. In Barrow, the utilidor is a combined length of 3.2 miles. Figure 18 depicts the existing BUS.

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UTILIDOR

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UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_UTILIDOR_r00.mxd 4/29/2014

UTILIDOR

Scale: 0 500 1,000 1,500 2,000 Feet

Figure: **18**

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7.5 Wastewater

BUECI operates the wastewater collection and treatment system. The wastewater flows are gravity fed to pump stations located throughout the town, collected using sewage lines, both direct buried and located in utilidors and a section of above-ground pipe that connects Barrow and Browerville. The sewer conveyance lines are a forced main system, operated with use of six total pump stations located throughout Barrow and Browerville. Figure 19 and Figure 20 depict the pump stations and sewer collection lines (marked with arrows indicating flow) for Barrow and Browerville, respectively. Minor mains feed sewage into the individual pump stations, with PS3 as the last pump station before traveling to the waste water treatment plant.

The Wastewater Treatment Plant (WWTP) uses an activated sludge membrane bioreactor (MBR) treatment process and is capable of processing up to 300,000 gallons of wastewater per day (North Slope Borough 2013). The sewage is collected from the pump stations; the sewage is pumped to the South Salt Lagoon which is considered a facultative lagoon system. A facultative sewage system is a settlement system separating the sludge into anaerobic layers located on the bottom of the lagoon and aerobic layers located on or near the top of the lagoon. Algae growing on the top layer, processes oxygen from direct sunlight, and consumes carbon dioxide given off of bacteria in the lower layers. The process oxidizes wastes as they migrate up.

In order to prevent overflow, water is pumped from the South Salt Lagoon to the Middle Salt Lagoon. From there it is eventually discharged into the ocean. Before final discharge, the water is tested for pH, dissolved oxygen content, fecal coliform, and total suspended solids to ensure compliance and to meet limits of the ADEC discharge permit.

7.5.1 Per Capita Wastewater Rates

Based on BUECI employee interviews conducted in late March 2014, the typical rates of wastewater flow into the wastewater treatment plant fluctuated from 216,000 gallons per day to 265,000 gallons per day. In calculating the per capita wastewater rate for Barrow in 2014, the population count established for this report is 5,176. Considering just the flow reaching the treatment plant daily, the daily per capita amount is 51 gallons pp/pd.

7.5.2 Annual Wastewater Pumping Rates

Currently, the annual wastewater flow rate into the wastewater treatment plant is about 87,840,000 gallons per year. The average wastewater flow for the first twenty days in March was 243,500 gallons. If calculated out for the year, the annual rate into the plant is 87,840,000 gallons per year. For planning purposes, to calculate an annual maximum average pumping capacity, if the maximum quantity that can be processed in the facility is 300,000 gallons per day, then a reasonable assumption is that 108,000,000 gallons can be processed in one year.

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Chukchi Sea

Tasigarrok Lagoon

Lower Isatkoak Lagoon

Upper Isatkoak Lagoon

To Wastewater Treatment Plant

PS 4

PS 2

PS 1

Stevenson St.

Momegana St.

Ahkovak St.

Ahkovak St.

CHUKCHI SEA

Barrow

Wainwright

Atqasuk

0 25 50 75 100 Miles

BARROW

ELSON LAGOON

Main Map Extent

0 1 2 3 4 Miles

SEWER

PARCELS & ROWs

PUMPSTATIONS

MANHOLES

DIRECTION OF FLOW

Inset Map

BARROW BOUNDARY

ROADS

NORTH SLOPE BOROUGH

SOURCES:
Satellite Imagery: July/August 2012
NSB GIS: Barrow Streets & Parcels
NSB GIS/UMIAQ: SEWER

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Date: 6/13/2014 UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_BRW_SEWER_r04.mxd

SEWER UTILITIES
BARROW

Scale:
0 250 500 750 1,000 Feet

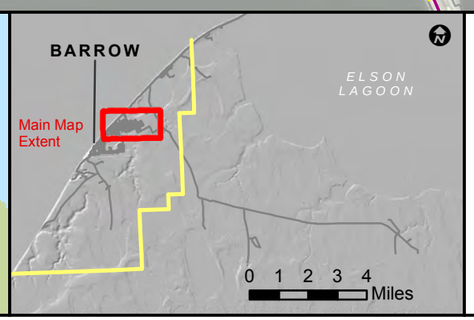
Figure:
19

UMIAQ

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SEWER

PARCELS & ROWs

PUMPSTATIONS

MANHOLES

DIRECTION OF FLOW

Inset Map

BARROW BOUNDARY

ROADS

SOURCES:
Satellite Imagery: July/August 2012
NSB GIS: Barrow Streets & Parcels
NSB GIS/UMIAQ: SEWER

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Date: 6/13/2014 UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_BVILLE_SEWER_r04.mxd

SEWER UTILITIES
BROWERVILLE

Scale:
0 300 600 900 1,200 1,500
Feet

Figure:
20

UMIAQ

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7.5.3 Forecast Summary – With and Without Oil and Gas Development

Based on Barrow wastewater calculations, typical daily wastewater generation per capita is 51 gallons. Table 28 and Table 29 list estimated wastewater generation for Barrow for the scenarios assuming with oil and gas development and without oil and gas development.

If the current waste water treatment plant is run at the capacity rate of 300,000 gallons per day, then 108,000,000 gallons can be processed in one year. This is adequate to meet future needs past 2025, but will reach capacity in 2026. In 2026, the population is estimated to reach 5,833 with anticipated wastewater generation rate of 108,581,295 gallons per year. This is 500,000 gallons more than maximum capacity of the current plant.

Table 28 Barrow Wastewater Generation/Treatment - Without Oil and Gas Development

Forecast Year	Population Count (each)	Daily Usage (gallons per day)	Anticipated Usage (gallons per year)
2014	5,176	263,976	96,351,240
2025	5,661	288,711	105,379,515
2035	6,379	325,329	118,745,085

Table 29 Barrow Wastewater Generation/Treatment - With Oil and Gas Development

Forecast Year	Population Count (each)	Daily Usage (gallons per day)	Anticipated Usage (gallons per year)
2014	5,176	263,976	96,351,240
2025	6,658	339,558	123,938,670
2035	7,400	377,400	137,751,000

Based on the projected population estimates expected with oil and gas development, wastewater treatment would begin to become an issue before 2025. In 2018, the population is estimated to reach 5,826 with anticipated wastewater generation rate of 108,450,990 gallons per year. This is 500,000 gallons for the maximum capacity of the current plant.

The WWTP is currently operating on one of two treatment trains. Plans are underway to modify the current plant to operate on full capacity using both treatment trains. If this is accomplished, the plant capacity could be doubled. If the plant was able to process 600,000 gallons per day, the annual capacity would increase to 216,000,000 gallons per year. This increase in capacity will maintain the wastewater flows for the increased ten-year population growth (2025) without oil and gas development; and the 20-year population growth with oil and gas development.

7.6 Gravel

In the Barrow area, gravel material for construction is limited. There are two active commercial material source mining pits used to supply the gravel needs for non-airport construction and maintenance needs:

- SKW operates a pit on land owned by the City of Barrow and located at the southwest end of the airport. This pit is reaching the end of its useful life. Although it is still mined, it will not be able to be the sole provider for large gravel needs. Expansion is possible and estimated yield has been discussed as high as one million cubic yards (CY). The soils are classified as gravel, producing sandy gravel and gravelly sand.

- UIC operates a pit four miles southeast of Barrow located off of Eastfield Road near the landfill. The soils here are generally sandier/siltier than the material in the SKW pit and are poorly graded sand with silt and gravel.

Gravel needs for community use includes landfill cover, road and culvert maintenance and infrastructure parking area maintenance as well as for private use and capital projects. Large scale development, such as the new Samuel Simmonds Memorial Hospital or new Top of the World Hotel create additional demands for gravel.

During the construction of the airport, the material was mined from the Alaska Department of Transportation (ADOT) pit located between the runway and the SKW material pit on state land. Expansion of this pit is limited as minimal materials remain within the State property. Also, there is a petroleum pipeline that is located along the south boundary of the pit. Emaiksoun Road limits expansion from the east.

As part of the Barrow Airport Master Plan, two new material sites were investigated as possible new sources for construction materials (Figure 21). Ninety-five borings were drilled in and adjacent to the two material sites to depths of 20 to 50 feet. The West Material Source is located on state land adjacent to their existing material pit. Another source, East Material Source, is south and east of the runway. A portion of the northern area that was explored is located on state land, but the majority of the exploration area was conducted on land with surface rights owned by UIC with BLM subsurface rights. General conditions found seem favorable to a sizeable\ material source that could produce gravely sands and sandy gravels. There are upper layers of rich organic overburden and organic silts from 3-19 feet. In places, large ice lenses were found.

Barrow is a growing community and will require gravel to support the future development. The construction and maintenance needs will drive the need for well-graded construction material, while providing a material that is cost efficient. One to two years is needed to obtain a permit for a new material source, depending on environmental issues. The easiest and quickest sources of additional material are expansions of the UIC and SKW/City of Barrow pits. However, these pit expansions may produce limited material that is of lesser quality. While difficult, an assessment of future needs for private use, capital projects, maintenance and potential industry demand is needed. Additionally, expansion of existing pits should be considered where practical and feasible, along with a careful evaluation of new material sources that could economically be developed to serve the community.

7.7 Solid Waste

The NSB Barrow landfill is an ADEC permitted Class II Municipal Solid Waste (MSW) Landfill. The landfill is permitted to accept municipal solid waste, non-radioactive materials, inert wastes,

construction and demolition debris, ash, and sludge. The NSB provides refuse service to commercial businesses and households. Trash bins located throughout the community are picked up by refuse trucks and dumped.

The current landfill site was placed on land purchased from UIC in 2003. It is located about four miles southeast of Barrow and is accessed from Eastfield Road. The new Barrow landfill was opened in 2008 and permitted in 2009. This landfill will ultimately have eleven cells when completely constructed. Currently, the first cell is full of debris and the second cell is opening and already receiving waste.

The containment cells have an average storage volume capacity of about 81,000 CY per cell for waste and cover material. The maximum storage capacity of the first cell was about 95,000 CY. The first cell filled more quickly that originally estimated. In part, this happened because the early estimates assumed that 60% of the waste stream destined for the landfill was combustible, thus reducing the waste weights by 85% (North Slope Borough 2009).

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Chukchi Sea

Chukchi Sea

BROWERVILLE

South Salt Lagoon

Middle Salt Lagoon

CAKE EATER ROAD

Tasigarrok Lagoon

Lower Isatkoak Lagoon

Upper Isatkoak Lagoon

Parcel A
US Survey 4227

Parcel C
US Survey 4227

BARROW

ADOT

UIC LANDS

Lot 1. US SURVEY 4227
ADOT

UIC LANDS

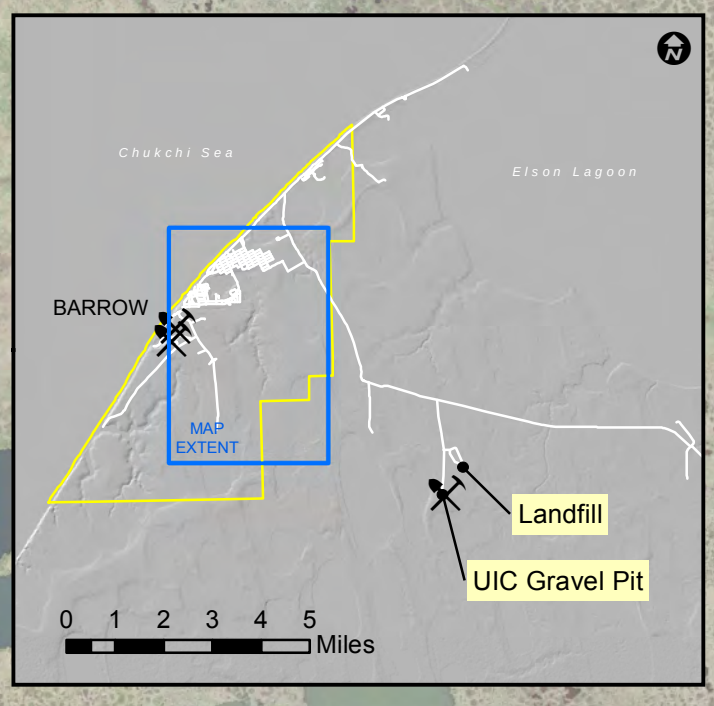
City of Barrow

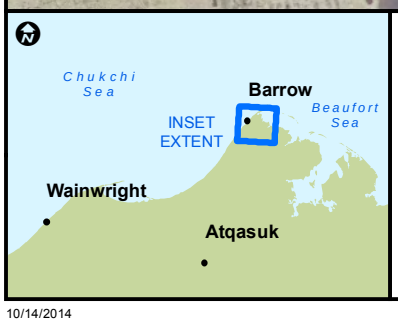
ADOT Gravel Pit

West Material Source

City of Barrow owned
SKW Gravel Pit

East Material Source





Existing Gravel Pits

Material Source Extents (approximate)

SOURCES:
UMIAQ: Gravel Sources and Pits (As identified in the ADOT& PF report regarding material source extents Feb. 2014)
Satellite Imagery: July/August 2012

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EXISTING AND POTENTIAL GRAVEL SOURCES

Scale:
0 0.15 0.3 0.45 0.6 Miles

Figure: **21**

UMIAQ

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7.7.1 Thermal Oxidation System

The NSB operates a thermal oxidation system (TOS) incinerator facility for municipal waste in Barrow. The facility is located near the old Barrow Landfill on the Middle Salt Lagoon on Stevenson Street. Currently, the TOS facility is not operational and has not been operating steadily for over a year. During the time that it has not been operational, the waste is directly landfilled in the Barrow landfill without incineration. The TOS facility incinerators do not produce electricity, but emit directly to a stack exit. It was designed to process 30 tons per day of municipal waste and is currently permitted to process up to 20 tons per day of domestic and commercial waste (State of Alaska Department of Transportation & Public Facilities 2014).

There are plans to repair the controls in the TOS facility this year to return it to service by late 2014. Once the repairs are complete, the NSB will begin incinerating its refuse before depositing directly in the landfill. Incinerating the waste before landfilling will reduce the overall waste footprint. A 30% reduction is used in the analysis of this plan.

7.7.2 Estimated Landfill Rates

Based on studies completed in 2009 in support of the NSB MSW Permit Application to ADEC in May 2009, the landfill is estimated to receive 6.28 tons per day of solid waste, or 2,300 CY per year. At the time of the permit application submittal, the landfill life for the new Barrow landfill was estimated at 45 years, with an estimated closure date in 2052. The estimated population growth rate used in the MSW permit was just under 1% per year.

In the MSW permit application, the estimated per capita waste generated daily was 6.2 pounds per day; and this is the rate used for this report.

Using estimated growth rates as part of this plan without oil and gas development:

- In 2035, a total of 17.9 tons of garbage will be generated in one day.
- Or an accumulative tonnage of 41,350 tons of solid waste between 2014 and 2020.
- Or an accumulative cubic yardage of 348,626 CY without incineration before landfilling.

Using estimated growth rates as part of this plan with oil and gas development:

- In 2035, a total of 22.9 tons of garbage will be generated in one day.
- Or an accumulative tonnage of 42,056 tons of solid waste between 2014 and 2020.

Or an accumulative cubic yardage of 386,204 CY without incineration before landfilling.

7.7.1 Forecast Summary - With and Without Oil and Gas Development

The MSW permit application calculated landfill life at 45 years or estimated closure in 2052. The application estimated population growth rate at the time of application (May 2009) at just under 1.0%. Because the population growth rate is lower in the MSW application than what is projected

in this plan, the total accumulative amounts shown for this plan reflect the plan estimated growth rates for each scenario are presented in Table 30 and Table 31.

Table 30 Barrow Solid Waste - Without Oil and Gas Development

Year	Pop.	Pounds/ Day	Tons/ Year	Cumulative Tonnage	Cumulative Yardage (CY)	Cumulative 30% Burn Reduction (CY)
2014	5,176	32,091	5,857	5,857	14,642	10,249
2015	5,228	32,414	5,915	11,772	29,430	20,601
2020	5,495	34,069	6,218	41,350	103,374	72,362
2025	5,775	35,805	6,534	72,437	181,094	126,766
2030	6,070	37,634	6,868	105,110	262,774	183,942
2035	6,379	39,550	7,218	139,451	348,626	244,039

Table 31 Barrow Solid Waste - With Oil and Gas Development

Year	Pop.	Pounds/ Day	Tons/ Year	Cumulative Tonnage	Cumulative Yardage (CY)	Cumulative 30% Burn Reduction (CY)
2014	5,176	32,091	5,857	5,5857	14,462	10,249
2015	5,332	33,058	6,033	11,890	29,725	20,807
2020	6,181	38,322	6,994	42,056	105,139	73,597
2025	6,658	41,280	7,534	77,025	192,561	134,793
2030	7,033	43,605	7,958	114,692	286,731	200,711
2035	7,400	45,880	8,373	154,481	386,204	270,343

Oil and gas development may generate waste on a project basis rather than simply on population. These data also highlight the possibility that a service area for operation of a landfill, wastewater and industrial water facility should perhaps be considered.

8.0 EMERGENCY SERVICES

Emergency services include police, fire, search & rescue and risk management. These services are provided by the NSB.

8.1 NSB Police Department

The Police Department's primary responsibility is providing police services within the NSB. The Department's headquarters are in Barrow, as are the jail and 24-hour dispatch center. The Department also has offices and staff in each of the seven villages and Prudhoe Bay.

The Field Operations Division staff includes uniformed police officers, detectives, correctional officers and a Drug Abuse Resistance Education (D.A.R.E.) officer that respond to service calls, conduct criminal investigations, engage in proactive patrols and oversee the housing and care of inmates. The Detective Unit focuses on offenses involving the importation and sale of drugs and alcohol. The Corrections Unit staff run the NSB's jail facility. The Dispatch Unit facilitates calls for assistance for police, fire and search and rescue personnel.

The Police Station is located at 1068 Kiogak Street on a leased parcel at the intersection of Agvik and Kiogak Streets. The building was constructed in 1980 and, with the exception of a roof replacement in 2010, has seen only minor repairs over the years. Staff report that the facility is too small, the current layout does not fit their programmatic needs and requires constant repair. The police station lease will expire in 2018.

On a separate adjacent parcel is a Quonset hut, at the intersection of Kiogak and Aivik Streets. This facility is used by the Police Department for offices, storage of supplies and equipment – from ammunition to office supplies and serves as a vehicle repair bay for police specific equipment that are not serviced by the borough Public Works Department. This property is leased on a month-to-month basis. Neither facility complies with current zoning regulations.

As an effort to address the building's deteriorating condition, in 2009 a project analysis report was drafted but not finalized. The draft report indicated that a new 117,965 square feet justice center that included a police station, jail and juvenile substance abuse facility was projected to cost $134.15 million. The jail and juvenile substance abuse facility were proposed to serve Barrow as well as the villages. An alternative presented in the draft report specified that a replacement of only the police station would cost $43.4 million and would provide 33,270 square feet of space. Neither estimate included the cost of land acquisition, site development or utility costs. The draft project analysis report indicated that it was a joint effort with Alaska Department of Corrections, Alaska Court System, Alaska Department of Health and Social Services Division of Juvenile Justice and NSB with a high level of support from all agencies.

An updated cost estimate that identifies potential sites would be beneficial to determine alternatives for the police department and its functions. A relocation project of this magnitude would entail many different funding sources, engaging a variety of stakeholders and procuring significant resources.

8.2 NSB Fire Department

The Fire Department responds to fires and other emergencies in all the North Slope communities; its headquarters are in Barrow. Staff includes medical professionals for critical care air ambulance and medevac services, instruction at Iḷisaġvik College and fire prevention and safety programs for school children.

8.2.1 Fire Station #1

There are two fire stations in Barrow. The first, known as Fire Station #1, is at 1040 Kiogak Street near the intersection with Cunningham Street / Nachik Street. It is the older of the two fire stations in Barrow. A substantial addition was constructed in 1995 and has 6,848 total square feet of space that includes four equipment bays, several offices and a training room. Fire Station #1 is on the site of the old weather station and is also a potential location for a Barrow Consolidated Office Space Facility.

The Fire Department has received general obligation bond funds to purchase a quint fire apparatus that serves the dual purpose of an engine and a ladder truck. It is intended to be stored at Fire Station #1 in Barrow. Retrofitting the equipment bays may be needed to station the apparatus at this facility.

8.2.2 Fire Station #2

Barrow Fire Station #2 is at 4374 Laura Madison Street near the intersection with Okakok Street in Browerville. Fire Station #2 is 14,496 square feet and has three equipment bays and administrative offices. It was constructed in 1995. There is very little to no expansion possibility for this Station.

8.2.3 Proposed Future Fire Station #3

A third station has been proposed that would be constructed where a future extension of Laura Madison Street would intersect with Cakeeater Road. The Fire Department foresees a need for this third fire station combined with a training center. The training center would be intended to function as a regional facility that offers training for village volunteers as well as those in Barrow.

The potential advantages of the proposed Laura Madison/Cakeeater site are that it is located in a less urban area and be able to operate training exercises without negatively affecting nearby residents and would be well-positioned to provide services to NARL.

8.3 NSB Search and Rescue Department

The Search and Rescue Department provides medevac, search and rescue and other emergency services. The Department currently operates four aircraft that are capable of day, night, visual or instrument meteorological flight conditions and utilized for both search and rescue missions and medevac roles. There are two helicopters equipped for enhanced night vision operations and two fixed-wing aircraft capable of operating in icing conditions and high altitudes.

The existing Search and Rescue facility is at 1797A Okpik Street near the intersection with Ahkovak Street. The 13,706 square feet facility was constructed in 1984 with some major upgrades in 1995. It has an aircraft hangar bay and utility, maintenance and storage areas on the first floor. The second floor has a conference room and administrative offices. Search and Rescue also has the adjacent Fuel Truck Building at 1797B Okpik Street. An addition to the existing Search and Rescue facility was funded this year through general obligation bonds.

8.4 NSB Risk Management Division

Among its many duties, the staff at the Risk Management Division of the Administration and Finance Department is responsible for disaster coordination and emergency preparedness and response, such as power outages during severe winter storms. Risk Management stores supplies and equipment for immediate deployment in the case of an emergency.

The Risk Management Office is at 1795 Okpik Street above the Shipping and Receiving Warehouse and adjacent to the Search and Rescue building. Staff at Risk Management has stated that there is not sufficient storage space for supplies and equipment, reducing their effectiveness during an emergency. The NSB is in the process of retrofitting the existing Risk Management office to better fit its needs, including a back-up diesel generator and several conference rooms. This retrofit will enable Risk Management to have an effective Emergency Operations Center. However, the Risk Management Division's need for storage space for emergency preparedness equipment and supplies remains unmet.

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9.0 HEALTH AND SOCIAL SERVICES

9.1 General Health

Barrow is the regional center for most North Slope Borough Health Services. The primary providers include Arctic Slope Native Association (ASNA), NSB Health Department, NVB and the State of Alaska Department of Health and Social Services. Additionally Polar Care is the only private health care provider. It is owned and staffed by a nurse practitioner. Many of the health care services are being assumed by ASNA. The NSB is the only entity that can provide for non-tribal community members through arrangements with ASNA.

The State of Alaska Department of Health and Social Services has a small office in Barrow. Its primary role is providing service to displaced children, including coordination with the NSB Child and Youth Services (CYS) and with NVB for foster care or other types of placement.

Point Hope and Anaktuvuk Pass are the two NSB villages that are geographically located such that services from other regions are more practical and that are responsive to those village's needs.

Figure 22 Samuel Simmonds Memorial Hospital



In 2012, the NSB completed a Baseline Community Health Analysis Report which includes a Barrow Health Profile Report to provide the community with information on basic health measures at the village level to guide community health promotion and planning efforts. This report indicated the following in terms of Barrow's general health:

- A large majority of Barrow adults report or were reported to have at least good health. Slightly more than half of Barrow adults (51% of household heads and 53% of all adult household members) had very good to excellent health and 17% of household heads (13% of all adults) reported fair or poor general health. These estimates are fairly similar to current estimates of overall health among adults in national surveys.

- Self-reported general health varied significantly by ethnicity. Except in the over-65 years of age group, Caucasian household heads were most likely to report very good to excellent health and were the only group to report better general health than their statewide counterparts. A high percentage of residents aged 65 years and older of other ethnicities reported very good to excellent health, although this represented a very small group.

- As noted in the North Slope Borough Health Profile, reported general health status of adults living in Barrow was significantly better than in other villages as a whole. This was true when comparing all ethnic groups combined and when comparing Iñupiat adults only.

9.2 Physical Healthcare Services

9.2.1 Samuel Simmonds Memorial Hospital

Physical health care services for the North Slope are centered in Barrow and are primarily operated by ASNA at the new Samuel Simmonds Memorial Hospital. ASNA is a not-for-profit organization with accreditation from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), a non-governmental organization that ensures that member organizations meet quality standards.

The Indian Health Service (IHS) works with Alaska Native Tribes and Tribal organizations to provide comprehensive health services to Native Alaskans. Samuel Simmonds Memorial Hospital is an IHS-funded, tribally managed hospital. Control of Samuel Simmonds Memorial Hospital was transferred from the IHS to ASNA in 1986. Personnel from the Alaska Native Medical Center (ANMC) in Anchorage provide specialty clinics at Samuel Simmonds Memorial Hospital. The specialty and tertiary referral location for the Barrow service area is ANMC.

In August 2013, the new Samuel Simmonds Memorial Hospital officially opened. The 109,000 square foot structure is four times larger than the 1963 facility it replaces. Healthcare services at Samuel Simmonds Memorial Hospital include:

- Outpatient unit providing emergency, clinic and urgent care (15 outpatient and 4 emergency rooms);

- Inpatient unit providing care for newborn through elderly patients, including low-risk obstetrical services with two labor and delivery rooms;

- Case management;
- Specialty clinics offering access to specialists by referral;
- "Screening for Life" Breast and Cervical Cancer Screening Program (mammography is offered at the Wellness Center);
- Diabetes education;
- Physical Therapy;
- Optometry;
- Pharmacy
- Audiology and endoscopy services; and
- Meditation room.

Support services provided by the Hospital include:

- Central sterile supply;
- Medical records;
- Business office;
- Translation services;
- Eye care (currently being transferring from the NSB Health Department to ASNA); and
- The morgue.

ASNA also administers a prematernal home at 274 Pisokak Street. ASNA would see this facility located adjacent to the hospital in the future.

The NSB Health Department has expressed interest in ASNA taking over the several of its programs: the Community Health Aide Program (CHAP), Public Health Nursing and Women Infant Care (WIC). The Public Health Nursing, WIC and CHAP programs are all located in the Wellness Center.

Figure 23 Samuel Simmonds Memorial Hospital



9.3 Social Services – Adult Programs

9.3.1 Substance Abuse and Treatment

According to the 2012 NSB Baseline Community Health Analysis Report, 6% of Iñupiat households reported to "often" be affected by alcohol and drug problems. This is nearly twice as much as other ethnic groups. While this percentage seems low, conversely, 61% of Barrow households reported the health of the community had "often" been hurt by alcohol and drugs in the past year. The report did not indicate any speculation on the percentage disparities of the household and community impacts (North Slope Borough 2012).

The NSB Health Department provides only outpatient substance abuse assessment and treatment services through Integrated Behavioral Health Program at the Matsutani Community Resource Center. Integrated Behavioral Health also provides referral services to adults and youth who may require inpatient substance abuse services. Together with the NSB Assembly, the Health Department offers treatment scholarships to those who require inpatient services. This scholarship is a once in a lifetime opportunity for adults. If a scholarship is offered to a minor, the scholarship can also be offered again in adulthood. Patients are often referred to the Lakeside-Milam's 28 day residential treatment program in Washington.

Barrow does not currently have any formal detoxification facility or services available. Barrow residents appearing to require detoxification from alcohol or drugs are taken to the Samuel Simmonds Memorial Hospital for medical monitoring and/or evaluation. Those that do not require medical evaluation are typically taken to the Barrow Police Department jail provided they are not a danger to others or themselves due to intoxication.

The Wellness Center once served as a Barrow substance treatment center and detox facility but was closed in 2006 due to the declining North Slope Borough budget. There are no current plans to reopen a substance treatment center and/or detox facility in Barrow. The Alaska Federation of Natives (AFN), the largest statewide Native organization in Alaska, is highlighting the importance

of substance abuse treatment centers in regional communities to expand the treatment options for Alaska Native individuals and families (Alaska Federation of Natives 2014). Additionally, the NSB Health Department reported a number of concerns with sending those in need of treatment to residential programs out of the Barrow area, such as the one in Washington, because the programs are expensive. The typical 28 day duration is too short to be effective and the centers are deficient in cultural relevance. The Health Department supports reinstituting a treatment program in Barrow to serve not only Barrow residents but all North Slope village residents. Over the next twenty years, the NSB Health Department anticipates a need for a thirty-bed facility with fifteen of those reserved for village use and an additional five to ten bed detox facility.

9.3.2 Assisted Living

Assisted living is provided by the NSB Health Department at the Senior Center facility at 5452 North Star Street. There are twelve beds at this facility, three of which are for respite. An additional seven beds are available at a 12-plex at 5155 Herman Street. The NSB Health Department reported that 5 - 10 elders per month are requesting assisted living accommodations. The NSB Health Department believes that there is an unmet need for an additional 20 units now and an additional 30 units by 2035.

Hope Community Resources, a non-profit organization, has an elders care assisted living program. This is an apartment style facility that provides assistance with daily living activities that often includes preparing meals, housekeeping, medication assistance and laundry. There is currently a wait list of six individuals.

9.3.3 Homemaker's Program

The Homemakers Program is administered by the NVB. Homemakers assist elders and people with disabilities who have chronic medical conditions that limit their ability to live independently by providing meal preparation, light house cleaning and personal assistance with dressing and bathing. The program is administered out of the Wellness Center.

9.3.4 Independent Living

There is currently a waiting list for the 29 unit Senior Center facility for independent living located at 5452 North Star Street. The NSB Health Department believes that there is a current unmet need for an additional 20 units now and an additional 50 units needed by 2035.

9.3.5 Mental Health

Hope Community Resources offers mental health assistance through a facility with six beds. The NSB Health Department believes that there is currently a need for a 20 bed facility, growing to as large as 30 beds by the year 2035. There is also a mental health day program that is administered out of the 12-plex at 5155 Herman Street.

9.3.6 Arctic Women in Crisis

AWIC offers emergency shelter and counseling services for victims of domestic violence and sexual assault. It also provides accommodation for homeless women. The current women's shelter is located in a 12-plex complex in Browerville.

Over the next 20 years, it is possible that a new AWIC facility would be needed. The Health Department indicated that locating a new AWIC facility near the police station would be beneficial to the program and its clients.

9.3.7 Homeless Shelter

Barrow does not currently have a dedicated homeless shelter. The NVB administers a housing assistance program that places tribal members in local hotels on a temporary basis. This program is provided through a grant from HUD and NAHASDA that is only available to federally recognized tribes and housing authorities. The maximum amount of assistance available is $5,000 per year, per person, every other year. On average, NVB assists 20 individuals per year with securing temporary housing. They also maintain a list of "couch surfers." These are individuals going back and forth between friends and family because they do not have a home of their own. The North Slope Borough provided a $200,000 grant to NVB for assistance in locating a suitable homeless shelter facility. NVB is also working with ASRC and UIC to address the need for a homeless shelter in Barrow.

9.3.8 The Gathering Place

The Gathering Place is a day program for adults impacted by severe and persistent mental illness. It is located in Browerville and offers counseling services, case management and assistance with state and local resources.

9.3.9 Itinerant and Transient Housing

The NSB Health Department operates itinerant housing for traveling health care workers. There are several itinerant housing facilities: 5115 Herman Street, 5306 Laura Madison Street, and 5328 Laura Madison Street. UIC is planning on developing an extended stay hotel in the vicinity of the new hospital that could supplement or replace current facilities.

9.4 Social Services – Children's Programs

9.4.1 Daycare

Childcare services for 42 children were offered at the current Kiita Learning Community alternative high school at 5245 Karluk Street until 2006. Both Iḷisaġvik College and the NSB Health Department operated the daycare. Unfortunately due to declining revenue in the NSB budget and a program that rarely covered its own costs, the daycare was closed.

Mayor Brower has recognized the urgent need for childcare services within Barrow and all of the North Slope communities. Per her direction, a project analysis report (PAR) was prepared by WHPacific, #18-041 and dated 9-20-13. The report calls for a facility for 249 children and

concludes that “the need is urgent and requires near, mid- and short-term facility investments to bring childcare center services online as quickly as possible.” Focused on one daycare facility, it did not evaluate the possibility of two daycare facilities in Barrow, although the NSB Health Department has indicated that one larger facility would be preferable. Some municipalities in Alaska, such as the Municipality of Anchorage that regulate daycare centers within its jurisdiction, recommend that daycares remain small; they function better and have a warmer and more intimate atmosphere if the number of children does not exceed 100 (Municipality of Anchorage 2007). Planning options discussed in this plan suggest two facilities: one in Barrow and another in Browerville to allow easy access to centers of employment and reduce traffic congestion near the daycares.

The NSB Health Department operates an infant daycare program in the former AWIC building at 4470 North Star Street.

9.4.2 Children and Youth Services

The North Slope Borough Children and Youth Services Division (CYS) of the Health Department provides emergency shelter to children ages 18 years and younger. CYS has a 14 bed facility for displaced children when family or foster placement is not available. Counselors are available 24 hours a day, seven days a week to assist children and their families.

The current CYS facility is a Level 2 Emergency Stabilization and Assessment facility. A Level 2 facility provides behavioral rehabilitation services and temporary residential care for children that may be in danger in their current situation, require temporary placement or an assessment of their needs. The NSB Health Department indicates that CYS could be licensed as a Level 3 Residential Treatment program. The Level 3 designation requires that 24-hour behavioral rehabilitation treatment for children with emotional and behavioral disorders. (State of Alaska Department of Health and Social Services 2008). CYS takes placements from NVB, the NSB Health Department and the State of Alaska.

The CYS facility is located at 2000 Ahkovak Street, at the intersection with Okpik Street. Although there will be a need for additional space by 2035, the lot size and configuration limits the ability to expand the facility or provide an outdoor playground.

9.4.3 Foster Care

The NVB Social Services Department provides tribal foster care services. NVB is the federally recognized tribal organization for Barrow and has exclusive jurisdiction over all Indian Child Welfare Act cases in Barrow. NVB strives to ensure Iñupiat children are placed with extended families or local Iñupiat families when reunification with their parents is not possible. There is a stringent tribal foster care application process that all potential Tribally Licensed Foster Parents must pass before NVB children can be placed in their home. NVB indicates that the need for displaced children is desperate; perhaps as many as 60 children are in need of foster care. NVB actively seeks to improve foster care opportunities to place displaced children in suitable and safe homes. NVB has conducted a study titled “Child and Family Services Plan 2012-2014” to guide their efforts for displaced children. NVB Social Services Department can also investigate reports

of harm to NVB children through a memorandum of agreement with the State of Alaska Office of Children's Services.

9.4.4 Substance Abuse and Treatment

Currently there is not a program or facility for substance abuse or treatment for minors. The potential for a substance abuse and treatment facility for minors was addressed in a 2009 draft PAR for a new police station/justice center. The project cost was estimated to be approximately $35 million. The NSB Health Department supports both a program and facility. The Health Department also notes that extremely overcrowded housing is a factor in drug exposure for young children and that juvenile drug use is on the rise.

When minors commit crimes, they are released to their parents because housing minors with adults at the jail is prohibited. The Health Department has indicated that there is a need for a culturally relevant program that serves minors with substance abuse issues that are involved in criminal activity.

9.5 Veterinary Services

The North Slope Borough Health and Social Services Department operates the veterinary clinic in Barrow. Services offered by the veterinary clinic include animal control, pet adoptions, rabies control, animal vaccinations and limited veterinary services including spaying and neutering and treatment for sick or injured animals. The veterinary clinic has a full-time veterinarian on staff.

10.0 TRANSPORTATION

10.1 Barrow Airport

The Wiley Post / Will Rogers Memorial Airport (Barrow Airport) provides access to many villages in the northwest Arctic, including Atqasuk, Wainwright, Point Lay, and Nuiqsut residents can easily access the larger cities of Fairbanks and Anchorage. Passengers, cargo, and mail destined for these communities are routed through Barrow. Multiple air carriers provide scheduled incoming and outgoing service with Era Aviation (rebranded as Ravn Air in 2014) and Alaska Airlines being the primary passenger carriers. In 2012, there were 43,673 passenger enplanements (State of Alaska Department of Transportation & Public Facilities 2014). Northern Air Cargo schedules daily weekday cargo deliveries to Barrow.

The Barrow airport was originally constructed in 1964. Over the years, there have been many improvements, including extending the runway and expanding the apron. Currently, the airport has a single, paved runway that is 7,100 feet long and 150 feet wide. At the end of the runway are aircraft turnarounds ("elephant ears") to allow large aircraft to turn around in preparation for take-off. Three 75-foot-wide taxiways connect the apron, which covers approximately 620,000 square feet, to the runway (State of Alaska Department of Transportation & Public Facilities 2014). Current configuration and features of the airport are depicted in Figure 25.

Leasing space at the airport is in demand. In 2012, six entities inquired about leasing airport property (State of Alaska Department of Transportation & Public Facilities 2014). Most activity is in the center of the apron, where the primary passenger carriers Alaska Airlines and Era Aviation operate their terminals. Transient aircraft park in the tie-down area of the apron. The NSB Search and Rescue Department and medevac facility is located on a leased property on the northeast end of the apron. The NSB operates two helicopters, a twin-engine airplane, and a jet-engine airplane for these services. It also provides rescue services slope-wide to and from all villages and will provide medevac services to Barrow, Fairbanks, and Anchorage.

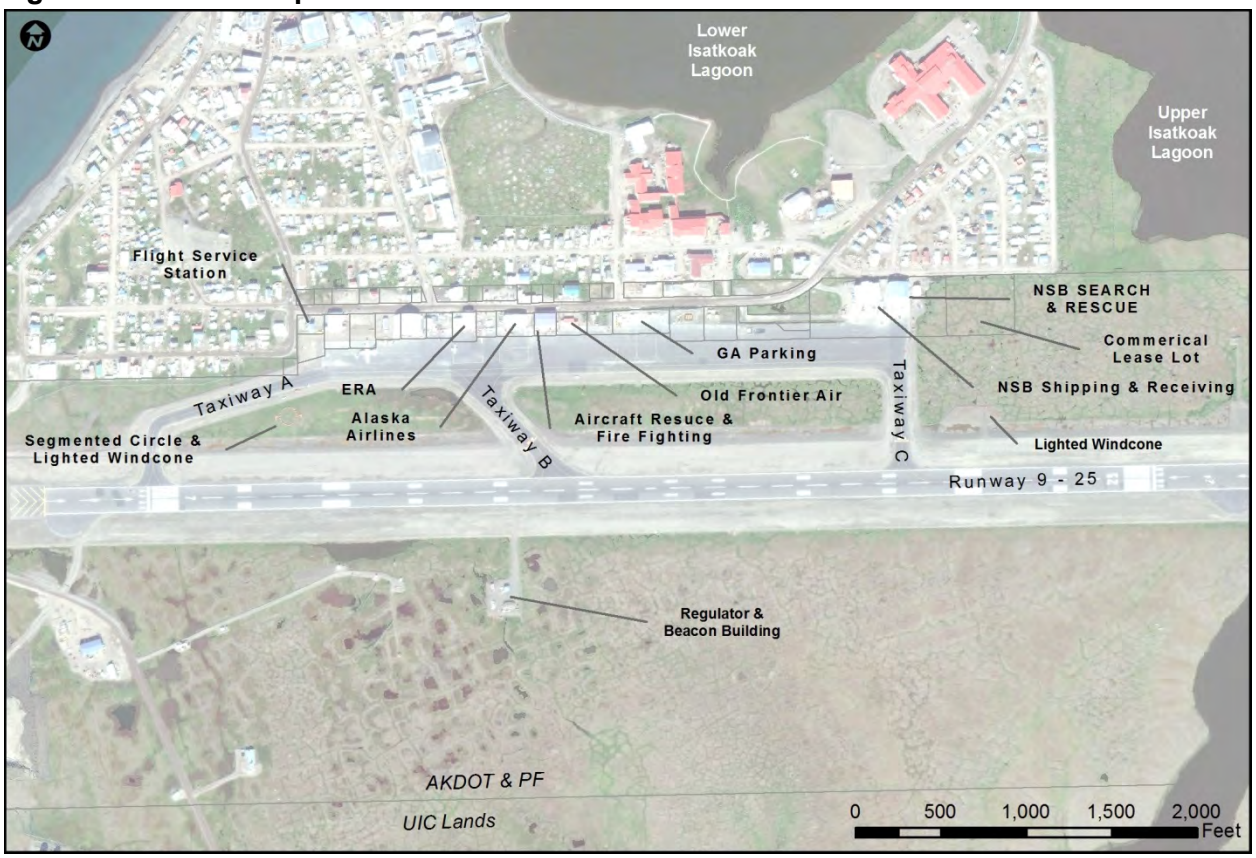
Figure 24 Alaska Airlines



The Barrow Airport plays a large role in the support of regional oil and gas exploration and development. Royal Dutch Shell has chartered a Boeing 737-400 to transfer crews from Anchorage to Barrow, used the airport to transport crew to offshore exploratory drilling platforms, and staged helicopters in Barrow to support crew changes and search-and-rescue operations. Oil and gas activity may increase travel through Barrow; ConocoPhillips and Statoil have both indicated they will use

Wainwright as a base of operations for assessing Chukchi Sea leases (State of Alaska Department of Transportation & Public Facilities 2014). During 2012, USCG provided 24-hour search-and-rescue availability from the Barrow Airport to support Beaufort Sea and Chukchi Sea activities.

Figure 25 Barrow Airport Site Features



There is a dramatic increase in aircraft for scientific research during the summer. Helicopter operations are highest in summer. During research activities such as wildlife surveys and aerial photography, aircraft often operate from the Barrow Airport for a couple of weeks at a time. The USCG is considering Barrow as a seasonal base of operations to monitor arctic marine traffic and offshore oil and gas exploration.

Barrow residents are less likely to own private aircraft than residents in many other Alaska villages. Only 11 private aircrafts were registered with the Federal Aviation Administration (FAA) in 2013.

Priorities for the Barrow Airport include improved passenger terminal, baggage claim, vehicle access and cold storage building for sand and urea (North Slope Borough 2005b).

North of NARL, near North Salt Lagoon, there is an abandoned corrugated metal U.S. Navy airstrip that is used in September and October for whale haul-out and butchering. This airstrip was constructed in the mid-1900s to service the U.S. Navy Point Barrow Camp.

10.2 Community Roads

The City of Barrow has approximately 52 miles of roads, none of which are paved. The largest major streets are 25 feet wide and minor streets are less than 20 feet wide. Road rights-of-way (ROW) are mostly 60 feet wide, but several in western Barrow are 50 feet wide (Native Village of Barrow 2010). Many of Barrow's roads, including high use roads such as Eben Hopson Street, Stevenson Street, and Ahkovak Street are listed on the BIA Indian Reservation Road (IRR) Inventory. All public roads are maintained by the NSB.

Typical arctic construction methods are used to build roads in Barrow. Arctic construction is necessary to preserve frozen layers beneath the road sections. The road design involves using geotextile fabric and insulation in conjunction with free draining gravel and culverts to equalize drainage. To maintain integrity during freeze-thaw cycles, embankment depth and amount of insulation is determined by soil type and underlying permafrost conditions. Utilities in Barrow are buried in the road system, with maintenance trenching done in winter months.

During winter, road surfaces are frozen and stable. Warmer seasons cause a variety of issues including mud, potholes, roadway rutting or wash boarding, and airborne dust. Typically roads are graded in the spring and gravel placement may be required. Airborne dust is problematic, causing respiratory problems such as bronchitis, asthma, and a high incidence of sinus infection (North Slope Borough 2005a). Dust is also blown onto drying subsistence foods, at times causing them to be inedible.

Community roads are travelled by automobiles, pickup trucks, all-terrain vehicles, and snow machines. Road watering trucks, large waste and auto loading trucks, gravel and soil hauling trucks, large fork-lifts, pay loaders, and heavy equipment are all found on roads in Barrow.

The community of Barrow has a public bus that stops at various locations including the hospital, residential neighborhoods, retail stores, and the college. The Senior Center provides an on-call van service to elders and the disabled seven days per week.

10.2.1 Traffic Flow and Community Centers

The City of Barrow has several main community centers which determine traffic flow. These include the City Center of Barrow, the suburb of Browerville, NARL/Barrow Arctic Research Center (BARC) area and the area south of the airport. The DEW Line station, about five miles northwest of Barrow, is sometimes thought of as a community center but is not included in this discussion because the station is self-sufficient, utilizing delivery systems and full lodging services. Recognizing these community centers and reinforcing them through future planning efforts creates the opportunity for cohesiveness for community growth.

Barrow. The City Center of Barrow includes the airport, police station, village and regional native corporation headquarters, Piuraaġvik Recreational Center, Fred Ipalook Elementary and Barrow High schools, the court, hotels, businesses including the bank, government agency facilities, utility offices and production facilities, and residences.

Most travel in Barrow is concentrated in the central business district in the north and west. Main travel routes are Eben Hopson Street from the U.S. Post Office to Kiogak Street, Stevenson Street along the coast from the Elson Lagoon boat ramp to the gravel pit just south of the Airport, and Laura Madison Street, which has recently been extended to meet with Cakeeater Road. Ahkovak Street runs north-south in from of the airport, curving west at Ipalook School to connect with Laura Madison and Stevenson Street. Alaska Commercial Company (locally known as Stuaqpuk or AC), Barrow's largest grocery and general store is at the intersection of Laura Madison and Ahkovak Streets. Figure 26 depicts the current road layout in Barrow.

Traffic flows through the main business district along Stevenson Street to Eben Hopson, providing connection to Browerville. Momegana and Kiogak streets run almost parallel and connect to Ahkovak Street and the airport. Momegana Street is a well-travelled road that continues onto Eben Hopson Street.

Congestion along Ahkovak Street is a concern for Barrow residents, especially when flights are arriving. This road is owned by the SOA and is noted as one of the worst during breakup (Native Village of Barrow 2010).

Browerville. Browerville is a suburb of Barrow located north of Isatkoak Lagoon. Browerville includes the hospital, Stuaqpuk, the gas station, Kiita Learning Community and Eben Hopson Middle schools, Native Village of Barrow offices, Inupiaq Community of the Arctic Slope, the Iñupiat Heritage Center, Tuzzy Consortium Library, government offices, businesses including two auto parts stores and residences. Solid waste disposal is located a few miles east of Browerville.

In Browerville, traffic flow is concentrated along Laura Madison, Eben Hopson, and Stevenson streets. Figure 27 depicts the current road layout in Browerville.

Transportation priorities in Browerville include the Yugit Street Extension and Cakeeater subdivision roads. Extending Yugit Street will create a direct route from Ahkovak Street to the hospital. Design has been completed for this extension. Some Cakeeater subdivisions do not have roads constructed for access in Barrow. One is located adjacent to Cakeeater Road on the north and Qaiyaan Street on the west. The second is located in the vicinity of Nunavak Bay. Both of these subdivisions are priority for roadway construction so landowners can access their home sites.

Samuel Simmonds Memorial Hospital has become a new center point of community activity. As Barrow grows, more space will be needed for institutional, commercial and residential development. The area around the hospital offers a significant future growth opportunity.

Naval Arctic Research Laboratory/Barrow Arctic Research Center. The Naval Arctic Research Laboratory (NARL) facility was originally established during World War II. Over many years, the scope of research at NARL expanded far beyond the original military interest, and included inter-agency and university collaboration. At its height, NARL consisted of nearly 200 buildings, an airstrip, and an antenna field. After the U.S. Navy ended its support for research in 1980, the parcel was divided. "NARL" is used to describe the group of former laboratory and support buildings clustered along the coast between Imikpuk Lake and Middle Salt Lagoon. NARL area

includes Iḷisaġvik College, a hotel and other business offices and residences. The Barrow High School football field is located a short distance north of NARL on Stevenson Street.

The Barrow Arctic Research Center (BARC) and Barrow Environmental Observatory (BEO) are located just to the southeast of NARL. BARC facilities are used year-round by scientists from all over the world. The Tom Gordon Expressway/Uivaqsaagiaq Road is an alternative to Stevenson Street, will begin at the Laura Madison/Cakeeater Road intersection and follow the south shore of the Middle Salt Lagoon, ending at the BARC. Figure 28 depicts the road layout for Tom Gordon Expressway/Uivaqsaagiaq. ADOT and the NSB have received final design drawings, and are currently waiting for funding to construct the road, which has been listed as the top priority in the Native Village of Barrow Long Range Transportation Plan (2010).

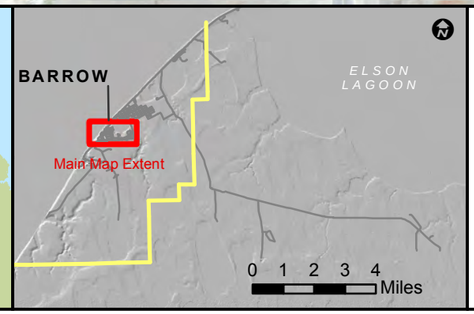
South of the Airport. Property directly south of the airport is primarily industrial in nature; many uses are geared toward aviation activities. There are opportunities to dedicate much of the undeveloped property to oil and gas related activities, including man camps. There is also the possibility of a Coast Guard presence south of the airport. Additional industrial development in this area directs transient oil and gas operations away from the local community.

There has been some interest in residential housing in this area but access and the cost to extent infrastructure to this area make this type of development unlikely over the next twenty years. Improved ingress / egress and fire and other public safety enhancements would need to be put into place before residences are constructed there.

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BARROW ROADS

PARCELS & ROWs

Inset Map

BARROW BOUNDARY

ROADS

SOURCES:
Satellite Imagery: July/August 2012
NSB GIS: Barrow Streets & Parcels

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BARROW ROADS

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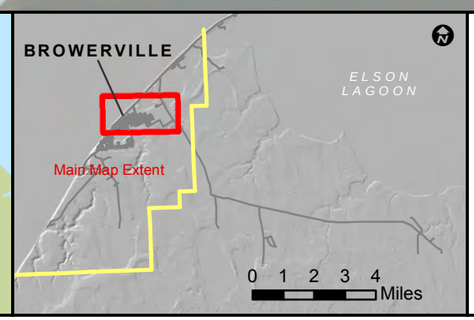
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BROWERVILLE ROADS

PARCELS & ROWs

Inset Map

BARROW BOUNDARY

ROADS

SOURCES:
Satellite Imagery: July/August 2012
NSB GIS: Barrow Streets & Parcels

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BROWERVILLE ROADS

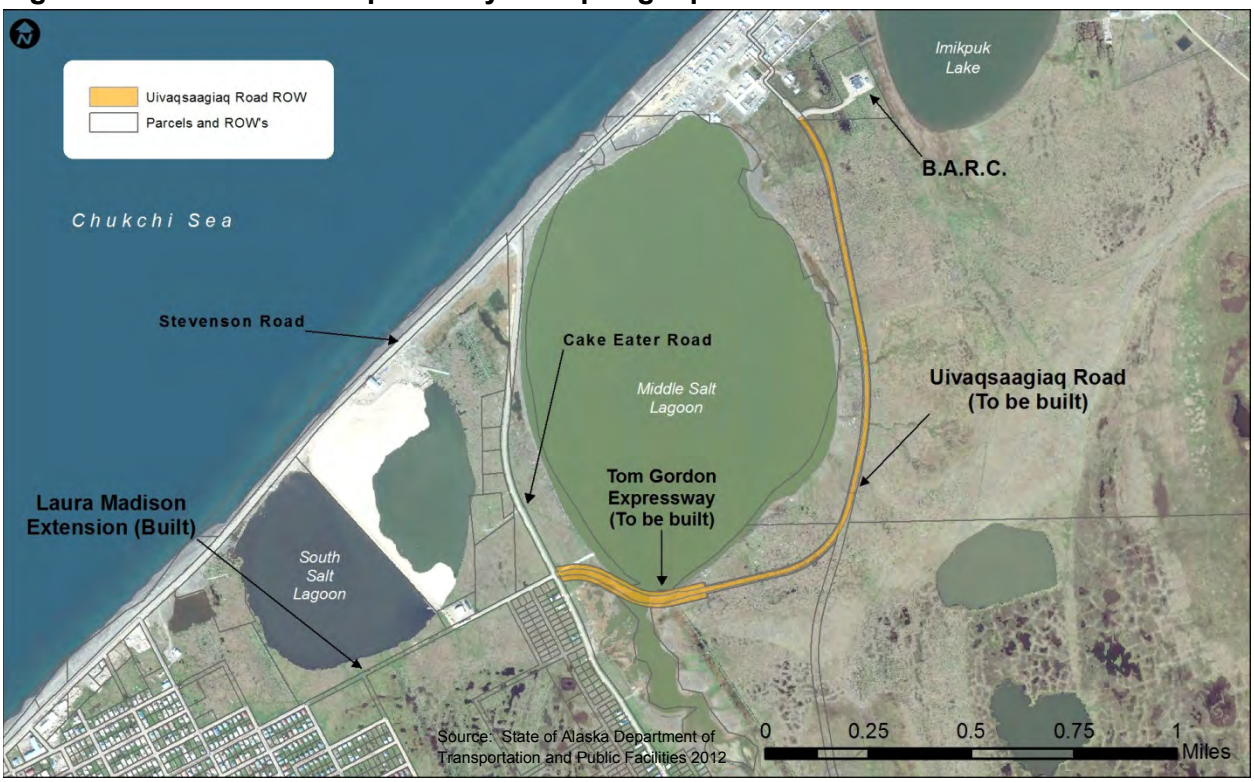
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Figure 28 Tom Gordon Expressway/Uivaqsaagiaq



10.2.2 ATV and Snowmachine Trails

In Barrow there is abundant use of snowmachines and all-terrain vehicles (ATVs) for transportation. In an informal survey conducted for the 2010 Long Range Transportation Plan for Barrow, there are more than 1,000 more snowmachines and ATVs in Barrow than there are cars. Summer ATV trails and winter snowmachine trails link surrounding villages to Barrow and provide routes for subsistence activities. Some years, winter ice roads provide access from Barrow to Deadhorse. When frozen, the Beaufort Sea also provides access to Deadhorse (Native Village of Barrow 2010).

10.3 Marine

Because there are no year round roads into Barrow, residents are dependent on marine and air travel. Economic development drives much of the current maritime activity in and around Barrow.

Marine traffic has increased in recent years due to a relatively ice-free Arctic. Higher air and water temperatures have caused permanent ice cover to diminish to low levels seasonally, and scientists predict this trend will continue (U.S. Coast Guard 2013).

Barrow is the staging ground for Chukchi and Western Beaufort Sea offshore oil and gas development. Thirty percent of the world's undiscovered natural gas and natural gas liquids are estimated to occur in the Outer Continental Shelf and Circum-arctic region. Increased offshore exploration can be expected to increase with receding sea ice. Since 2005, there has been over three and a half billion dollars of commercial investments in Chukchi and Beaufort Sea offshore

leases. In previous years, Royal Dutch Shell has held offshore exploration activities in the Arctic. Commercial exploratory efforts are expected to expand during the next decade (U.S. Coast Guard 2013).

10.3.1 Barging

Cargo barges deliver supplies to Barrow during ice-free months in the summer. Barges leave from Seattle on or about July 1 of each year and carry about 3,000 to 5,000 tons, which is estimated to be 75% business usage and 25% individual goods. Barges offload onto the Chukchi Sea beach, approximately four miles north of Barrow, just north of the NARL facility.

Due to undeveloped shore-based infrastructure, unloading the barges in Barrow can be a risky and time-consuming task. Once in Barrow, if conditions permit, the line haul barge is put on the beach stern first and secured with lines to heavy pieces of equipment that serve as deadheads. A landing craft is put alongside the line haul, and cargo is swung by crane to the landing craft, where it is unloaded by rubber tired loaders. Although this is the quickest way to unload, sea and wind conditions have to be calm and consistent to unload the barge in this manner, and equipment available to hold the barge on the beach. If the haul barge cannot be landed on the beach, a lightering operation occurs in which the line haul barge anchors approximately one half-mile offshore. The landing craft lays alongside the line haul, and cargo is swung by crane from the line haul to the landing craft. Once the landing craft is loaded, it proceeds to the beach landing site and drops a ramp on the beach. Once secured, rubber tired loaders are used to drive onto the landing craft, pick up containers or flats and carry them onto a beach staging area.

Local municipal and Native governments have become acutely aware for the need for a Barrow Safe Harbor and Staging area. A barge docking facility has been suggested, and a Project Analysis Report was prepared in the early 2000s for a single launch and floating dock along the short channel between Elson Lagoon and North Salt Lagoon. At the time, the rough cost estimated by the NSB Public Works Department was five to eight million dollars (Native Village of Barrow 2010). As with many resource development projects, there is potential for conflict between subsistence activities and industrial needs. Development of a Safe Harbor and Staging area could help mitigate conflict by providing benefits to both industry and residents of Barrow.

10.3.2 U.S. Coast Guard Presence

The USCG's Arctic Strategic Plan, published in 2013, describes the anticipated presence of the USCG in the Arctic in upcoming years (U.S. Coast Guard 2013).

Shipping between two destinations outside of the Arctic is increasing dramatically. One million tons of marine cargo transited through an Arctic route in 2012. The USCG expects maritime activity in the Arctic to continue to evolve from exploration and scientific research to resource extraction and commercial shipping. In the short time between 2008 and 2012, traffic moving through the Bering Strait increased 118%. Therefore, the USCG is preparing a Bering Strait Port Access Study. According to the USCG Arctic Strategic Plan, "An oceanic trade route across the Arctic from the North Atlantic to the North Pacific would represent a transformational shift in maritime trade, akin to the opening of the Panama Canal in the early 20th century."

A reduction in sea ice and declining onshore oil production creates incentives for further exploration offshore. This will stretch current search and rescue capabilities. Maritime governance and USCG oversight can be expected to ramp up to respond to high risk activities, The USCG plans to help protect the health of the marine environment, preserve living marine resources, and safeguard the Nation's Exclusive Economic Zone, which extends approximately 200 miles offshore. To support these goals, the USCG may forward-deploy small boats, cutters, and communication assets during the summer season to Barrow. This is expected to be similar to the 2012 Operation Arctic Shield, which was the largest USCG Arctic force package in history.

The USCG also calls for icebreaking capacity, noting that the U.S. will need to make a strategic investment in icebreakers to enable access to the high latitudes over the long term.

10.3.3 Marine Tourism

Arctic tourism is rising rapidly; it is estimated that one million adventure tourists visited the Arctic in 2013 (U.S. Coast Guard 2013). Higher-risk activities such as adventure and eco-tourism often involve transportation via passenger vessel. In past years, small inflatable boats have been used to bring passengers ashore from cruise ships. The cruise industry schedules tours through the Northwest Passage and into the U.S. Arctic.

10.3.4 Subsistence Boating

The ocean and rivers near Barrow provide transportation for many subsistence activities. Iñupiat people living in coastal villages have been hunting the Bowhead whale for thousands of years, and as the International Whaling Commission (IWC) has acknowledged, "whaling, more than any activity, fundamentally underlies the total way of life of these communities." Skin boats are commonly used in spring whaling. Conventional boats are used during fall whaling, as well as for other subsistence pursuits, such as caribou, seal, or walrus hunting, and fishing the rivers with Chukchi and Beaufort seas access. Residents from Nuiqsut can travel to Barrow via passenger vessel. At least one Barrow resident used an airboat on the frozen Beaufort Sea to deliver summer cabin supplies in May before the ice is gone from the Beaufort Sea (Native Village of Barrow 2010).

The existing boat launch at the end of Niksiuraq Road is limited by the condition of the road, which is continually requiring maintenance due to storm surges and erosion. Currently, residents launch boats from several different locations on the shores of Elson Lagoon and North Salt Lagoon. A new boat launch, dock and breakwater have been constructed in the northeast corner of the North Salt Lagoon and has been operating since the summer of 2014. The dock was constructed with NPR-A grant funds and is owned and maintained by the City of Barrow.

10.3.5 Future Port Authority and Facility

Because of its strategic location at the northernmost point in the United States with access to the Chukchi and Beaufort Seas as well as the Arctic Ocean, Barrow is well positioned to serve as a hub for Arctic multi-modal transportation. Industry, government, and private user groups have publically stated that a port along the Arctic Coast of Alaska is needed with increasing immediacy due to greater use of the Northwest Passage.

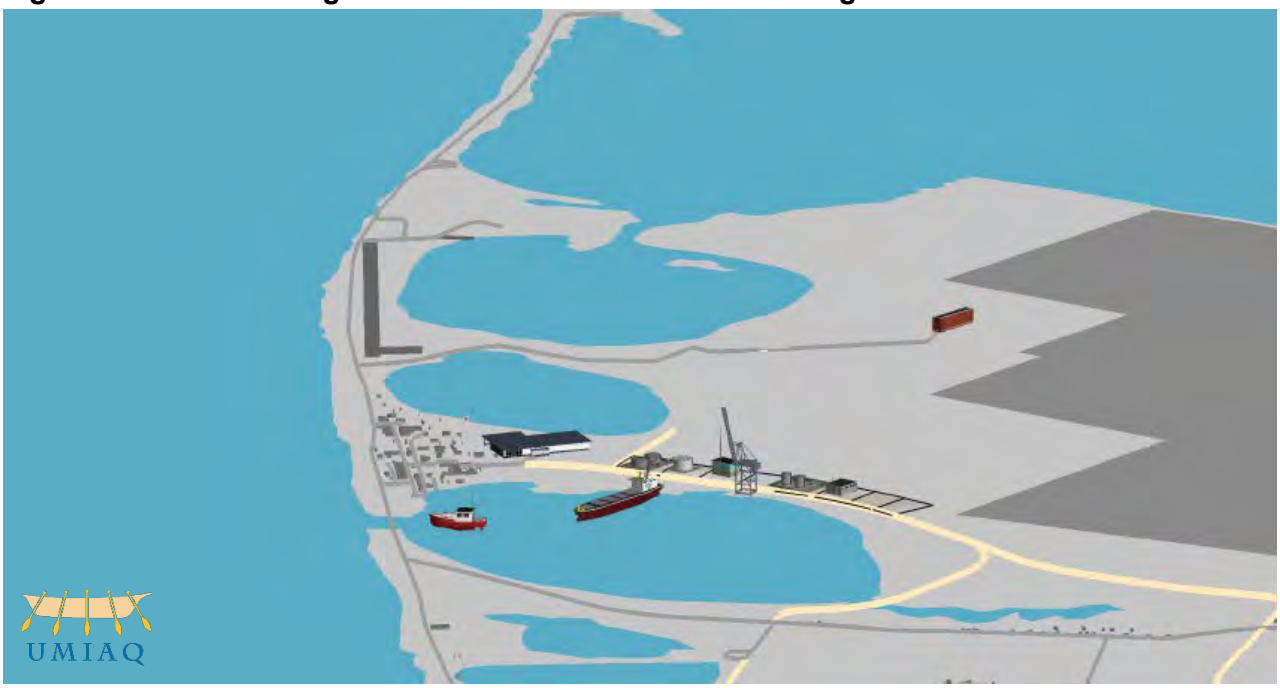
The North Slope Borough has recognized that the increased traffic is both an opportunity and a risk for North Slope residents. The NSB Assembly adopted ordinance 2014-01 for the creation of a port authority in July 2014. North Slope voters approved the formation of the port authority; the election was on October 7, 2014. The purpose of the port authority is to protect subsistence resources and enable residents, tribal corporations and local businesses to take advantage of new economic opportunities through planning, financing and operating and maintaining facilities and related activities (North Slope Borough 2014b).

A Barrow port would support a variety of users, ensure safe access and harbor, support efficient shipping and trans-shipment of goods and provide the infrastructure necessary to serve and promote not only traditional pursuits but industries that include tourism, research, oil exploration and development. This concept is still in its infancy; substantial engineering and geotechnical research and analysis would be needed to determine potential locations for the port based on bathymetry, sediment transport patterns, shore protection, gravel resources, etc. and infrastructure needs, such as fuel storage, utilities and road connections (UMIAQ 2010). Figures 29 and 30 are renderings of potential port sites, Elson Lagoon and the Middle Salt Lagoon.

Figure 29 Rendering of a Potential Port at Elson Lagoon



Figure 30 Rendering of a Potential Port at Middle Salt Lagoon



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11.0 RECREATIONAL FACILITIES

A common theme shared by many stakeholder participants during comprehensive planning processes was the need for recreational facilities serving all ages where families could go to find a variety of activities. The City of Barrow manages the greatest share of recreational needs in Barrow. These facilities include Piuraaġvik, roller rink and baseball fields. The NSBSD manages the football field.

11.1 Piuraaġvik ("A Place to Play")

The Piuraaġvik Recreation Center was originally constructed in 1984. A renovation was completed in 2010; an expansion began in 2011. Currently, another $13 million is needed to complete the work. The new gymnasium will seat approximately 700 people and have a fold down stage and movie screen for movie night events. When the entire facility is complete, it will have five interchangeable program spaces to provide aerobics, weight training, exercise equipment and dance lessons. Additional recreational and cultural activities held at Piuraaġvik include flag football, bocce, soccer, basketball, racquetball, rock wall climbing, volleyball, weight lifting, dance, kick-boxing, aerobics, Eskimo dancing, whaling celebrations and Christmas games. Newer activities include laser tag, archery, and air rifle training.

11.2 Roller Rink

The roller rink is in the former BIA “Home of the Whalers” Gym. This facility offers roller skating, soccer, "open-mic" nights and special events such as Piuraagiaqta (Spring Festival) and Easter egg hunts. Several residents and stakeholder expressed interest in preserving the former gymnasium

Figure 31 City of Barrow Roller Rink



11.3 Football Field

The Cathy Parker Field was built in 2007 and is located along Stevenson Street west of Imikpuk Lake and north of NARL along the Chukcki Sea coastline. It was named after a Florida woman who raised $500,000 to ship 60 tons of blue artificial turf to Barrow to build the Whalers a football field (Gillis 2011).

11.4 Playgrounds

There are four outdoor playgrounds in Barrow. Two are located in Browerville and two in Barrow. The Barrow playgrounds are located near Eben Hopson and Egasak streets and in A Block. In Browerville, there is one on Ahkovak Street near the fire station and one near Utiqtuq Street. The playgrounds are used primary during the summer months. There is one indoor playground at Ipalook Elementary School, but it is not available for public use. An indoor playground available for public use would be a welcome addition to the community.

11.5 Aquatics

There is not an aquatics center in Barrow but there is an indoor pool at Barrow High School that is available for public use during non-school hours. During the summer months, the BHS pool is open for community use and is operated as part of the City of Barrow Recreation Department programs. The first pool in the NSB built in 1978 was in Kaktovik. It was built to teach people to swim, specifically whalers in case they were knocked out of umiaqs. The possibilities surrounding water activities can be greatly expanded to provide for family recreation.

12.0 COMMUNICATIONS

12.1 Mail Delivery

Barrow is served by a single United States Post Office. There is no door-to-door mail delivery service. The mail arrives via an air carrier from Anchorage or Fairbanks. The post office retail office is open during regular business hours.

Passengers, cargo, and bypass mail destined for Wainwright, Point Lay and Atqasuk are routed through Barrow. Roughly 8.7 million pounds of mail flows into Barrow annually. Most of that mail stays in Barrow, while approximately 1.8 million pounds continues to outlying villages. (State of Alaska Department of Transportation & Public Facilities 2014)

12.2 Telecommunications

GCI and Arctic Slope Telephone Association Cooperative (ASTAC) offer telecommunications service in Barrow. Both offer cellular service, internet and local and long distance landline telephone service. GCI also offers cable television.

12.3 Radio Communications

Community residents frequently use very high frequency (VHF) radios to communicate with one another, as well as with community hunters that may be out of range of cell phone service.

12.4 Fiber Optics

Planning is underway for a fiber optic line from Tokyo, Japan to London, England with branch lines connecting six Alaskan villages, including Barrow, Wainwright and Point Hope. Deadhorse will also be included. The fiber optic connection will eliminate the need for transmitting data through satellites and increase internet speeds and reliability. The system is estimated to be operational in 2016.

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13.0 ECONOMY

13.1 Economy

Barrow's economic viability is heavily dependent on government employment and contracting. The local workforce reflects this reality, despite the growing presence of ASRC and UIC as employers in the community.

13.2 Tribal Efforts to Address Economic Development

In 2013, NVB developed a Comprehensive Economic Development Center (CEDC) for Barrow. This effort included the formation of the Barrow Economic Development Council (BEDC) which is comprised of representatives from NVB, UMIAQ (a UIC subsidiary), City of Barrow, Iḷisaġvik College, UIC Lands, NSB Planning Department, Alaska Growth Capital (an ASRC Subsidiary that funds business efforts) and several small business owners. The purpose of BEDC is to mentor the NVB and its membership in the economic development process while that also incorporates subsistence activities. The CEDC is focused on economic benefits for its Tribal members and does not express an economic view for the entire Barrow population.

CEDC identified the following economic development goals and objectives:

Transportation. One of the major concerns was the need for expanded road service to lots that are landlocked by the membership, preventing access to them.

- Goal: The community will possess well maintained roads for all the membership.
    - Objective 1: Expand, improve and maintain local roads.
    - Objective 2: NVB will continue to seek BIA funding to support the NSB in the development of roads.

Housing. The need for housing and housing maintenance is a high priority for the membership. The housing priority is single family homes, rehabilitation of existing homes, apartments and/or condominiums, and the need to have enough room for visitors from the outer villages.

- Goal: All residents will have access to safe and affordable housing.
    - Objective 1: Increase housing stock in the area.
    - Objective 2: Utilize a comprehensive approach to implement housing projects.
    - Objective 3: To the extent feasible help homes to become energy efficient.
    - Objective 4: Increase the availability of qualified labor force in the community.

Workforce, Education and Training. Supporting Iḷisaġvik College was a priority vote by the BECD committee. The focus on skill development and childcare is based on the membership meeting and surveys, that identified higher education, vocational training and employment opportunities as priorities.

- Goal 1: Economic development and employment opportunities earnings will grow through education and job skill training.
    - Objective 1: Support Iḷisaġvik College in building their capacity to deliver integrated and coordinated training programs that incorporate business needs and students interests.
    - Objective 2: Encourage mentoring opportunities for youth training and leadership programs.
- Goal 2: Childcare will be available to working membership parents.
    - Objective 1: Seek solutions to the historical high cost of opening and operating a daycare center.

Quality of Life. A high concern for the membership was the ability to preserve and pass on language and values along with the preservation of subsistence activities.

- Goal: Maintain traditional lifestyles and values in order to foster community wellness in the region.
    - Objective 1: Assist organizations in heritage projects.
- Goal: Increase elder health and longevity through expansion of elder services.
    - Objective 1: Expand health, legal, and housing services for elders.

Health Community. Focus on Families, Individuals and Eliminating Substance Abuse.

- Goal 1: Create a happy and healthy community.
    - Objective 1: Provide parenting classes.
    - Objective 2: Expand the foster care and other child services programs.
    - Objective 3: Reduce teen pregnancy.
    - Objective 4: Support public health initiatives.
    - Objective 5: Expand tribal court services.
- Goal 2: Leaders will establish a healthy community through example and actions.
    - Objective 1: Offer leadership training to all tribal council members.

- Goal 3: Increase healthy family lifestyles and productivity of the workforce by decreasing substance abuse.
    - Objective 1: Increase the quality and the availability of services for substance abuse prevention and treatment.
    - Objective 2: Seek to train Iñupiat Counselors.
    - Objective 3: Seek to train Iñupiat Public Safety Officers.

Natural Resources. The protection of the environment and the subsistence way of life was identified as a high priority of the membership. Focus on Fish & Wildlife.

- Goal: Successfully and thoughtfully manage the natural resources.
    - Objective 1: Identify and develop fishing stocks.
    - Objective 2: Identify and develop industries for land mammals.

Business Development. In order to build sustainability for its membership, NVB identified that steps are needed to ensure employment for its members. They identified tribal enterprise along with the development of local and small business start-ups as its priorities.

- Goal 1: Successfully move into enterprise to provide employment opportunities for the membership.
    - Objective 1: Obtain the ability from the USDOI to move into tribal enterprise by obtaining approval of the Section 17.
    - Objective 2: Apply for and obtain 8(a) status.

Priority List. In discussions and assessments of community needs, it was determined that two categories exist under business development for-profit and not-for-profit. A total of ten for-profit and three non- profit development projects were identified.

Through membership participation the BECD committee identified the following top business project priorities in the Comprehensive Economic Development Strategy process.

For Profit:

- Commercial Kitchen.
- Butchery/Tannery.
- Tourism.
- Sewing Co-op.
- Shop for Small Engine Repair or Self Service Repair.

- Arctic Community Greenhouse.
- Sewing/Craft Café.
- Laundromat/Washeteria.
- Native Store.

Non-Profit:

- Arctic Survival Program.
- Snow Park.
- Chamber of Commerce.

Business Starts

- Goal: Increase employment and income through business start-up.
    - Objective 1: Explore feasibility of community kitchens as a business to support feasible business start-ups such as fish/mammal production.
    - Objective 2: Explore feasibility of native store, butcher/tannery, Movie Theater, bowling alley, sewing co-op, self-repair and small engine shop, local fish and land mammal development, arctic community greenhouse, sewing/craft cafe and Laundromat.
    - Objective 3: Work with Iḷisaġvik College and other entities to enhance and develop new training opportunities for small business management that would include classes that addresses specialized business applications for Barrow.
    - Objective 4: Encourage the use of the Internet and other technologies for business marketing, growth, and development.
    - Objective 5: Determine the feasibility of non-profit activities that support businesses and a healthy community.

Tourism Development

- Goal 1: Strengthen the local community through tourism development.
    - Objective 1: Expand tourism activities.
    - Objective 2: Identify and develop feasible Eco-tourism activities.
    - Objective 3: Research tourist preferences for the top-of-the-world (why they came, did they see what they wanted to see, complaints, compliments, what would make them recommend others to visit, etc.).

- Objective 4: Develop a website promoting tourism.

To assist in the development and expansion of small businesses, the Native Village of Barrow employs a part-time position made possible from the U.S. Economic Development Administration (EDA) grant to implement the following in year two:

- Organize community and BECD meetings.
- With input from the community identify and disseminate information about business development opportunities.
- Move forward with the existing Economic Development Committee in addressing the economic needs of the community and then periodically re-evaluate the plan to see if the community needs are being met.
- Contact financial institutions to move into partnerships and explore funding opportunities for small business and tribal enterprise.
- Move forward with plans and strategies developed during year one for the potential development of small business and tribal enterprise and implement those plans and strategies in year two.
- Continue working with the Alaska Economic Development Representative and EDA Regional staff in project development.

13.3 Tourism

As the most easily assessable of North Slope communities, Barrow is the primary destination of tourists interested in visiting the Arctic. Hotel accommodations in Barrow include the King Eider Hotel, located at 1752 Ahkovak Street with nineteen rooms and the Airport Inn, located at 1815 Momegana Street with a total of sixteen rooms. The Top of The World Hotel, owned by ASRC, had seventy rooms. The restaurant adjoining the hotel, Pepe's North of the Border, caught fire on August 31, 2013 and was completely destroyed; the hotel was so damaged that it is currently unusable.

Figure 32 King Eider Hotel



ASRC has constructed a new hotel next to the post office on Eben Hopson Street named Top of the World Hotel. A grand opening was celebrated in April 2014. The three story, 40,000 square feet building will offer seventy guest rooms, a restaurant, gift shop, three multi-purpose rooms and a workout room. (Tundra Tours Hotel 2014). As part of this project, ASRC is repurposing the former's Brower Café and Cape Smythe Whaling and Trading Station building and the building immediately adjacent, the former location of A&D Auto Repair, into an artesian work studio where tourists can see local artisans at work. Given its close proximity to the new hotel and on the Arctic Ocean, it is anticipated to be a popular destination for tourists. There is also speculation that UIC is interested in constructing an extended stay hotel next to the new hospital located on Uula Street near Yugit Street. There are several locally owned and operated tour companies in Barrow as well as those that operate out of Fairbanks or Anchorage that offer packages tours of Barrow.

Figure 33 Top of the World Hotel



The primary tourist attractions include: the Arctic Ocean and Point Barrow; polar bear viewing; bird watching, including snowy owls; learning about the North Slope's traditional culture at the Iñupiat Heritage Center and during the Nalukataq spring whaling festival and blanket toss; visiting the Will Rogers/Wiley Post memorial crash site located 13 miles southwest of Barrow; visiting the whale bone arches and skin boats frames near the former Cape Smythe Whaling and Trading Station; and the Birnirk archaeological site.

Alaskan Arctic waters are not a popular cruise destination but there is at least one cruise line, Hapag-Lloyd Cruises that includes stops in Barrow and Point Hope as part of their Northwest Passage cruise. Because neither community has a deep water port that can support a docking cruise ship, passengers are ferried to shore via smaller boats. While this type of tourism is by no means a significant contributor to the local economy of Barrow, the Bering Strait is seeing an increase in cruise ship traffic that is expected to continue that may eventually mean more cruise-related tourism in Barrow (Committee on the Marine Transportation System 2013) However, because there are no customs or border security along the remote Arctic coastline, allowing cruise ships access to these arctic communities is an increasing concern. Securing the U.S. Arctic maritime border is increasingly important to the USCG (U.S. Coast Guard 2013).

13.4 Other Economic Development Efforts

Unlike most areas of Alaska, the North Slope does not have an Alaska Regional Development Organization (ARDOR). ARDORs in other parts of Alaska are used to encourage business growth and development. The program has been used successfully in many rural locations to spur community development and employment. Urban areas like Anchorage use its ARDOR as the main economic development strategy to recruit for businesses to Anchorage. One successful recruitment effort was the air cargo business, such as UPS and FedEx. Barrow may have a similar opportunity with fiber optic connection proposed by Quintillion; an ARDOR would examine ways to take advantage of this opportunity focusing specifically on economic development for the North Slope.

13.5 Employment

According to the Alaska Department of Labor and Workforce Development (ADLWD), from 2008 through 2012 Barrow local employment ranged from 72% to 74%. Between 67% and 69% of the local residents were employed on a full time basis. The 2010 NSBEP&CR estimates are close to those of ADLWD; approximately 63% of the 1,790 people in Barrow's labor force are employed full-time.

The 2010 NSBEP&CR indicates that 31.9% of the workforce has twelve months of employment, 82% of which have a full time permanent job. Employment status between 2003 and 2010 remained consistent for permanent full-time (52% and 54% respectively), seasonal (11% and 8%), part-time (6% and 5%) and retired (7% and 7%) statuses. The only marked difference between 2003 and 2010 employment statuses was those that were unemployed, which increased from 16% in 2003 to 25% in 2010.

13.5.1 Private Sector

The private sector employs approximately 45 percent of Barrow workers. The private sector employees are primarily with ASRC and UIC and their subsidiaries. The SOA also reports that there are 138 current business licenses register in Barrow, a robust population of small business owners.

13.5.2 Government

The NSB and NSBSD are the largest employers in the community, employing approximately 48 percent of all Barrow Workers. The City of Barrow and the Federal Government each employ about 2 percent of the Barrow Workforce. The State of Alaska employs approximately 1 percent.

14.0 EDUCATION

The primary operator of the educational system on the North Slope and in Barrow is the North Slope Borough School District (NSBSD). NSBSD operates eleven schools across the North Slope for preschool through twelfth grade, four of which are in Barrow.

Iḷisaġvik offers higher education opportunities for Barrow and the North Slope village residents. The common goal for all educational programs, especially at high school and college levels, is to prepare students to participate in the job market, tailoring many programs to meet the needs of employers of the North Slope.

Figure 34 North Slope Borough School District Administration Building



14.1 Ipalook Elementary School

Ipalook Elementary is a public school located at 2070 Ahkovak Street and operated by the North Slope Borough School District. The current enrollment is approximately 690 students with an estimated capacity of 1,245 to 1,470 students. Included in Ipalook is kindergarten through fifth grades and pre-kindergarten classes, K3 and K4.

Without oil and gas development, the projected Barrow population for 2035 is 6,379 – a 23% increase. The Ipalook population could increase an additional 138 students to approximately 739 total students by 2035 assuming the same distribution within age cohorts as 2014. This estimated student population increase could easily be accommodated within the current school facility.

With oil and gas development, the projected Barrow population for 2035 is 7,400 – a 43% increase. The Ipalook population could increase by 258 students to approximately 859 students by 2035, again assuming the same distribution within age cohorts as 2014. The projected increase in school enrollment could be accommodated within the existing facility.

14.2 Hopson Middle School

Hopson Middle School is a public middle school located at 6501 Transit Street. It has a current enrollment of approximately 249 students in sixth, seventh and eighth grades with a facility capacity of approximately 500 to 600 students.

Without oil and gas development, the projected Barrow population in 2035 is 6,379 – a 23% increase. The Hopson Middle School population could increase by 57 to total 306 students by 2035 assuming the same distribution within age cohorts as 2014. The projected increase in school enrollment could be accommodated within the existing facility.

With oil and gas development the projected Barrow population for 2035 is 7,400 – a 43% increase. The Hopson Middle School population could increase by 107 students to a total of 356 students in 2035 assuming the same distribution within age cohorts as 2014. The projected increase in school enrollment could be accommodated within the existing facility.

14.3 Barrow High School

Barrow High School is a public school located at 1684 Okpik Street and operated by the North Slope Borough School District. Current enrollment is approximately 201 students in grades ninth through twelfth with an estimated capacity of 675 to 810 students.

Without oil and gas development, the projected Barrow population in 2035 is 6,379 – a 23% increase. The Barrow High School population could increase by 46 students for a total of 247 students by 2035 assuming the same distribution within age cohorts as 2014. The existing high school twelfth grade classes are much smaller than those for the current kindergarten classes, suggesting that student enrollment may be higher than this analysis predicts.

With oil and gas development the projected Barrow population for 2035 is 7,400 – a 43% increase. The Barrow High School population could increase by 86 student for a total of 287 students assuming the same distribution within age cohorts as 2014. This student population could be accommodated within the existing high school facility.

Figure 35 Barrow High School



Two project analysis reports are included in the NSBSD's 6 Year Capital Plan that relate to the high school facility. The first is the feasibility of a 16,000 square feet multipurpose room addition. The location of Barrow High School makes an addition difficult; the facility is surrounded by the Lower Isatkoak Lagoon on its east side, the 29-plex apartment building to the north, Takpuk Street and the cemetery to the west; and Okpik

Street and residences to the south. The addition would be intended to serve the community for large events, such as Kivgiq, as well as high school students. Utilizing schools, especially high schools, as community centers outside regular school hours is an increasingly common practice[6]. There will likely be a need for additional parking and parent drop-off space in the future, making planning additions for this site even more difficult.

The second PAR addressed renovations to the high school, including the pool. The NSB administration has expressed a desire for greater community use of educational facilities after hours. In addition many community members have expressed a desire for a facility or facilities that could provide activities for families, especially during the long winter months. While the PAR that addresses the multipurpose room addition does consider community use of the facility, the PAR that addresses renovations does not. Potentially shared program space with Iḷisaġvik College and/or the City of Barrow's recreation center, Piuraaġvik, may facilitate greater use of the facility and its resources, including evening classroom use for college students, vocational education classroom space and community use of the pool for public events and classes.

14.4 Kiita Learning Community

Currently the Kiita Community Learning Program is located in the repurposed Browerville daycare at the corner of Karluk Street and C Avenue. It has reportedly been highly successful in capturing students who might not have otherwise graduated from high school and as a result, many have achieved a higher level of success and become contributing community members. The School District has estimated that the Kiita Program could expand to as many as 70 students by 2035 (Cowan 2014).

Mayor Charlotte Brower directed that Kiita move out of its current facility to provide needed space to reinstitute a daycare in Barrow. A study to locate a new home for Kiita focused on a site at the corner of Herman and Ahkovak streets, block 9, lots 1 and 2. The structure on one of these sites is the Nelson Building. There are additional locations that may also be suitable, including the CO2 site. The best way to reestablish the Browerville daycare and relocate Kiita has yet to be resolved.

14.5 Residential Learning Center

The concept of a Residential Learning Center is still in development. The facility would provide an opportunity for village students to receive short term intensified educational experiences utilizing Barrow resources at the high school and potentially Iḷisaġvik College. There is an estimated need for 50 students.

There are a number of models for this program being studied for potential implementation. One model provides dormitory space only in combination with utilization of current classrooms at local schools. Dormitory space would need to be located separately from those for Iḷisaġvik College (Cowan 2014).

[6] There are several schools in Alaska that have shared facility space including Nikiski High School in the Kenai Peninsula Borough School District and West High in Anchorage

14.6 Administration

The North Slope Borough School District houses administrative duties in two different buildings: Central Administration, located at 829 Aivik Street and Central Administration 2 (CO2) at 1849 Momeganna Street. The Administrative Offices is approximately 7,600 square feet and CO2 is approximately 30,000 square feet without the roller rink. Approximately 45,000 square feet are needed for the School District's administrative functions.

14.7 Bus Barn

The NSBSD Bus Barn is located on Okpik Street is across from Barrow High School and adjoins the former NSBSD bus barn now being utilized by the Fuel Division of Public Works. Warehouse. The School District warehouse is currently housed on the CO2 site in buildings 1849H and 1849K with a total of 12,456 square feet.

14.8 Iḷisaġvik College - "A Place to Learn"

Iḷisaġvik College is located at 100 Stevenson Street within NARL. It is currently the only federally recognized Tribal College in Alaska and serves approximately 1,268 students. The College offers post-secondary academic, vocational and technical education designed to align with the borough and Alaska's workforce needs.

Issues at this location are antiquated building technology and facilities constantly requiring fixes, distance and weather related issues affecting transport of students from Barrow and Browerville and space organizations suitable for effective delivery of education. Currently, Iḷisaġvik is housed in 14 buildings from NARL to Browerville.

The Iḷisaġvik College administration has expressed a desire to move closer to Barrow into a new facility that is designed for higher education use. A Space Program Study was developed that delineated facility and space needs for the College's programs and provided relocation options for the College. The College currently occupies 22,030 square feet of vocational education space at NARL in four buildings. The study recommended a facility totaling 26,827 square feet.

15.0 SUBSISTENCE

15.1 Definitions of Subsistence

There are many different understandings of the meaning of subsistence that often differ based on cultural upbringing.

Subsistence implies the use of natural resources for physical needs; for many, subsistence harvest activities also have a spiritual and cultural importance through a connection to the land and traditional knowledge passed down through generations. Subsistence is not only a way of life, but also the joy of living from the gifts that the Creator provides.

The NSBMC §19.20.020 defines subsistence as:

> "An activity performed in support of the basic beliefs and nutritional needs of the residents of the Borough and includes hunting, whaling, fishing, trapping, camping, food gathering and other traditional and cultural activities."

The State of Alaska statute §16.05.940(33) defines subsistence uses as:

> "...the noncommercial, customary and traditional uses of wild, renewable resources by a resident domiciled in a rural area of the state for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption; in this paragraph, "family" means persons related by blood, marriage, or adoption, and a person living in the household on a permanent basis."

Subsistence, as it is practiced in Barrow and across the North Slope, is more similar to the NSB definition than it is to the state definition.

15.2 Village Area of Influence

Barrow is on the coast of the Arctic Ocean, specifically the Chukchi Sea to the west and the Beaufort Sea to the east. Barrow's unique geographical location provides for an expansive area for marine mammal harvesting. According to a 2012 Pew Environment Group summary of marine subsistence uses as prepared by Stephen R. Braund & Associates, Barrow subsistence users travel as far as 90 miles north of Barrow and approximately 60 miles off the Beaufort and Chukchi sea coastlines. The marine mammals cited as taken for subsistence purposes in the report included beluga whales, bowhead whales, polar bears, seals (bearded and ringed) and walruses.

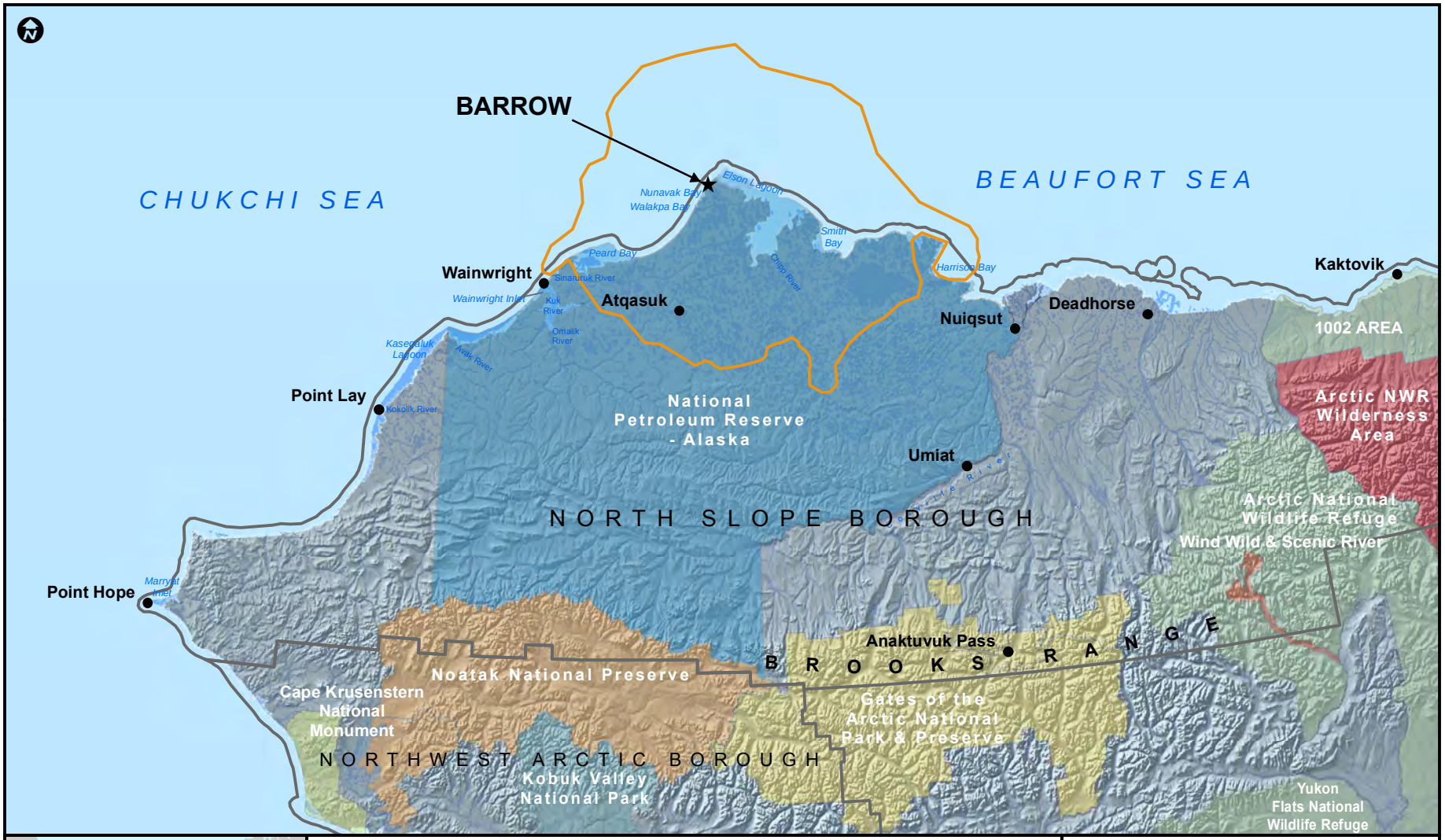
The subsistence hunting area also extends to inland areas south of Barrow. The subsistence traditional use area spans from Barrow to Peard Bay to the southwest and Smith Bay to the southeast. Many subsistence users have cabins where caribou, brown bear, wolf, wolverine, ground squirrel and various species of fish and waterfowl are harvested. Figure 37 depicts the Barrow Area of Influence.

The area of influence is an aggregation of traditional subsistence uses. The area of influence depicted in Figure 37 is not maximum extents that hunters will go for subsistence activities; it is a typical hunting range based on past hunting and fishing use. The area of influence can also be used to determine community stakeholders that may need to be consulted prior to activity that may affect their traditional use of the land.

The village area of influence boundary changes over time as traditional subsistence land use patterns change based on the availability of animals and fish.

Figure 36 Whaling in Barrow





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BARROW, ALASKA AREA OF INFLUENCE

Scale: 0 25 50 75 100 125 Miles

Figure: **37**

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15.3 Barrow Subsistence Harvest

Subsistence users in Barrow rely upon a vast array of terrestrial and marine mammals, fish and waterfowl. According to the NSB 2010 Economic Profile and Census Report (NSBEP&CR), nearly 95% of Barrow's Iñupiat households use subsistence foods and nearly 60% of Barrow's Iñupiat households receive at least half of the household diet from subsistence foods (North Slope Borough 2010). While caribou, fish, geese and ducks are part of the subsistence diet; the bowhead whale is the foundation of the Iñupiat people.

Sharing the Harvest. Community sharing is an important cultural value in Barrow and across the North Slope. One Iñupiat tradition indicative of the importance of sharing the harvest is for a young hunter to give his or her first harvest to an elder in the community that is no longer able to hunt or fish. The bountiful subsistence harvest is shared widely with people across the North Slope. The tradition is prehistoric and one way the different groups of Iñupiat ensured their collective survival.

Whaling preparation is a year around event. The coastal villages of Kaktovik, Nuiqsut, Barrow and Wainwright begin the fall whale hunt from late September through mid-October. Hunters then turn inland to traditional hunting sites for fox, wolverine and wolf, often used for making hunting gear and ceremonial parkas. Polar bear hunting also occurs from November to January. Crews begin repairing or making new boat frames and cleaning ice cellars in preparation for the spring whaling season. In March, women begin sewing the bearded seal skins for skin boats, called umiaqs. Skin sewing is very important; the whaling crews depends on careful stitching to ensure their boats stay afloat during the hunt. Whaling season begins again in the spring, typically ending in May. After Nalukataq, a festival in June that celebrates a successful whale harvest, whaling captains and subsistence hunters begin hunting a variety of marine mammals, including bearded seal, ringed seal and walrus. Caribou hunting is year-round but mostly takes place from June through September or as weather conditions allow. Caribou tendon is made into thread to sew bearded seal skins for the skin boats. The process begins again, a traditional practice of the Iñupiat people for hundreds of years.

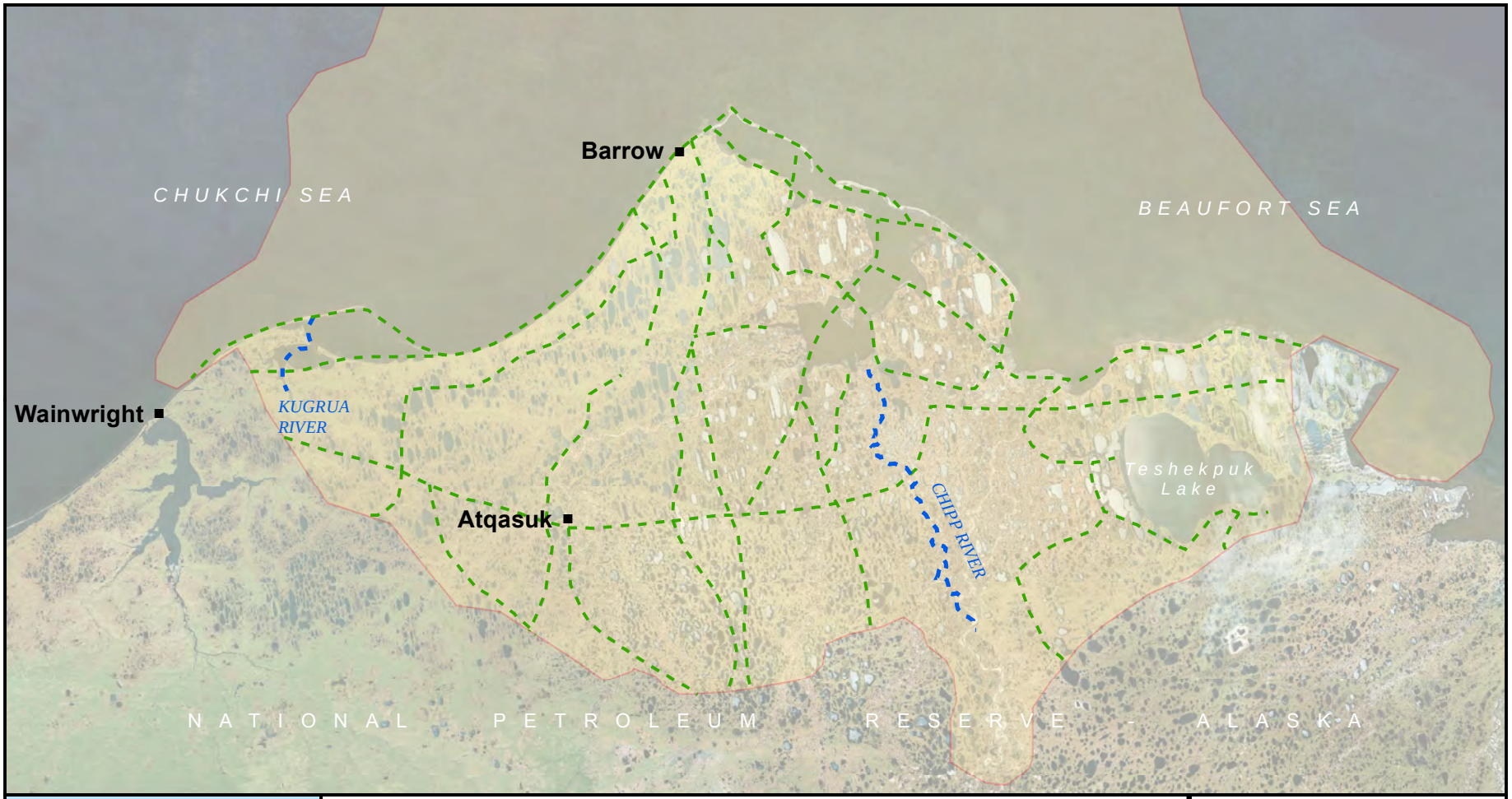
The Alaska Eskimo Whaling Commission (AEWC) reports that there were 36 registered whaling crews in Barrow for the 2013 spring whaling season. A single bowhead whale harvested in the spring, typically feeds the entire community five times throughout the year:

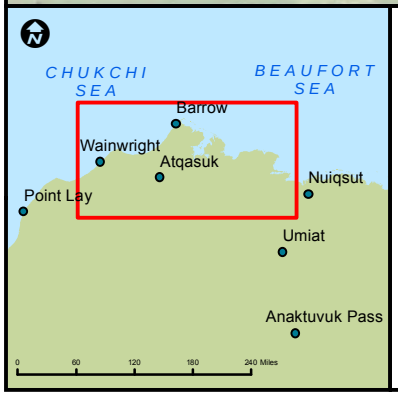
- Initial captain's open house when the whale is caught;
- The Apuġauti - a feast on the beach held by the whaling captain's wives to welcome the returning whalers after the whaling season is over;
- The Nalukataq - the whaling festival held in June after the successful spring whaling season ends;
- Thanksgiving church feast; and
- Christmas church feast.

15.4 Barrow Subsistence Harvest Areas

The community of Barrow is situated to allow for hunting of both marine and terrestrial animals. Marine mammals include bowhead whale, ringed and bearded seal and walrus. Birds, such as eider ducks and geese, are also common targets for subsistence hunters. Hunters also harvest fish in local rivers and lakes and in Elson Lagoon. Other resources include moose, ptarmigan, and furbearing animals such as wolf and wolverine. But the most common subsistence harvest is caribou, which crosses the tundra throughout the year.

Figure 38 illustrates historic subsistence routes as originally documented by the Inupiat of the Arctic Slope and ASRC with Arctic Environmental Information and Data Center at the University of Alaska in 1974-75.





RIVER ROUTE

SNOW MACHINE OR DOG TRAILS

BARROW AREA OF INFLUENCE

SOURCES:
Satellite Imagery: Alaska Mapped BDL Layer
Routes & Trails: Digitized from Native Land Use Map and clipped to the Barrow Area of Influence
Arctic Environmental Information and Data Center
University of Alaska 1974-75

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BARROW HISTORIC ROUTES & TRAILS

Scale: 0 10 20 30 Miles

Figure: **38**

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Date: 7/29/2014

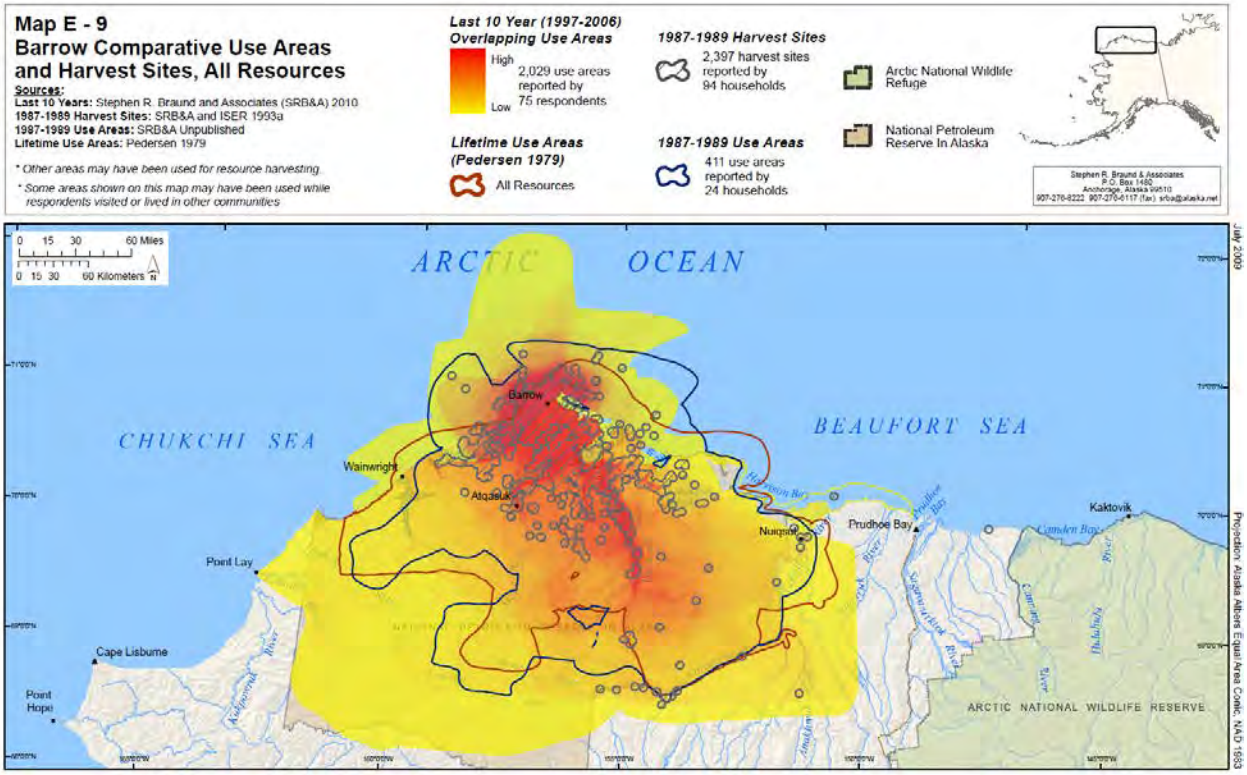
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The former Minerals Management Service (now the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)) within the U.S. Department of Interior commissioned a study of regional subsistence patterns of three North Slope communities. The maps and data contained here are a result of the report, Subsistence Mapping of Nuiqsut, Kaktovik and Barrow published in April 2010 by Stephen R. Braund & Associates.

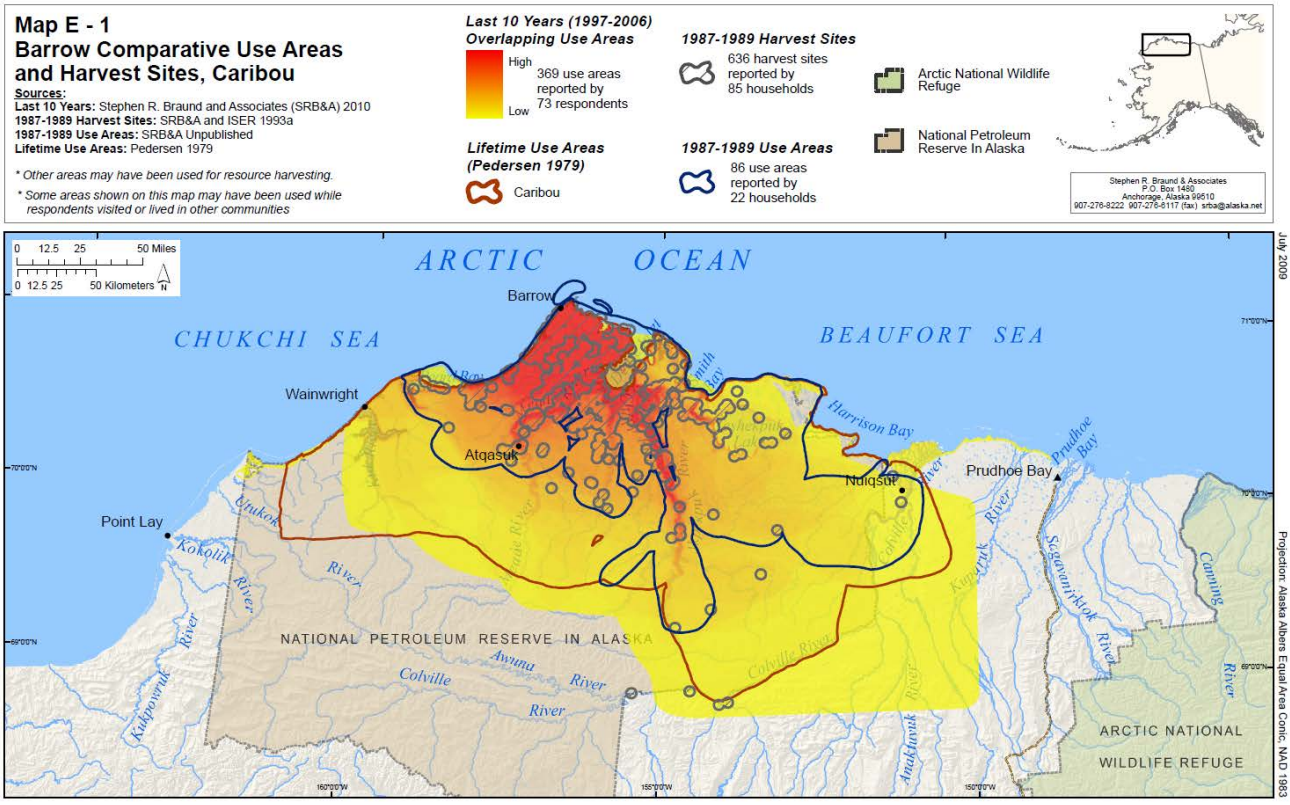
Subsistence Harvests – Data indicates that Barrow residents primarily utilize marine mammals, caribou, fur bearing animals, birds and fish. These harvests are important to maintain and sustain the Iñupiat way of life. Figure 39 depicts the consolidated harvest areas in the Barrow, Alaska vicinity.

Figure 39 Barrow Comparative Use Areas and Harvest Sites, All Resources



Caribou (tuttu). Caribou is by far the most common harvest for subsistence hunters residing in Barrow. The data gathered by Stephen Braund and Associates indicates that Barrow residents travel significant distances inland to hunt caribou, most commonly to the Meade, Topagoruk and Chipp rivers; around Pittalukruak Lake and Alaktak River; along the coast between Peard Bay and Dease Inlet; and inland from Barrow to the Inaru and Meade rivers (Stephen R. Braund & Associates 2010). While caribou are harvested throughout the year, the most activity takes place in July, August and September as the herds head toward the coastline seeking cooler weather and fewer mosquitoes. The intensity of caribou harvest is shown in Figure 40.

Figure 40 Barrow Comparative Use Areas and Harvest Sites, Caribou

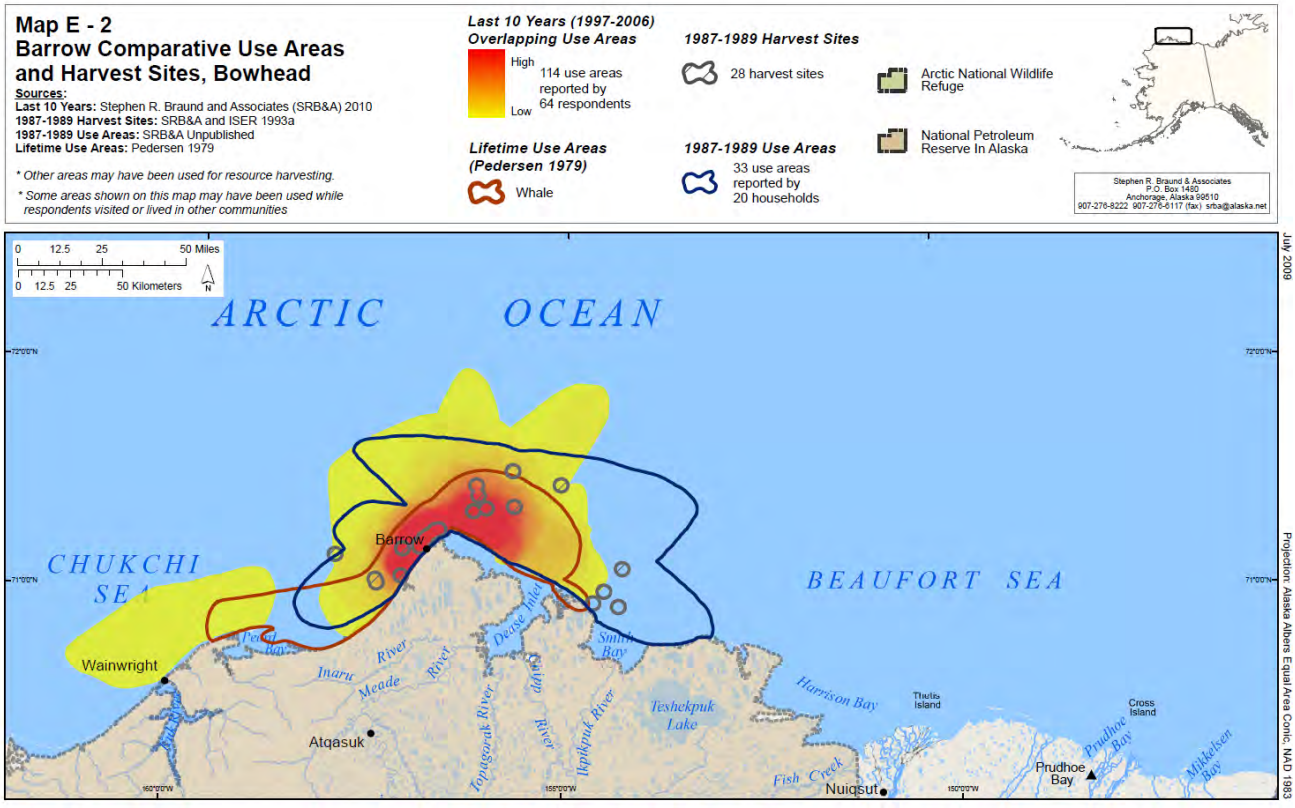


Bowhead Whale (aġviq). The subsistence hunt for bowhead whales is by far the most celebrated within coastal North Slope communities, including Barrow. The hunters organize into whaling crews that function as a team in harvesting bowhead whales. Each whale taken is a victory for both the crew and community as a whole.

Whales are harvested twice a year: during the spring and fall hunting seasons. The spring hunt is typically west of Point Barrow and closer to the shore; the fall hunt is west and east of Point Barrow and is generally a greater distance from shore. During the spring hunt that typically takes place in April and May, the whale crews use traditional seal skin boats, known as umiaqs, and pull harvested whales onto the sea ice. During the fall hunt that typically takes place during September, October and November, crews use power driven aluminum boats to hunt in open water.

The data regarding bowhead subsistence use by Barrow residents was derived from data Stephen R. Braund and Associates with collection of from a variety of sources dating back to 1979. Data indicate that Barrow residents will go as far as 70 miles offshore to hunt for bowhead whales. The intensity of the bowhead whale harvest is illustrated in Figure 41.

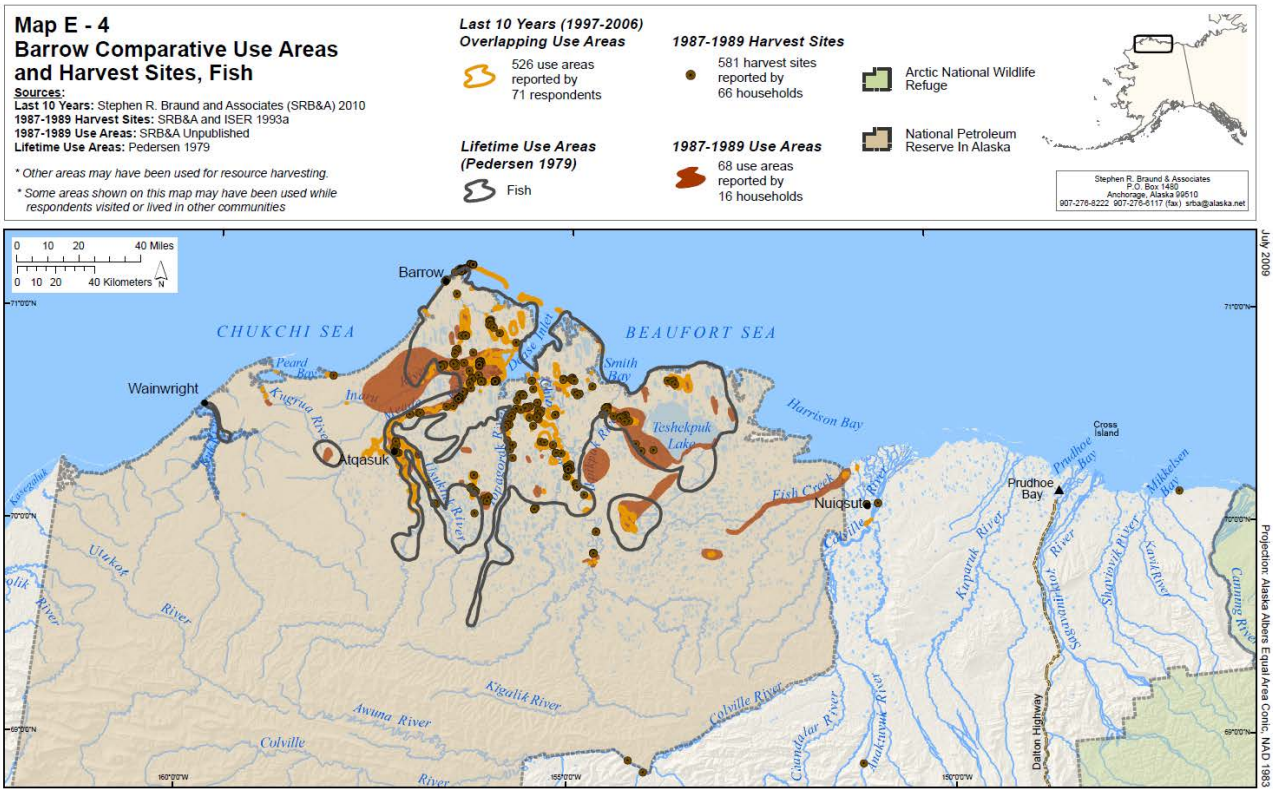
Figure 41 Barrow Comparative Use Areas and Harvest Sites, Bowhead



Fish. Barrow residents typically fish for Arctic cisco (qaaktaq), Arctic char/Dolly Varden (paikłuk/iqalukpik), broad whitefish (aanaakliq) and Burbot (tittaaliq). Residents indicate that Arctic cisco is mostly found near Nuiqsut and in Kuyanak Bay. August is reportedly when many Barrow subsistence harvesters fish for Arctic cisco but can be successfully fished throughout the fall. The most common places to fish for Arctic char/Dolly Varden is Elson Lagoon and along the Meade, Inaru, and Chipp rivers during the summer months. Compared to other fish species, broard whitefish make up a greater amount of a yearly harvest. Residents most commonly reported harvesting broad whitefish during the summer and fall months on the Chipp, Inaru, Meade, Alaktak and Miguakiak rivers and near Pittalukruak, Tusikvoak and Sungovoak lakes. Burbot are often harvested in nets by those wanting broad whitefish so subsistence use areas and the harvesting months are similar.

Figure 42 indicates that Barrow residents will travel significant distances inland to harvest fish.

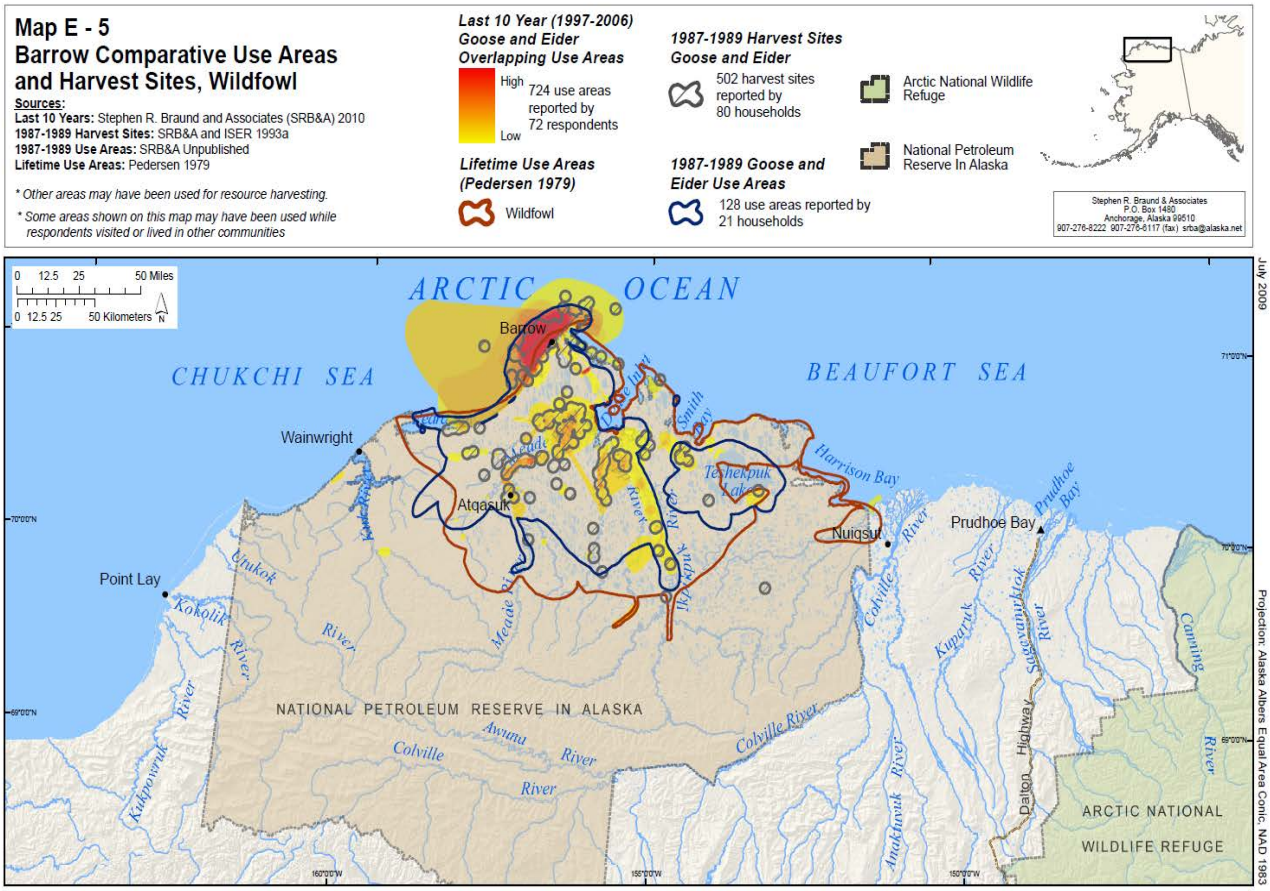
Figure 42 Barrow Comparative Use Areas and Harvest Sites, Fish



Birds. Barrow residents harvest several different species of geese including white-fronted geese (niġliq), Canada geese (iqsraġutilik), brants (niġliñġaq) and snow geese (kaŋuk). Barrow residents hunt geese along the coast from Barrow south past Walakpa Bay and at Peard Bay; around Avak Creek; and around Inaru, Meade, Topagoruk, Chipp rivers, Piasuk, and Miguakiak rivers. Some also travel to near Lake Sungovoak and Ekalgruak Lake. May and June are the most common months to harvest geese. Barrow residents also commonly hunt eiders, primary king (qiŋalik) and common (amauligruaq) eiders. Eiders are typically harvested during the same months as bowhead whales and are most often found offshore along the spit to Point Barrow, or in the western portion of Elson Lagoon.

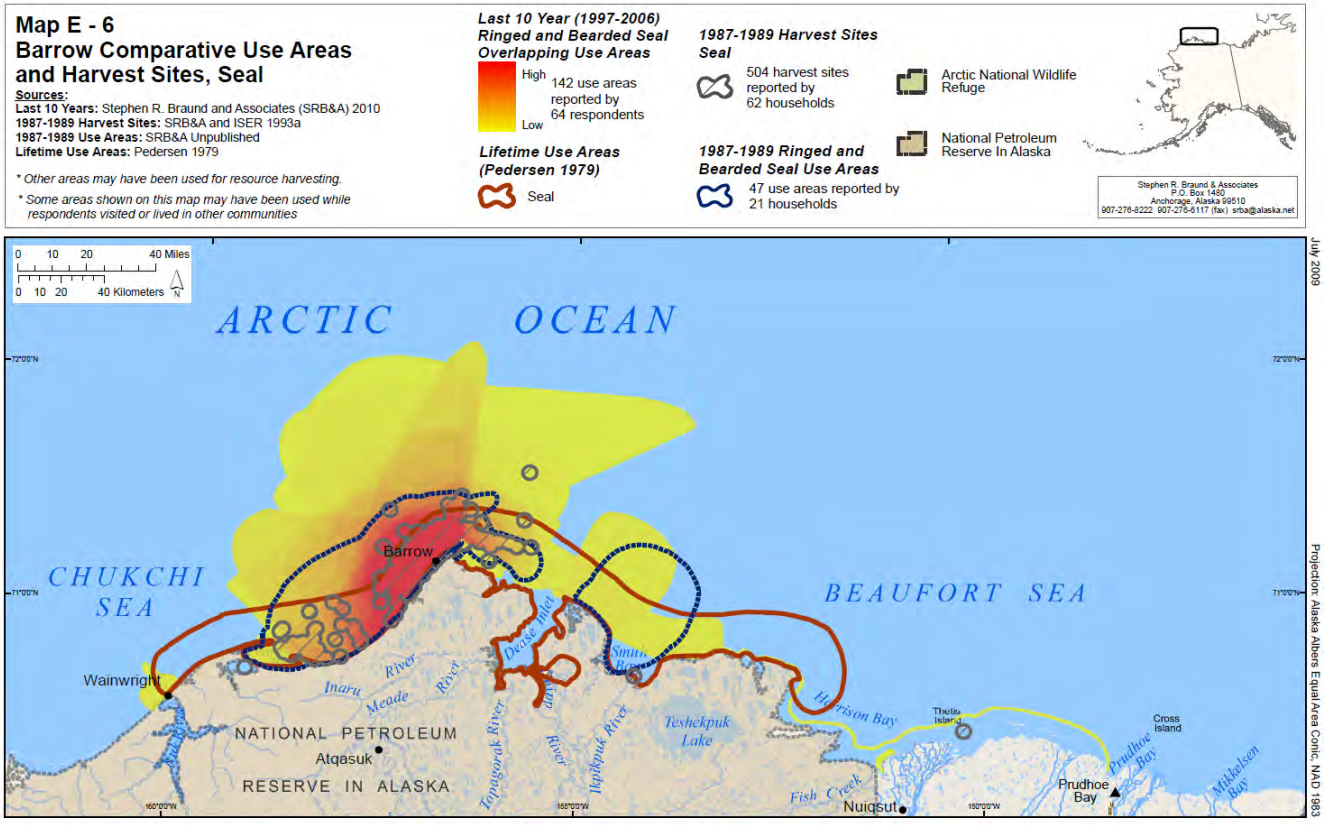
Figure 43, below illustrates subsistence harvest areas for all wildfowl as provided by Stephen R. Braund and Associates.

Figure 43 Barrow Comparative Use Areas and Harvest Sites, Wildfowl



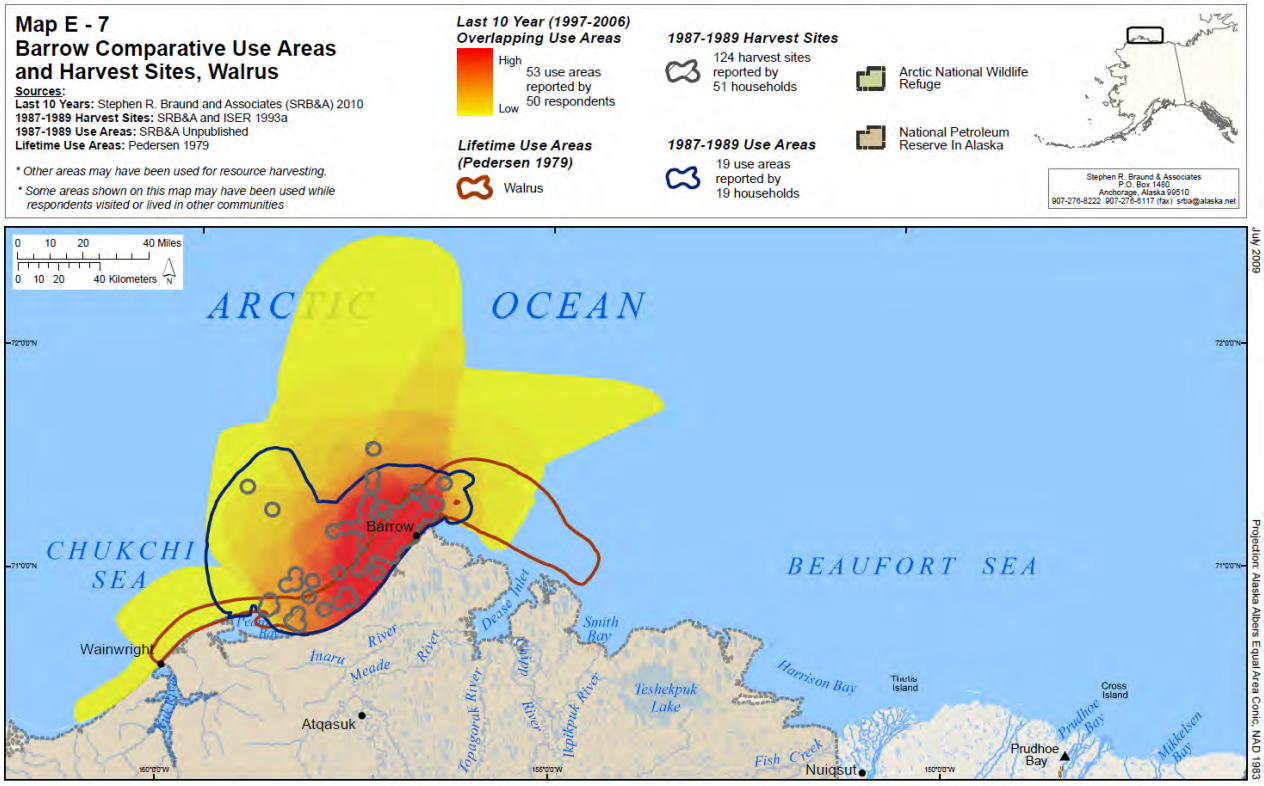
Seals. Barrow residents typically harvest two types of seals: ringed seals (natchiq) and bearded seals (ugruk). Ringed seals are not harvested in large quantities. The ringed seals are most commonly harvested while hunting for bearded seals and found close to shore between Walakpa Bay to the west and Tapkaluk Islands to the east. While ringed seals are harvested all year, the majority are taken between June and August. Bearded seals are prized for meat, seal oil and skin, which is used for constructing skin boats (umiaqs) used for subsistence whaling. The success of bearded seal harvest is largely dependent on sea ice pack; because the bearded seal follows the ice pack north past Barrow each year, poor ice conditions can make hunting difficult. Like ringed seals, bearded seals are primarily hunted during the summer months, from June through August. Figure 44 depicts the extent of subsistence areas for harvesting seals.

Figure 44 Barrow Comparative Use Areas and Harvest Sites, Seal



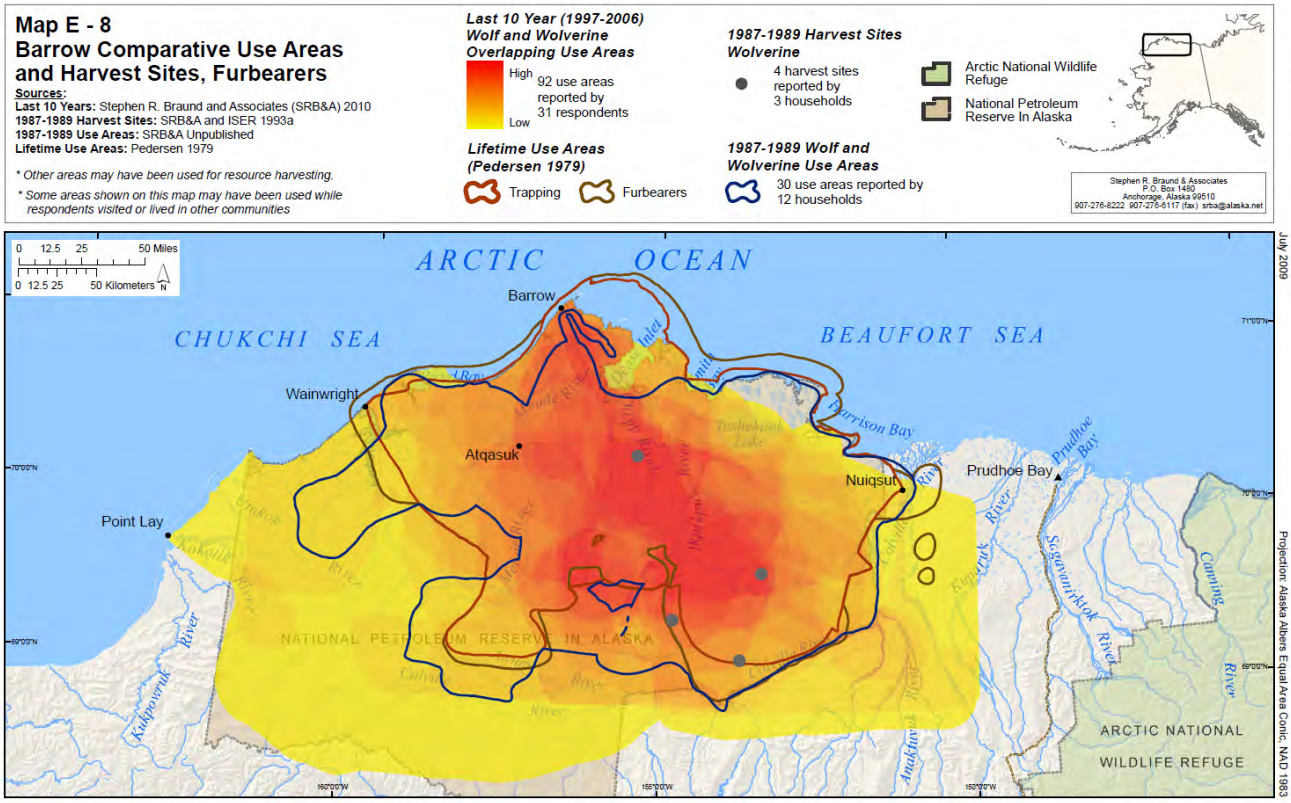
Walrus. Walrus (aiviq) are generally hunted in concert with bearded seals during the summer months and near the ice pack.

Figure 45 Barrow Comparative Use Areas and Harvest Sites, Walrus



Wolves and Wolverines. Wolf (amaġuq) and wolverine (qavvik) hunting requires long distance travel during the cold winter months. As a result, Barrow residents are less likely to hunt these animals that may be found closer to home. However, some residents reportedly travel long distances to regularly hunt wolves and wolverines. Hunting can occur anytime from October through June; peaking in March. Figure 46 illustrates the subsistence harvest area for wolves and wolverine by Barrow residents.

Figure 46 Barrow Comparative Use Areas and Harvest Sites, Furbearers



16.0 LAND USE AND ZONING

16.1 Land Ownership

The following section briefly describes the land ownership of Barrow and its vicinity. Barrow Zoning Districts are presented in Figure 48.

16.1.1 Federal Government

U.S Air Force, Department of Defense. Approximately 4.5 miles northeast of Barrow, close to the Chukchi Sea beach frontage, is a U.S. Air Force (USAF) DEW Line site. The USAF currently maintains a ROW from BLM on 1,512 acres of land. The USAF is in the process of remediating environmental hazards there to relinquish the ROW because it no longer actively uses the land for DEW Line purposes.

U.S Navy, Department of Defense. The U.S. Navy owns land that is located approximately about four miles northeast of Barrow and southeast of NARL. The future Tom Gordon Expressway / Uivaqsaagiaq Road that will connect Cakeeater Road to BARC will run through U.S Navy property.

U.S. National Oceanic and Atmospheric Administration (NOAA). NOAA owns property approximately five miles northeast of Barrow that is directly adjacent to land owned by USGS. NOAA operates the Earth System Research Laboratory (ESRL) that was established in 1973. ESRL measure the properties of the atmosphere related to air quality, ozone layer and greenhouse gases, especially as they related to climate changes. Located on the same site is the Atmospheric Radiation Measurement (ARM) Program that was created in 1989 by the U.S. Department of Energy (DOE). The Barrow facility was established in 1997. Barrow was chosen because the arctic has been identified as one of the most sensitive regions to climate changes on Earth. This facility provides data about cloud and radiative processes at high latitudes.

U.S Geological Survey. USGS owns property that is approximately 4.75 miles northeast of Barrow that abuts NOAA and U.S. Navy property.

U.S. Federal Aviation Administration. The FAA flight standards station is located on the north side of the Wiley-Post Memorial Airport runway.

U.S. Bureau of Land Management, National Petroleum Reserve – Alaska. Land that is located immediately south of the City of Barrow falls within the NPR-A, under the jurisdiction of the BLM.

16.1.2 Native Corporations

Ukpeaġvik Iñupiat Corporation (UIC), the village Native Corporation established under ANSCA, is the primary landowner in Barrow. UIC has selected and received 175,620 acres under ANCSA sections 14(a), 12(b) and the NARL Transfer Agreement. UIC's land holdings are bound by Point Barrow and the Beaufort Sea to the north, the Chukchi Sea to the west; and extend south to the farthest end of Sukok Lake and Lake Sungovoak; and east to Iko Bay and the northernmost portion of Lake Tusikvoak, as depicted in Figure 47. UIC has 7,177 acres remaining to select to

receive its full ANSCA land entitlement. In Barrow, ASRC owns the subsurface estate to over 175,000 acres of land beneath UIC surface estate.

One of the primary real estate holdings by UIC is NARL. The Barrow Arctic Research Consortium (BARC) has brought new life to NARL. Connecting Browerville to NARL via the planned Uivaqsaagiaq Road will likely further the revitalization.

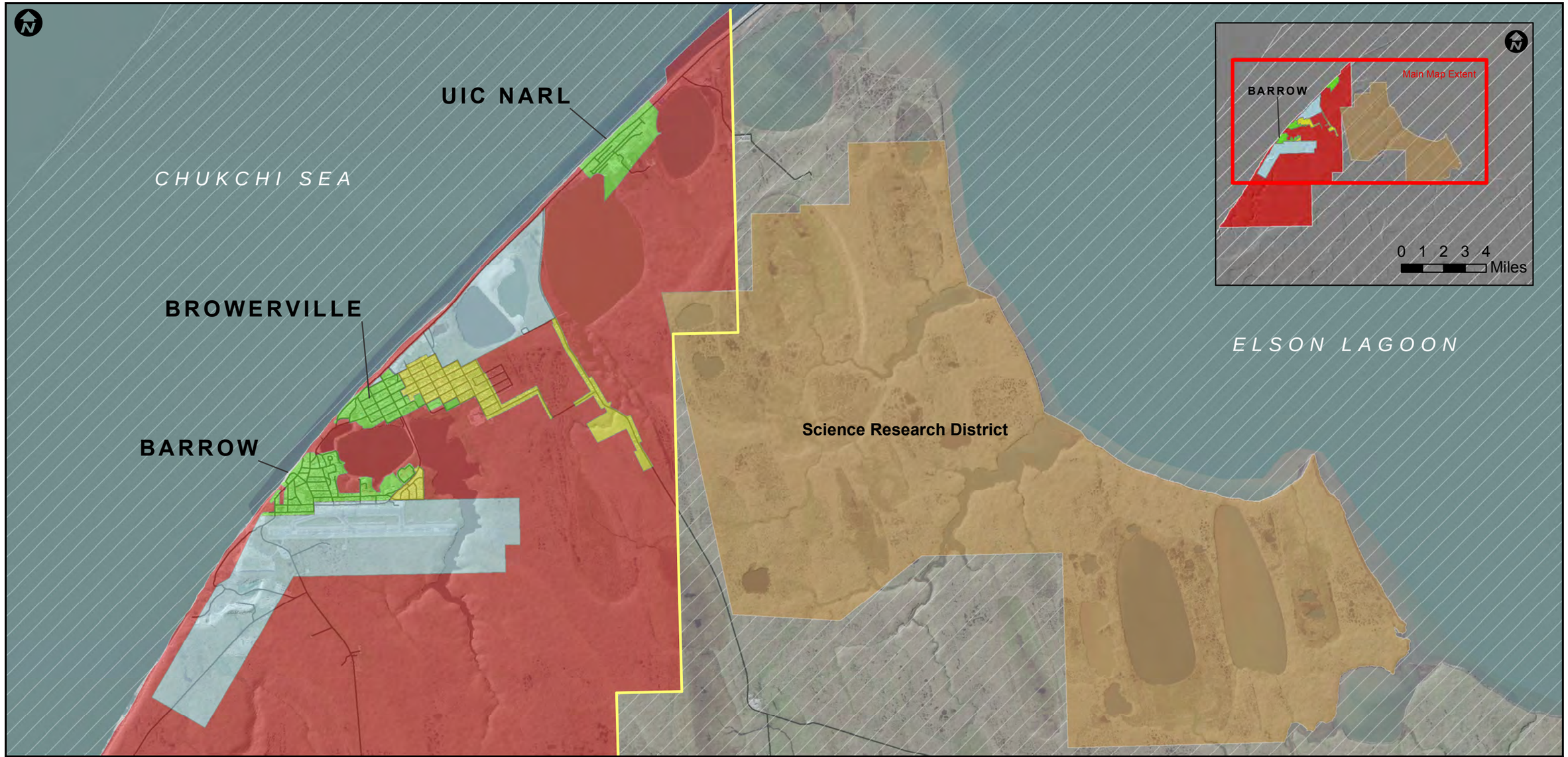
The NSB Wildlife Management Department is currently located in Building 360 with Iḷisaġvik College at NARL. However, a project analysis report is underway to identify sites for a new facility for the Department. Potential sites include an addition to the BARC building and on an existing gravel pad northeast of its current location that would require demolition or relocation of existing buildings.

UIC is also developing a housing manufacturing plant at NARL to assist in remedying the housing crisis. Utilizing industrial hut 36 and outfitting it accordingly, UIC is currently developing a strategy to build traditional stick built homes in manageable sections inside the hut. Once each section is complete, the home will be transported to homesites within Barrow and potentially across the North Slope for onsite assembly.

Iḷisaġvik College, currently located within NARL, is investigating sites for a new campus. UIC believes that keeping the College at NARL, perhaps in a new facility, would be beneficial for the students because of the potential for student training opportunities. Similarly, UIC would like to incorporate a future NSB Residential Learning Center facility at NARL to take advantage of some of the same vocational training opportunities as Iḷisaġvik students, including the proposed housing manufacturing plant, a future three bay garage for light and heavy duty mechanics and welding training, BARC programs and UIC Science Logistical Support Services, already based at NARL. The siting for the College and the concept for the Residential Learning Center are still in their infancy and NARL one possible location for these facilities.

Figure 47 UIC Corporate Boundary







BARROW BOUNDARY
EXISTING ROADS
Conservation (C)
Industrial (I)
Mixed Use (MU)
Reserve (R)
Suburban (R)
SCIENCE RESEARCH DISTRICT

SOURCES:
UMIAQ Existing Roads
Satellite Imagery: 2012 Worldview 2 Ortho Mosaic
NSB GIS - Barrow Corporate Bnd., Zonning

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BARROW
ZONING DISTRICTS

Scale:
0 0.5 1
Miles

Figure:
48

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16.1.3 North Slope Borough

The NSB provides electricity, water, sewer, public health, public safety, fire protection and landfill services. The NSB owns the land under the public facilities that support these services to the community. Under the Barrow Gas Field Transfer Act, the NSB shares ownership of the Barrow Gas Fields subsurface estate with the federal government.

16.1.4 City of Barrow

The City of Barrow has limited land ownership within Barrow. The City owns land that is occupied by City Hall, the community recreation center, Piuraaġvik, boat launching ramp, Emaiksoun Cemetery and two historic cemeteries in Browerville. The City has also developed a subdivision named Block A with land that it received under its ANCSA 14(c)(3) entitlement. It has title to west of Block A that received title to under ANCSA 14(c)(3) and several tracts between the Wiley-Post Memorial Airport and Nunavak Bay. The City of Barrow owns over 200 acres of land, mostly zoned industrial. Additional land acquisition is underway.

16.1.5 Native Restricted Land

There are two types of protected (restricted) land for Native Alaskans: native allotments and townsite lots. Restricted land is inalienable; the property owner cannot lease, sell or convey the land, or any inherited interest in the land, without first obtaining approval from the Bureau of Indian Affairs (BIA). Generally speaking, restricted land is also not subject to state or local laws, including taxation and land use regulations, such as zoning. Native restricted land will remain tax-exempt unless changed by the United States Congress or the restrictions are removed with expressed approval by the BIA. (Kawerak Land Management Services 2014; Case, D. 2007).

Generally, restricted lots were distributed via two federal statutes: the Alaska Native Allotment Act of 1906 and the 1926 Alaska Native Townsite Act. The Alaska Native Allotment Act of 1906 authorized the Secretary of the Interior to grant individual Alaska Natives ownership of up to 160 acres of vacant, non-mineral and unappropriated land. The majority of Native allotments are near villages and along rivers, streams, lakes and coastal waters. There are only two Native allotments within ten miles of Barrow and approximately 185 within the Barrow Area of Influence (see Figure 37). In 1971, one of the provisions in the Alaska Native Claims Settlement Act (ANSCA) repealed the authority to grant Native allotments, with the expectation of those applications that had already been submitted. Native allotment land is still being conveyed by the Bureau of Land Management (BLM). (Kawerak Land Management Services 2014; U.S. Department of the Interior 2013).

The 1926 Alaska Native Townsite Act was passed by the United States Congress for the purpose of conveying public lands to Native Alaskans for homes within villages. All townsite acts were repealed by the passage of the Federal Land Use Policy and Management Act (FLPMA) in 1976 but lots that were already designed as Native restricted under the Act did not lose their status. There are at least 200 restricted lots within Barrow.

As the tribal government for Barrow, the Native Village of Barrow Realty Department is the primary entity that coordinates with the BIA in managing Native restricted properties.

Unlike other forms of property which are subject to the probate jurisdiction of state or Tribal courts, Native restricted property is completely within the U.S. Interior Department's jurisdiction. Because some restricted landowners do not always have wills that specify beneficiaries, heirs in common inherit the land, often for several generations. Some property may have multiple owners and each with each passing generation, the portions of property interest become smaller and smaller, causing the property to become fractionalized. Even without probate issues, it may be difficult to reach a consensus amongst multiple property owners, rendering a property virtually useless. Many organizations in Barrow, the NSB included, are interested in resolving probates for restricted townsite lots to take better advantage of the property and have taken steps toward resolving property ownership issues.

Native restricted land can become unrestricted. Once the restricted status is removed, the land can be taxed and it can be sold without BIA approval or oversight. For example, if a restricted property is willed to a non-native, it will be conveyed to that person in an unrestricted status. Natives that chose to leave a restricted property to a non-Native can opt to leave it as a life estate. The non-Native heir would use the property during his or her lifetime; when he passes away, the property is transferred to the second choice named in the owner's will, thus returning it to restricted status. (Maniilaq Association Probates and Estate Services 2014). Property can also be sold to a non-Native, which removes the property's restricted status.

There are several land use concerns with Native restricted property. If a structure on a restricted property becomes a safety hazard for the community, local land use regulations cannot require that property owners mitigate the property to remove the risk. This, coupled with fractionalization that comes with many owners, land and structures on it are often not maintained.

16.1.6 Other Institutional Landowners

The NSBSD, BUECI and the Presbyterian Church own lands on which their facilities are located.

Local municipal governments are the NSB (a home rule borough) and the City of Barrow (a first class city). Both governments have planning and zoning powers under Alaska State law. The NSB is the only entity that exercises planning and zoning powers with Barrow-specific zoning districts and zoning commission.

The City of Barrow is made up of two district areas – the original town site of Barrow and Browerville. The original town site is primarily the oldest part of Barrow; however the Cape Smythe Whaling Rescue Aid Station, located in Browerville, is one of the oldest structures in the community. Browerville is where the majority of newer development of Barrow has occurred, expanding over five large subdivision additions.

16.2 Zoning

Within Barrow there are four distinct zoning districts specifically designed to accommodate Barrow's unique land use practices. These districts are the Barrow Mixed Use District (MU), Barrow Suburban District (S), Barrow Industrial District (I) and Barrow Reserve District (R).

The MU District is found primary within the City of Barrow original townsite and allows a variety of uses, ranging from commercial to religious to multi and single family residential. Land that is zoned MU is allowed the most dense development of residential land in the NSB. The MU district also has the greatest number of restricted lots which has resulted in significant challenges to develop or redevelop the land after the original owner has died. Consensus among the many heirs is rare and the most likely reason the greatest development potential for additional accessible residential land will go unfulfilled.

The S District is intended to be a low density quiet residential area, encouraging development that reflects the traditional Iñupiat settlement pattern of individual family home sites. The S District is the low density alternative to the MU District, with single-family homes on large lots that have large spaces between houses and ample storage area for vehicles, boats and subsistence equipment.

The I District is intended to provide areas for airports and storage and warehousing of materials and goods in bulk. These uses which are generally not compatible with residential and commercial uses because of safety conflicts including aircraft, heavy truck and equipment traffic which is often segregated from pedestrian, residential and business traffic.

The R District is intended to provide protection for environmental resources, local subsistence and recreational opportunities and to hold lands for future infrastructure such as roads, sewer, water and power. The primary objective of the R District is protection of the environmental resources, especially watersheds, for the benefit of all residents.

Crossing the corporate limits of Barrow is the Scientific Research District (SRD). The SRD is specific to the Barrow Environmental Observatory (BEO), 7,466 acres of land reserved by UIC for scientific research purposes. Scientific land use in this area dates back to 1948 and has one of the longest records of continuous research use in the Arctic.

Outside of the corporate limits of Barrow is the Conservation District (C). Lands zoned for Conservation are intended to be kept in a natural state. Many Barrow residents depend on subsistence foods which flourish in a natural and clean environment.

16.3 Land Issues

16.3.1 North Slope Subsistence Rural Region Designation

Members of one of the tribal organization raised the concern that because Barrow's population is approaching 5,000 people, residents might be exempt from the North Slope Region federal designation as a Subsistence Rural Region. Under the authority of the Alaska National Interest Lands Conservation Act (ANILCA) regulations established rural subsistence use on federal lands. The following regulation governs such designations:

"§242.15 Rural determination process.

(a) The Board shall determine if an area or community in Alaska is rural. In determining whether a specific area of Alaska is rural, the Board shall use the following guidelines:

(1) A community or area with a population of 2,500 or less shall be deemed to be rural unless such a community or area possesses significant characteristics of a non-rural nature, or is considered to be socially and economically a part of an urbanized area.

(2) Communities or areas with populations above 2,500 but not more than 7,000 will be determined to be rural or non-rural.

(3) A community with a population of more than 7,000 shall be presumed non-rural, unless such a community or area possesses significant characteristics of a rural nature.

(4) Population data from the most recent census conducted by the United States Bureau of Census as updated by the Alaska Department of Labor shall be utilized in this process.

(5) Community or area characteristics shall be considered in evaluating a community's rural or non-rural status. The characteristics may include, but are not limited to:

(i) Use of fish and wildlife;

(ii) Development and diversity of the economy;

(iii) Community infrastructure;

(iv)Transportation; and

(v) Educational institutions.

(6) Communities or areas which are economically, socially, and communally integrated shall be considered in the aggregate.

(b) The (Federal Subsistence) Board shall periodically review rural determinations. Rural determinations shall be reviewed on a 10-year cycle, commencing with the publication of the year 2000 U.S. census. Rural determinations may be reviewed out-of-cycle in special circumstances. Once the Board makes a determination that a community has changed from rural to non-rural, a waiting period of 5 years shall be required before the non-rural determination becomes effective."

Barrow's population would need to exceed 7,000 residents for the community to lose its presumptive designation as part of the North Slope Subsistence Rural Region (NSSRR). The current projections with oil and gas development occurring in the Chukchi Sea, the Barrow community would reach 7,000 residents in about 2030. Even if the number of residents exceeds 7,000 people, the community can petition the Federal Subsistence Board to retain its status as part of the NSSRR. This issue may not need to be addressed for another 20 years.

16.3.2 Historic Buildings and Structures

Birnirk Archeological Site. National Historic Landmarks are considered to have exceptional national significance quality in illustrating or interpreting the heritage of the United States. Properties are designated by the Secretary of the Interior. Currently, there are just over 2,500 historic places with this national distinction, including the Birnirk archeological site in Barrow. The Birnirk site, composed 16 mounds located near the beach, was added to the list of National Historic Landmarks in 1962. This site is associated with the Birnirk and Thule cultures, precursors to the modern day Eskimo culture.

The National Register of Historic Places is an inventory maintained by U.S. National Park Service that have been determined to be worthy of preservation based on historic or cultural significance. The National Register of Historic Places is one effort by the National Park Service's to coordinate and support preservation of historic and archeological resources. There are several buildings and other structures in the Barrow vicinity on the National Register of Historic Places. Birnirk archeological site is on both the National Historic Landmarks designation and the National Register of Historic Places (U.S. Department of the Interior 1962; U.S. Department of the Interior 1966).

Point Barrow Refuge Station. According to the nomination for inclusion on the National Register of Historic Places inventory, the significance of the Point Barrow Refuge Station (later known as the Cape Smythe Whaling and Trading Station) is that it is "both the oldest - as well as most significant – American-built frame structure standing along the vast reaches of the Arctic Ocean between the Seward Peninsula and Demarcation Point at the Canadian Border - the northernmost outpost of the United States. The building, its management, and related events, played a significant role in commerce, whaling, fur trading, exploration, and development of the region. After 1896 this building epitomizes the extensive, colorful and important exploits of the redoubtable Charley Brower (and later of his son Tom) in association with about all of the pioneer explorers, whalers, scientists, missionaries, politicians, entrepreneurs and adventurers who visited the region." It was added to the inventory of historic places in December 1980; the photo below is from the initial nomination in September 1980 (U.S. Department of the Interior 1980a)

Figure 49 Point Barrow Refuge Station
Photo courtesy of National Park Service, photo by Doug Reger. Date: 1979



Will Rogers – Wiley Post Memorial Site. This memorial site is located at the site of the fatal plane crash, approximately 13 miles south of Barrow, is included on the National Register of Historic Places. The first memorial was constructed in 1938 by public subscription of thousands of Americans and under the organized efforts of friends and admirers in Oklahoma and Texas (U.S. Department of the Interior 1980b). The second monument was constructed by a lone admirer of Will Rogers in 1953. The original memorial was moved to higher ground in 1973 and now sits next to the second memorial. The crash site was included in the historic places inventory in April 1980.

Figure 50 Wiley – Post Memorial Site
Photo courtesy of National Park Service, Date: 1980



Utkeagvik Presbyterian Church Manse. The manse is the residence for the pastor of Utkeagvik Presbyterian Church, built in 1929. Dr. Henry W. Greist, who lived in Barrow from 1921-1925 and again from 1929-1936 was the church pastor as well as a physician for the community and the Manse served as both his home and an outpatient clinic. The Manse was added to the historic places inventory in October 1983 (U.S. Department of the Interior 1983)

Figure 51 Utkeagvik Presbyterian Church Manse
Photo courtesy of National Park Service, photo by Jill Kinsinger. Date: 1983



Figure 52 Utkeagvik Presbyterian Church
Photo courtesy of National Park Service. Date: 1940's



There are other sites in Barrow that either have the potential to be nominated for inclusion on the National Register of Historic Places or worthy of preservation without a National Register of Historic Places designation. These include:

- The current NSB Administration Building;
- The weather balloon launching building on the old Weather Station site;
- Three homes near Top of The World Hotel which were reportedly built with lumber salvaged from stranded in the ice whaling ships complete with old brass fittings;
- The former Ipalook School gymnasium that is currently used as a roller rink;
- The Presbyterian Church that was established in 1898; and
- Some elements of NARL including the main structure, possibly the old theater building, some residential Quonset huts, one or more of the industrial Quonset huts and the elevated utilidor.

16.3.3 Current Land Use

The majority of property located in the original Barrow townsite is a mix of commercial, industrial, institutional and residential development. There are a significant number of properties that appear to be abandoned due to fire, structural failure or are no longer occupied. Browerville is primarily residential, but also includes large institutional and commercial development.

Residential Uses. The majority of residences are concentrated in Browerville. There are many homes in the older section of Barrow but are mixed with offices, hotels, restaurants and other uses.

Commercial Uses. Commercial enterprises have sprung up all around Barrow and Browerville due to the permissive zoning laws in Barrow and limited space to develop around existing commercial development. Current commercial development efforts involve redevelopment of previously zoned Suburban residential land or Mixed Use land.

Industrial Uses. Most industrial activities are located around the Barrow airport, along the beach in northern Browerville or at the BUECI business complex.

Institutional Uses. The primarily institutional facilities are used for health care, museum/library, Iḷisaġvik College and government offices. These facilities are dispersed throughout Barrow and Browerville.

Land use in Barrow and its vicinity is illustrated in the following figures:

- Figure 53: Barrow Land Use
- Figure 54: Browerville Land Use
- Figure 55: South Barrow Land Use
- Figure 56: UIC NARL Land Use

16.3.4 Future Land Use

Residential. Barrow, like all other NSB villages, has a shortage of available land for residential homes. UIC, as the primary landowner in Barrow, has indicated it intends to make more land available for residential use. It will be largely through UIC's efforts that residential land becomes available.

Public Infrastructure. The City of Barrow has expressed interested in building a community freezer but has not located suitable land for this use.

ANCSA 14(c)(3). UIC has not completed its 14(c) requirements in transferring land to the local municipality.





PARCELS & ROWs
CORPORATION (COR)
CITY (CTY)
FEDERAL (FED)
HOUSING AUTHORITY (HAS)
NATIVE RESTRICTED (NAT)
NORTH SLOPE BOROUGH (NSB)
RELIGIOUS (REL)
SHAREHOLDER (SHR)
STATE OF ALASKA (SOA)
PRIVATE (PVT)

SOURCES:
Satellite Imagery: July/August 2012
NSB - GIS - Land Use & Parcels
*Land Use was attributed from 2014 NSB Assessor's data.

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BARROW
LAND USE

Scale:
0 300 600
Feet

Figure:
53

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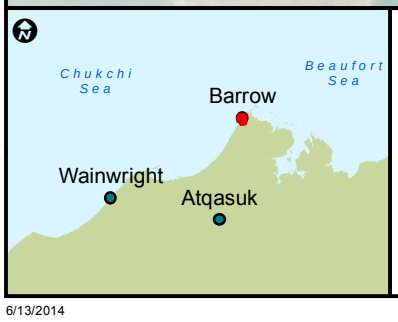
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CHUKCHI SEA
US Navy
Middle Salt Lagoon
South Salt Lagoon
North Meadow Lake
Science Research District
South Meadow Lake
Lower Isatkoak Lagoon
Upper Isatkoak Lagoon
COR
SHR
PVT
HAS
NSB
CTY
REL
FED
NAT
Barrow
Wainwright
Atqasuk
Point Lay
CORPORATION (COR)
CITY (CTY)
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HOUSING AUTHORITY (HAS)
NATIVE RESTRICTED (NAT)
NORTH SLOPE BOROUGH (NSB)
RELIGIOUS (REL)
SHAREHOLDER (SHR)
STATE OF ALASKA (SOA)
PRIVATE (PVT)
BARROW BOUNDARY
FEDERAL LANDS
SCIENCE RESEARCH DISTRICT (SRD)
PARCELS & ROWs
SOURCES:
Satellite Imagery: July/August 2012
NSB - GIS - Land Use & Parcels
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6/13/2014 UMQ: E:\GIS\Umiaq\Project\BRW_COMP_PLAN\MXD\BRW_COMP_PLAN_BROWERVILLE_LUC_r01.mxd
BROWERVILLE LAND USE
Scale:
0 500 1,0001,500
Feet
Figure:
54
UMIAQ

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PARCELS & ROWs
CORPORATION (COR)
CITY (CTY)
FEDERAL (FED)
HOUSING AUTHORITY (HAS)
NATIVE RESTRICTED (NAT)
NORTH SLOPE BOROUGH (NSB)
RELIGIOUS (REL)
SHAREHOLDER (SHR)
STATE OF ALASKA (SOA)
PRIVATE (PVT)

BROWERVILLE
BARROW
Tasigarrok Lagoon
Lower Isatkoak Lagoon
Chukchi Sea
SOA
Fresh Water Road
Nunavaaq Street
NUNAVAK BAY



SOURCES:
Satellite Imagery: July/August 2012
NSB - GIS - Land Use & Parcels
Land Use was attributed from 2014 NSB Assessor's data.

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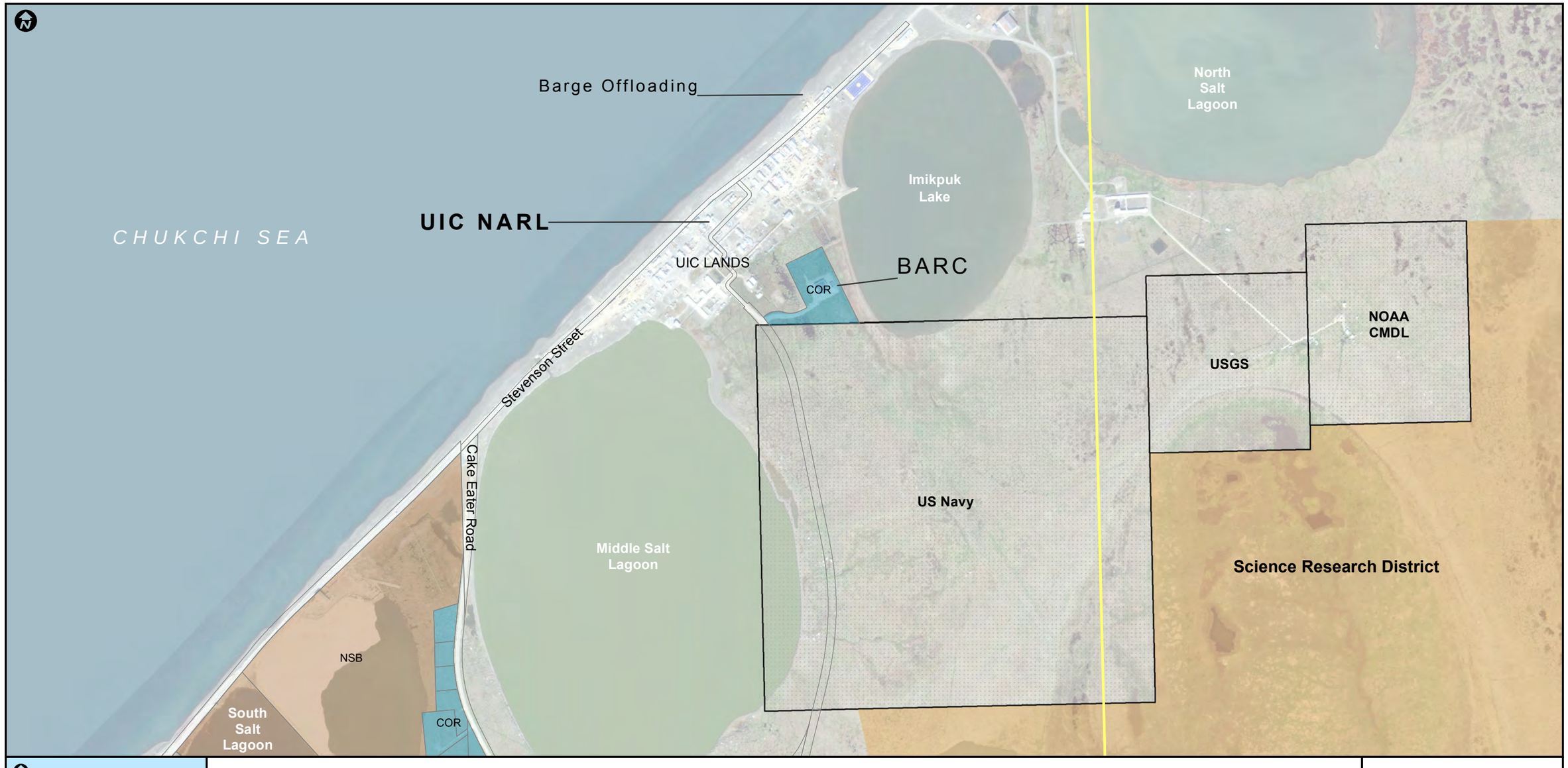
SOUTH BARROW
LAND USE

Scale:
0 0.1 0.2 0.3 0.4 Miles

Figure:
55

UMIAQ

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CORPORATION (COR)
NORTH SLOPE BOROUGH (NSB)
BARROW BOUNDARY
FEDERAL LANDS
SCIENCE RESEARCH DISTRICT (SRD)
PARCELS & ROWs

SOURCES:
Satellite Imagery: July/August 2012
NSB - GIS - Land Use & Parcels
Land Use was attributed from 2014 NSB Assessor's data.

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UIC NARL
LAND USE

Scale:
0 500 1,000 1,500
Feet

Figure:
56

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17.0 COMMUNITY PLANNING CHALLENGES AND OPTIONS

Four future development perspectives (options) were created that incorporated different potential scenarios. This section presents diagrams of the four planning options for discussion and comparison. The majority of the discussion focuses on Option 4, Consolidated. Option 4 incorporates the best aspects of Options 1, 2, and 3.

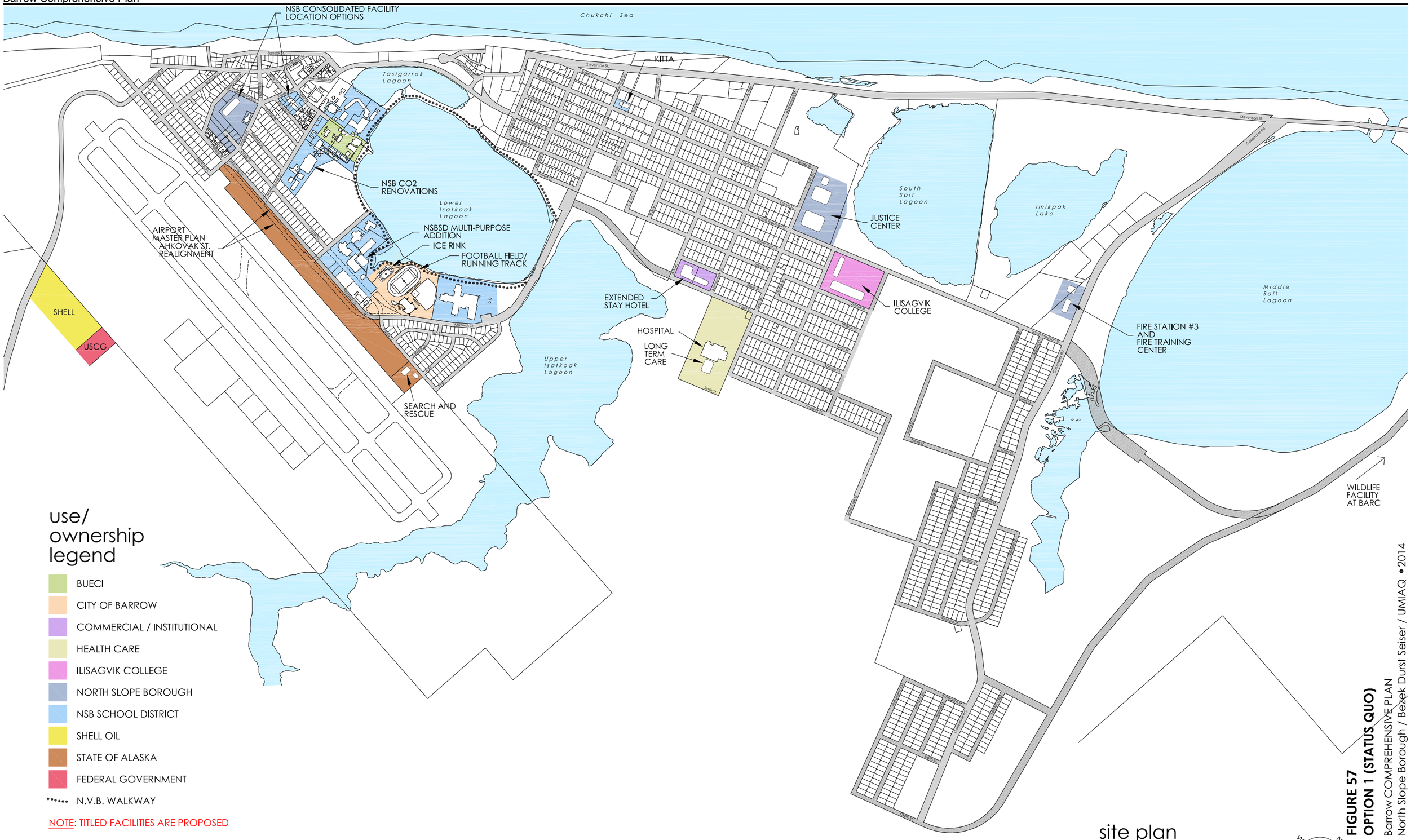
17.1 Options 1, 2 and 3

- Figure 57 Option 1: Status Quo
  This scenario shows what the Barrow community might look like if each entity or organization sought a location for its facility to meet its specific service needs based on sites available and conducted independently from other community and organizational interests.

- Figure 58 Option 2: Renewal
  This future development scenario focuses on the renewal of Barrow's original townsite by capitalizing on existing infrastructure.

- Figure 59 Option 3: New Town Center
  This scenario looks at future growth as it expands further into undeveloped areas of Barrow with a focus on the new Samuel Simmonds Memorial Hospital as a driving force of community development.

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use/ ownership legend

- BUECI
- CITY OF BARROW
- COMMERCIAL / INSTITUTIONAL
- HEALTH CARE
- ILISAGVIK COLLEGE
- NORTH SLOPE BOROUGH
- NSB SCHOOL DISTRICT
- SHELL OIL
- STATE OF ALASKA
- FEDERAL GOVERNMENT
- N.V.B. WALKWAY

NOTE: TITLED FACILITIES ARE PROPOSED

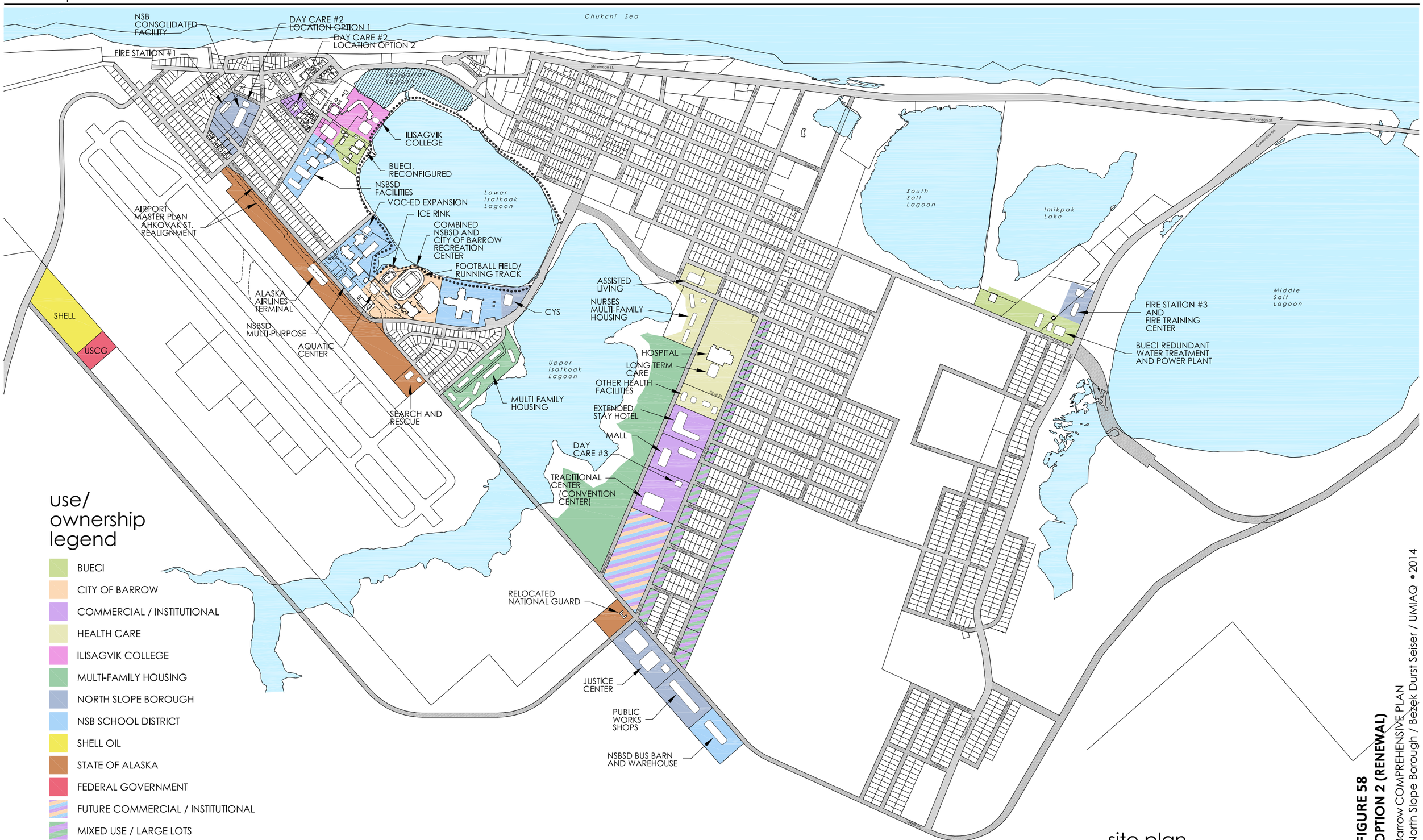
site plan
OVERALL 1
SCALE: N.T.S.

FIGURE 57
OPTION 1 (STATUS QUO)

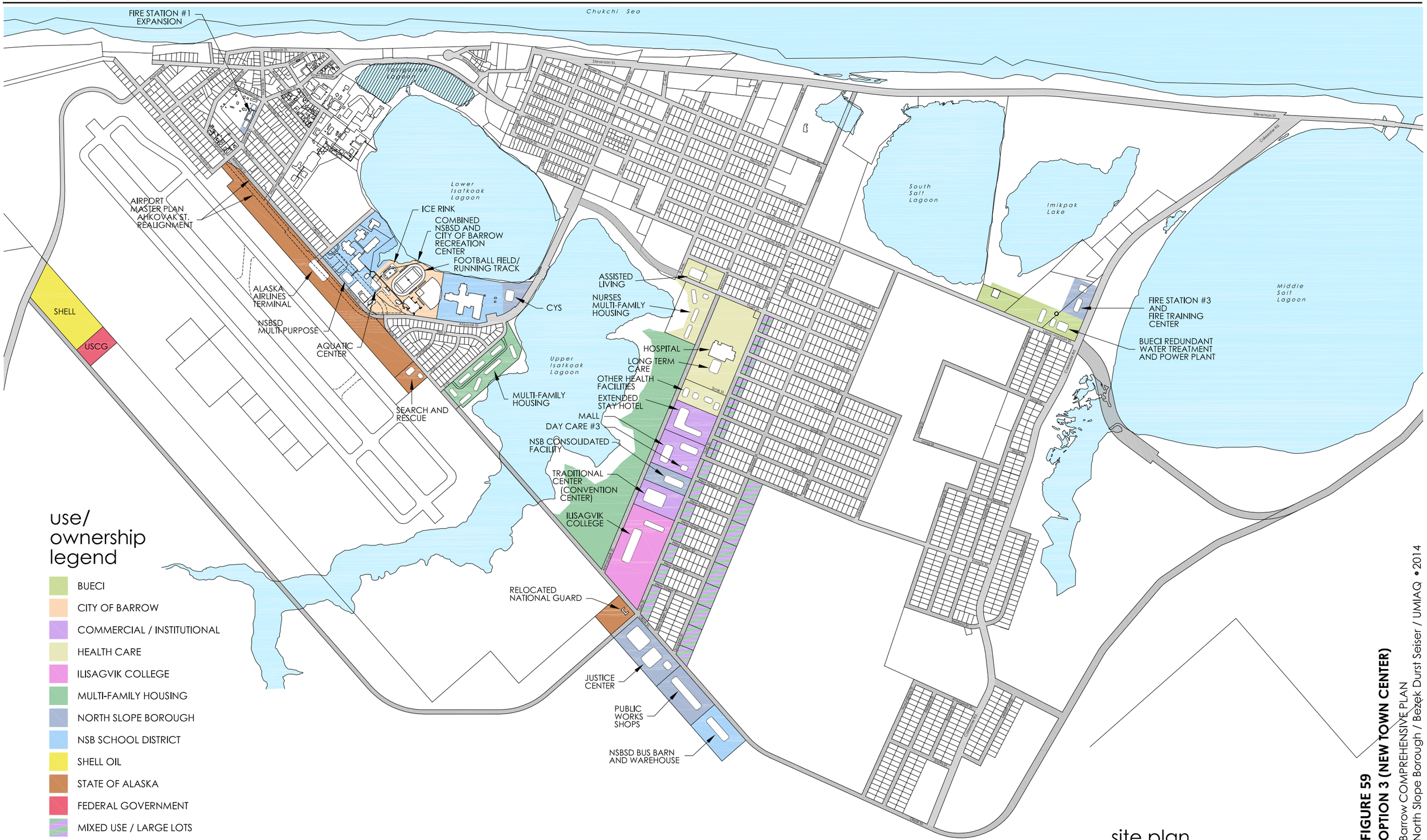
Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

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Chukchi Sea
NSB CONSOLIDATED FACILITY
DAY CARE #2 LOCATION OPTION 1
DAY CARE #2 LOCATION OPTION 2
FIRE STATION #1
Eskimo Lake
Lagoon Reclaimed
ILISAGVIK COLLEGE
BUECI, RECONFIGURED
NSBSD FACILITIES
VOC-ED EXPANSION
ICE RINK
COMBINED NSBSD AND CITY OF BARROW RECREATION CENTER
FOOTBALL FIELD/ RUNNING TRACK
Lower Isatkoak Lagoon
AIRPORT MASTER PLAN AHKOVAK ST. REALIGNMENT
ALASKA AIRLINES TERMINAL
NSBSD MULTI-PURPOSE
AQUATIC CENTER
SHELL
USCG
SEARCH AND RESCUE
CYS
MULTI-FAMILY HOUSING
Upper Isatkoak Lagoon
ASSISTED LIVING
NURSES MULTI-FAMILY HOUSING
HOSPITAL
LONG TERM CARE
OTHER HEALTH FACILITIES
EXTENDED STAY HOTEL
MALL
DAY CARE #3
TRADITIONAL CENTER (CONVENTION CENTER)
RELOCATED NATIONAL GUARD
JUSTICE CENTER
PUBLIC WORKS SHOPS
NSBSD BUS BARN AND WAREHOUSE
South Salt Lagoon
Imikpak Lake
Middle Salt Lagoon
FIRE STATION #3 AND FIRE TRAINING CENTER
BUECI REDUNDANT WATER TREATMENT AND POWER PLANT
Stevenson St.
Cakarosa Rd.
Eskimo St.
Agvik St.
Ahkovak St.
Isatkoak St.
Kiogak St.
Nanuk St.
Nunavak St.
Qaliq St.
Tuttu St.
Ukpeagvik Inupiat Corporation Dr.
Chukchi Dr.
Kaleak Dr.
Kugrua Dr.
Nalukataq Dr.
Nasaurak Dr.
Nigaliuk Dr.
Nipaluk Dr.
Nuvagapak Dr.
Piquniq Dr.
Qaiyaan Dr.
Qaliqpak Dr.
Qaliqsaun Dr.
Qaliqtaq Dr.
Qaliqtuk Dr.
Qaliqvik Dr.
Qaliqvuk Dr.
Qaliqvuk Dr.
Qaliqvuk

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use/ ownership legend

- BUECI
- CITY OF BARROW
- COMMERCIAL / INSTITUTIONAL
- HEALTH CARE
- ILISAGVIK COLLEGE
- MULTI-FAMILY HOUSING
- NORTH SLOPE BOROUGH
- NSB SCHOOL DISTRICT
- SHELL OIL
- STATE OF ALASKA
- FEDERAL GOVERNMENT
- MIXED USE / LARGE LOTS

NOTE: TITLED FACILITIES ARE PROPOSED

site plan
OVERALL 1

SCALE: N.T.S.

FIGURE 59
OPTION 3 (NEW TOWN CENTER)

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014
BDS

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17.2 Option 4 - Consolidated Plan

After reviewing the best features of Options 1 through 3, Option 4 was created. Several figures are included to depict the overall Option 4 configuration and details in specific areas (Areas A through G) as listed below. Locations of Areas A through G are delineated in Figure 60.

- Figure 60 Option 4, Consolidated Plan
- Figure 61 Detail Plan Area A, Central District
- Figure 62 Detail Plan Area B, Iḷisaġvik / NSBSD / BUECI
- Figure 63 Detail Plan Area C, State /NSB / NSBSD / City of Barrow
- Figure 64 Detail Plan Area D, Health Care / Housing / Commercial
- Figure 65 Detail Plan Area D, Health Care / Housing / Commercial, continued
- Figure 66 Detail Plan Area E, State / NSB / NSBSD
- Figure 67 Detail Plan Area F, BUECI / NSB
- Figure 68 Detail Plan Area G, NSB / NSBSD
- Figure 69 Detail Plan, NARL

1. Area A

The NSB has been considering constructing a consolidated office space for NSB employees. The Barrow Consolidated Office Space project analysis report (PAR) dated March 5, 2014 has been completed. The report indicates that a site of 3.2 acres is needed. While the report does not identify a location for the facility, NSB planning team members indicated that a desired location is the former Weather Service site. Option 4 depicts this site choice.

This site is approximately 8.6 acres and is currently occupied by six small structures and eight lesser structures, the former weather balloon launch structure and Fire Station #1 which occupies approximately one-half acre. With the exception of Fire Station #1 these facilities are unoccupied. A dead end extension of Okpik Street projects into the property. NSB Assessing data indicates that the property is owned by UIC. It is unclear, however, if UIC has completed acquisition of this property.

Fire Station #1 may need additional space for expansion as the south airport industrial area is developed. The Fire Department's administrative offices could be relocated from the Browerville Station to an expanded Fire Station #1 to bring staff closer into the NSB central administration that would be located within the consolidated facility.

The former weather balloon launch facility is a visual icon in the community and has been mentioned as a potential site for historic preservation consideration. This facility has tourism potential if repurposed, perhaps as a restaurant or weather museum.

If Okpik Street were carried through the property, the land south of Okpik could support new housing. This portion of the property is approximately 1.24 acres and could potentially support 12 units of housing or more, depending on resident preferences. Extending Okpik Street would consume 0.83 acres of the site. If Fire Station #1 was expanded, it would be

best positioned on the site facing Kongosak Street; the remaining portion of the site would be approximately 5.3 acres, potentially leaving sufficient space on the property for both the NSB Consolidated Offices and a new daycare center, conveniently located near the workplace of parents.

The site holds a lot of potential for the community and should be master planned from a community needs perspective to maximize its potential.

2. Area B shows two sub areas.

- Sub Area 1

Sub Area 1 is a primary renewal area consisting of a combination of the former hospital site, former BIA school site, BUECI, NSB Administrative Building, National Guard site and two privately owned residential lots.

Many community stakeholders have indicated that this part of Barrow has many structures that have exceeded their useful lives, outlived their original functional purposes and are absorbing high maintenance dollars. This area is also one of the most valuable contiguous pieces of real estate in Barrow and Browerville and is a viable candidate for renewal.

The site has two facilities that have potential historic value: the former “Home of the Whalers” gymnasium, now the roller rink and the NSB Administrative Building. The site also has other facilities that should remain in their current location: the power plant, water treatment plant, water tanks and the water distribution facility.

Some stakeholders indicated that this property should be maintained for educational purposes. Option 4 examines the opportunities of this property from multiple uses and perspectives, primarily educational uses and facilities while also considering shared facility potential.

1) The NSBSD could benefit by consolidating its spread-out administrative functions into a single NSBSD consolidated facility on this site. The District's current central office structure is 7,596 square feet; total dispersed space is closer to 40,000 square feet, including central district office, CO2 and the three schools.

2) Some community members have expressed interest in having the former “Home of the Whalers” gymnasium preserved and restored.

3) The School District has been confronted with displacement of its successful Kiita Learning Community program for a daycare facility. Kiita could be relocated on this site and utilize a restored old Home of the Whalers Gymnasium.

4) The School District has been charged with developing a Residential Learning Center program for students from outlying villages. A facility for this program on this site would be beneficial because of its close proximity to the High School. It could also share a restored Home of the Whalers Gymnasium.

5) Iḷisaġvik College is investigating potential sites for a new facility.

6) A NSB Consolidated Office facility would allow repurposing the current NSB Administrative Building, potentially as a historic structure.

7) The Samuel Simmonds Memorial Hospital has moved. The medical staff housing is still used.

8) There is a common thread between the School District, Iḷisaġvik, the proposed Residential Learning Center and Kiita. Vocational education prepares students to participate in job opportunities on the North Slope and this common thread potentially links these entities. Co-location of educational facilities on a contiguous site may provide otherwise overlooked shared facility opportunities.

9) The proposed NVB walkway could connect the High School to educational facilities proposed for this site.

10) The contiguous site could provide northern design opportunities with potential warm linkages between educational facilities.

11) The current medical staff housing at the former hospital site has dormitory potential for Iḷisaġvik College and / or the Residential Learning Center. Iḷisaġvik's space plan identifies a need for student / family housing at 23,447 square feet; ASNA medical staff housing is approximately 40,000 square feet.

12) The NSB Administrative Building was purportedly designed as a museum. If a consolidated NSB office facility is constructed, the Administrative Building could be repurposed into classrooms, a lecture hall and library facility for Iḷisaġvik College students and faculty. The former hospital and Greist Center could be demolished and replaced with a new Iḷisaġvik administration facility with adequate parking. Academics, administration, a kitchen and cafeteria (54,685 square feet), a new vocational educational complex identified as classrooms and labs (3,521 square feet), shop (26,827 square feet) and support space (2,916 square feet) could be accommodated on this site.

13) The former hospital site offers close access to the best recreational spaces in Barrow. The recreation needs of Iḷisaġvik students could best be planned using the high school and Piuraaġvik facilities. Future use of a restored "Home of the Whalers" gymnasium could provide additional recreational space.

The necessary components to implement this development scenario include:

1) Resolve land ownership issues. Potential requests for ownership from the Bureau of Indian Affairs may be required.

2) Demolish the Greist Center, former hospital, warehouse and shop structures.

3) Replace medical staff housing in-kind.

4) Replace warehouse and shop functions.

5) Relocate the National Guard building.

6) Relocate BUECI office to make room for site accessibility.

7) Purchase the two residential properties on Momegana Street.

8) Construct new teacher housing (see discussion for Area C regarding multifamily housing east of Block A).

9) Construct the NSB Consolidated Office facility.

10) Remove existing teacher housing. Contractors could relocate and repurpose this housing or demolish it.

11) Demolish structures surrounding the former "Home of the Whalers" gymnasium.

12) School District warehouse functions would need to be replaced. If the Public Works shops are replaced, there would be an interim opportunity to move this function into one of the current Public Works' shops until new accommodations can be arranged. Alternatively, the School District maintenance facility could be expanded to include warehouse functions.

Recommendations

Should the NSB pursue this renewal option, a joint educational programming effort including NSBSD and Iḷisaġvik College should be conducted to maximize joint educational opportunities. Undertaking a master plan for this area is recommended.

- Sub Area 2

Barrow High School is land locked on its north side by the 29-plex apartment building, on the south side by Okpik Street, on the east side by the City and the west side by Takpuk Street.

3. Area C has three sub areas.

- Sub Area 1

Sub Area 1 is a potentially contiguous site that combines Ipalook Elementary School, Barrow City Hall, City of Barrow-owned Tupikpuk (ice hockey facility), softball field, Piuraaġvik, Barrow High School, a segment of Okpik Street, the CYS facility, KBRW, the North Slope Borough School District maintenance facility and an area currently occupied by the School District bus barn and Public Works Fuel Division.

Option 4 examines opportunities of this potentially contiguous site from multiple perspectives:

1) Many members of the Barrow community expressed the need evening and weekend activities, especially for family recreation.

2) Barrow High School, as currently configured, is not meeting community needs as well as it could.

3) The ASD in its two high school PARs has attempted to respond to these issues.

The BHS Multipurpose Room Addition PAR, dated January 2010, proposed a 16,711 square feet addition. However, the PAR did not address additional parking needs, where the multipurpose room addition would fit on this congested site or how this addition would affect functional flow and defensible space planning for the school.

The Major Facility Upgrades PAR, January 2010, examines the replacement of the existing swimming pool and related equipment without considering its potential for community use.

Neither PAR included an analysis of vocational education opportunities or a potential Residential Learning Center.

4) The City of Barrow has expressed a desire to move the football field to its Piuraaġvik site.

5) The City of Barrow has consistently looked for revenue opportunities to support its daily operations.

6) The NSB Health Department has indicated that the CYS facility is too small to meet current and projected community needs, there is little space for expansion and it lacks an outdoor area for children to play.

7) The State of Alaska in its Barrow Airport Master Plan indicates that realigning Ahkovak Street north from Kiogak Street to Okpik Street may be needed to provide additional parking at facilities on the north side of the airport. The realignment would provide direct access to one side of this potentially contiguous site.

8) Moving Ahkovak Street creates significant opportunities which include folding a portion of Okpik Street into this site because it would no longer need to provide access to the NSB maintenance facility and KBRW. (The buried utilidor under Okpik Street would need to remain as well as access to it).

9) Combining the replacement of the School District Bus Barn and Public Works Fuel Division structures and relocation of CYS, this site becomes unrestricted and can easily resolve school bus and parent loading / unloading areas as well as parking for larger community events.

10) The proximity of the City of Barrow facilities and Barrow High School provide an opportunity for a warm walkway connection. The potential use for these facilities becomes considerable for community events. Facility space would include three gymnasiums, the proposed school district multipurpose room, an aquatics facility in lieu of replacing the existing pool and equipment (see item 11), potential night classes, football, ice skating, exercise classes, handball, baseball/softball, etc. Providing space for childcare while parents are engaged in other activities would also be beneficial. The City could add retail space to increase revenue, such as food service.

11) The City of Barrow and the School District could create a high school pool that would accommodate not only school events but community activities as well.

12) The Cities facilities help to provide the High School with opportunities that generally speaking are only available at large High Schools.

The necessary components to implement this development scenario include:

1) Public Works needs shop replacement facilities.

2) The School District needs a new bus barn near the Public Works shop replacement facilities.

3) The State of Alaska needs to realign Ogrook Street in the near term.

4) The Public Works building would need to be relocated and repurposed, potentially to a 29-unit apartment complex.

5) The expanded CYS facility would be relocated to the north side of Ipalook Elementary School.

6) Update both PARs for Barrow High School.

Recommendations

To maximize opportunities on this site, it is recommended that the City of Barrow and the School District coordinate the programming and master planning for this site.

- Sub Area 2

Sub Area 2 is the City owned block of land northeast of Block A. This site is ideal for multifamily housing and could accommodate displaced teacher housing from the CO2 site (approximately 33 units), Search and Rescue pilot housing needs (six units), BUECI housing needs, Health Department itinerant needs and still have additional capacity for tribal housing. Some residents indicated that this location connects subsistence trails and may be more appropriate for tribal housing. A mix of housing might be beneficial. This site would support 80 to 100 units of townhouse-style three bedroom single car garage

units. Because the City owns the property, they could take the lead by acquiring leases to secure financing. School District staff has discussed an attempt to integrate teacher housing throughout the community. Constructing multi-family housing initially for teachers would not require that it always be reserved for teachers. .

- Sub Area 3

Sub Area 3 includes the north side airport lease land that specifically includes potential for a new Alaska Airlines terminal and NSB Search and Rescue facility. A potential location for a new terminal is on Ahkovak Street near Takpuk Street.

Recommendations

The Barrow community needs to express their preference regarding the terminal location.

4. Area D

Area D extends from Soya Street to the extension of Okpik Street and is bordered on the southwest by Upper Isatkoak Lagoon and on the northeast by heavy wetlands. This is an area for a potential town center being driven by the new hospital location, potential access between the airport and the hospital, the quantity of buildable ground and the direction of new housing development. The potential of this site extends far beyond 2035 due to its significant size.

Option 4 examines opportunities of this site from multiple perspectives:

1) Because the new hospital has been established, a long term care facility (perhaps similar to those in Nome and Kotzebue) is a likely within the timeframe of this comprehensive plan.

2) ASNA and the NSB Health Department envision this area as a future health center that, in addition to long term care facilities, would include mental health, substance abuse, assisted living and prematernal facilities.

3) UIC is considering constructing an extended stay hotel in the area near the hospital.

4) Housing development is expanding into this section of Browerville. Mixed use areas would allow small businesses a potentially more affordable location to start a business.

5) As healthcare and housing develop in this area, a daycare facility nearby would benefit residents.

6) There has been interest expressed by residents that a mall-type facility to potentially include a washeteria, bowling alley, movie theater and food court, be developed. This area is a logical location for such a facility.

7) This location near the hospital is an ideal to meet ASNA's housing needs for medical staff (estimated at 100 units).

8) There has been discussion about developing a traditional community facility that could accommodate up to 3000 participants. The goal is a cultural gathering place that could host major local, regional or international events in a non-gymnasium environment.

The necessary components to implement this development scenario include:

1) Roads and utility extensions must be extended for further development.

2) Additional discussion is needed to ensure that all the healthcare components that are envisioned by the NSB Health Department and ASNA are discussed as a join effort.

Recommendations

A joint effort by ASNA and the NSB Health Department is needed to clarify provider's roles and further determine needed healthcare facilities. A joint master plan should follow.

5. Area E

Area E is preferred by the Police and Public Works Departments for a new Police Station and Justice Center and new Public Works Shops. The School District's bus barn, warehouse needs and a relocated National Guard building could also be accommodated in this area.

Recommendations

1) A PAR should be prepared for NSB Public Works facility needs at this location that include a replacement of the DMS Storage Shop #3429, Heavy Equipment Shop II #3427, Heavy Equipment Shop Warehouse #3425, Light Duty Service Shop #3431 and Mechanical Building (former bus barn) #1685. The PAR would need to interpret demographic projections through 2035 as they will likely require more equipment storage and maintenance bays, perhaps including wash bays as well.

2) A PAR should be prepared to address both school district bus barn and warehouse needs.

3) Should Area B renewal be pursued, the National Guard Building proposed relocation will need to be addressed with the National Guard.

6. Area F

Area F is preferred by the NSB Fire Department for Fire Station #3 and a training facility. It is also the area selected by BUECI as a placeholder for a redundant generator and water treatment facilities.

Recommendations

1) A PAR should be conducted to determine Fire Station #3 and training center needs and location.

2) A study of BUECI redundancy opportunities needs to be conducted.

7. Area G

Area G illustrates a proposed site for an adolescent substance abuse location, jail, adolescent detox center, police station and future AWIC facility. This location meets the locational needs of the Police Department: it is centrally located to service the community with minimum response times and it has multiple travel options in case of road blockages.

The Police Department choose the location depicted in Area E. However, Area E requires the construction of Okpik and Uula streets with utility extensions before the Police Station could begin construction. The current Police Station lease is nearing its expiration in 2018. It is likely that the NSB will have to negotiate a short term extension to accommodate development in either area E or G. Because Area G already has roads and utilities, it would provide for faster replacement.

The Health Department requested that if a new AWIC facility were to be developed, that it be located close to the Police Station.

Recommendations

1) The police station PAR should be updated and include a detox center and the potential for both State and Tribal courts.

2) The NSB Health Department, State Court and NVB should be included in the planning process.

8. NARL

NARL is a long term asset of Barrow. Although its structures are largely dated, Building 360, the current location of Iḷisaġvik College and the NSB Wildlife Department, has served many purposes since UIC acquired the property from the U.S. Navy in 1986. This structure was state of the art for its time and remains a viable structure with potential for expansion. There was discussion of historical significance of some of the structures at NARL during

the NSB Planning Commission Meeting held on October 30, 2014; Building 360 may fit into this category as well as some Quonset huts and the elevated utilidor and former theater. The former theater could become a small museum recording the history of NARL. UIC's plans call for demolition of the majority of the Quonset huts. Perhaps some professional photography could add to a display for tourism along with archival photos and story boards to preserve NARL's history.

1) UIC's plan calls for construction of a housing manufacturing plant. Considering the critical need for housing in the Barrow community, a site to assemble housing components may be an excellent use of the NARL site.

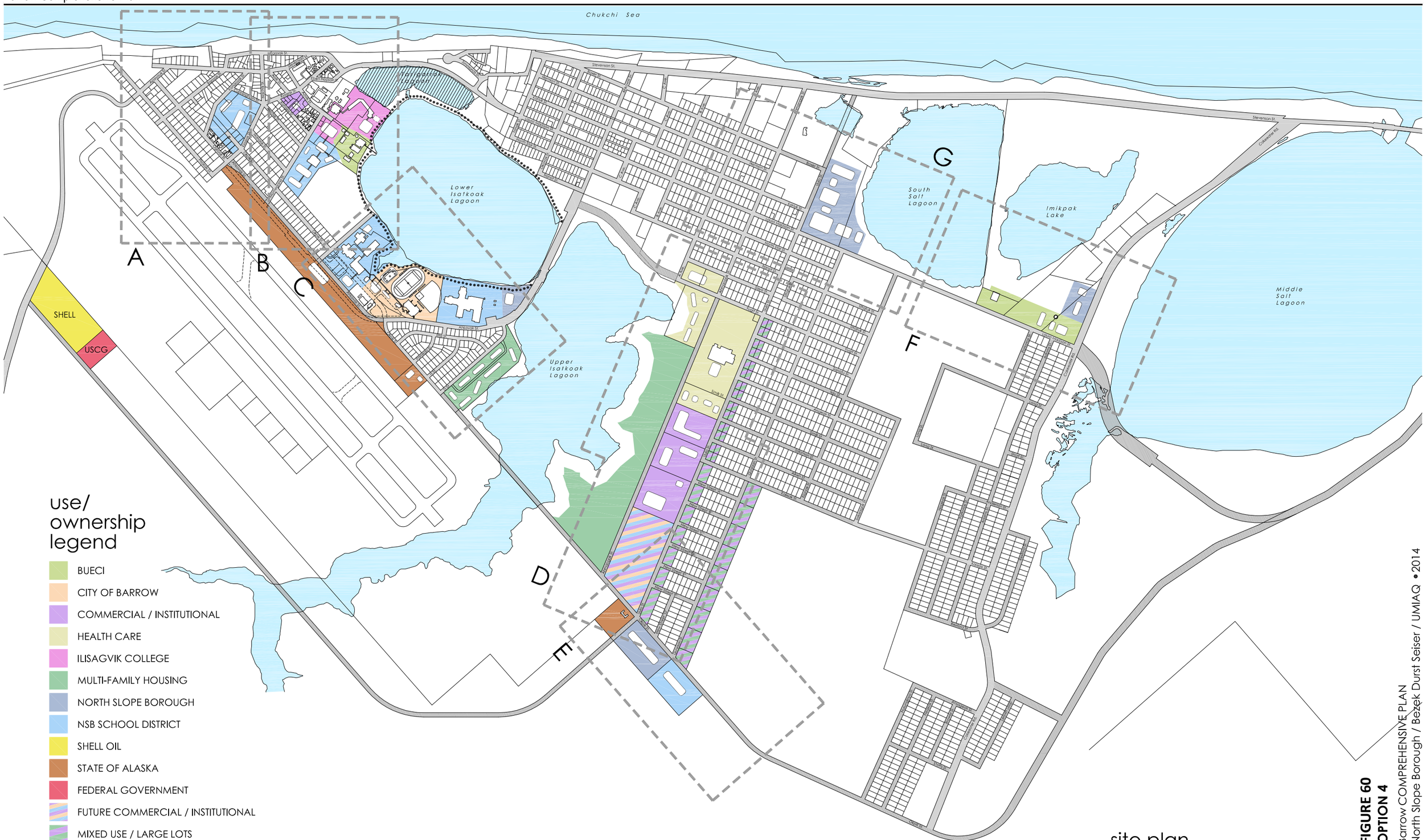
2) UIC's proposal to establish new housing at NARL would provide needed housing for both the staff at the NSB Wildlife Department and scientific groups.

3) Commercial lease buildings could well serve both the private/oil industry and potentially State and Federal agencies.

4) A proposed science complex would include expanded science logistical support services; a science dormitory to free up residential homes for local residents; science warehousing; leasable science office and administration space; and new shops for mechanic work; warehousing and commercial lease buildings.

5) A final component of UIC's plan is to retain Iḷisaġvik College in a new campus at NARL. This Comprehensive Plan illustrates three other optional locations for Iḷisaġvik College. Each option has advantages and disadvantages. Iḷisaġvik is currently examining all of their options. The new NARL access road which is an extension of Laura Madison should be an advantage to all functions as they are developed at NARL.

6) UIC's proposed plans are a good addition to the future of the community and provide pieces of community infrastructure that are and will become important to Barrow's development going forward to 2035 with or without oil and gas development.


Chukchi Sea
Stevenson St.
Stevenson St.
Cakarona Rd.
Eagle St.
Agvik St.
Agvik St.
Agvik

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Chukchi Sea

Nachik St.

Stevenson St.

Egasak St.

Kogak St.

Cunningham St.

Nanook St.

Okpik St.

Ahkovak St.

Kongosak St.

Egosak St.

Apovauk St.

Ogrook St.

Pisakak St.

DAY CARE #2

LOCATION OPTION 1

NSB CONSOLIDATED FACILITY

FIRE STATION #1

HISTORIC PRESERVATION OF WEATHER BALLOON LAUNCH BUILDING

PUBLIC HOUSING

REALIGNMENT OF AHKOVAK STREET

NOTE: TITLED FACILITIES ARE PROPOSED

site plan
AREA A --
CENTRAL DIST. 1

SCALE: 1" = 200'

FIGURE 61
AREA A -- DETAIL PLAN

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

BDS

A

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Chukchi Sea

Tasigarrok Lagoon

Lower Isatkoak Lagoon

EXPANSION POTENTIAL (ILISAGVIK)

N.V.B. PROPOSED BARROW WALKWAY

DORMS

ADMIN. / CLASS-ROOMS

ILISAGVIK COLLEGE

WATER TREAT.

POWER

WARE-HOUSE

H_2O

BUECI

RELOCATED OFFICES

H_2O

WATER DIST.

LIBRARY / CLASS-ROOMS

PRESBYTERIAN CHURCH

FUTURE EXPANSION (ILISAGVIK)

BARROW HIGH SCHOOL

Takpuk St.

CEMETERY

RESIDENTIAL LEARNING DORM 9,600 S.F.

RESIDENTIAL LEARNING CTR. 19,200 S.F.

HOME OF THE WHALER (HISTORIC PRESERVATION OF GYM)

Egasak St.

Eben Hopson St.

UIC

COMMERCIAL

Momegana St.

ASRC

Kiogak St.

Aavik St.

WELLS FARGO BANK

HOTEL (TOP OF THE WORLD)

Stevenson St.

DAY CARE #2

LOCATION OPTION 2

NATIONAL GUARD TO BE RELOCATED

COMMERCIAL

NSBSD

KITTA

ONE STORY 16,000 S.F.

NSBSD CONSOLIDATED FACILITY THREE STORY 45,000 S.F.

Aivik St.

Kongek St.

Nachik St.

Nachik St.

Nanook St.

Okpik St.

Kiogak St.

Cunningham St.

211

REALIGNMENT OF AHKOVAK STREET

Ahkovak St.

site plan
AREA B --
ILISAGVIK /
NSBSD / BUECI 1

SCALE: 1" = 200'

N E S W

NOTE: TITLED FACILITIES ARE PROPOSED

FIGURE 62
AREA B -- DETAIL PLAN

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

BDS

B

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Lower Isatkoak Lagoon

Upper Isatkoak Lagoon

PROPOSED C.Y.S. SITE

FRED IPALOOK ELEMENTARY SCHOOL

NSBSD

N.V.B. PROPOSED BARROW WALKWAY

FOOTBALL FIELD / RUNNING TRACK

BASEBALL FIELD

CITY OF BARROW

ICE RINK

PIURAAGVIK REC. CENTER

BARROW HIGH SCHOOL

NSBSD

CITY HALL

AQUATIC CENTER

COMMERCIAL

HIGH SCH. DROP-OFF

PARKING

PARKING

NSBSD MULTI-PURPOSE 16,000 SF

NSBSD MAINTENANCE

KBRW RADIO

Okpik St.

Takpuk St.

Ahkovak St.

Okpik St.

BLOCK A HOUSING

Ihta St.

Panigeo St.

H St.

D St.

MULTIFAMILY HOUSING (82 TO 100 UNITS)

100 FT. SETBACK FROM SHORE LINE

NOTE: TITLED FACILITIES ARE PROPOSED

REPLACEMENT ALASKA AIRLINES TERMINAL BUILDING

NSBSD BUS BARN AND P.W. FUEL DIVISION TO BE DEMOLISHED/RELOCATED

OKPIK ST. BETWEEN TAKPUK AND AHKOVAK STREETS TO BE CLOSED

REALIGNMENT OF AHKOVAK STREET

SEARCH AND RESCUE

FIGURE 63
AREA C -- DETAIL PLAN
Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

site plan, AREA C
STATE /NSBSD
CITY of BARROW 1

SCALE: 1" = 200'

N W E S

BDS

C

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MIXED USE ZONING

Quiyaan St.

Aiken St.

Kaleak St.

New Street "A"

New Street "B"

New Street "C"

New Street "D"

New Street "E"

New Street "F"

New Street "G"

MIXED USE ZONING

POLICE STATION LOCATION OPTION #1

Uula St.

EXTENDED STAY HOTEL

DAY CARE #3

MALL

TRADITIONAL CENTER (CONVENTION CENTER)

RESERVED FOR CITY CENTER AND POSSIBLE EDUCATION FUNCTIONS (BEYOND 2035)

GOVERNMENT
INSTITUTIONAL
COMMERCIAL

RELOCATED NATIONAL GUARD BUILDING

NOTE: TITLED FACILITIES ARE PROPOSED

Okpik St.

Ahmaogak St.

MULTI-FAMILY HOUSING ZONING

MATCH LINE

100 FT. SETBACK FROM SHORE LINE

200 FT. SETBACK FROM SHORE LINE

Upper Isatkoak Lagoon

215

site plan, AREA D
(NEW TOWN CENTER)
HEALTH CARE /
HOUSING /
COMMERCIAL 1

SCALE: 1" = 200'

FIGURE 64
AREA D -- DETAIL PLAN -- 1 of 2

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

BDS

D

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Utiqtuq St.

Uula St.

Ahmaogak St.

Saya St.

A Ave.

Yugit St.

Sanatu St.

Iigu St.

Angeak St.

Simik St.

Solomon St.

Aiken St.

MIXED USE ZONING

MIXED USE ZONING

MIXED USE ZONING

MIXED USE ZONING

MIXED USE ZONING

MIXED USE ZONING

MIXED USE ZONING

HOSPITAL

LONG TERM CARE

DAY CARE

SUBSTANCE ABUSE TREATMENT

PRE-MATERNAL

MENTAL HEALTH

EXTENDED STAY HOTEL

NURSES HOUSING

SENIOR HOUSING ASSISTED AND INDEPENDENT LIVING

MULTI-FAMILY HOUSING ZONING

200 FT. SETBACK FROM SHORE LINE

100 FT. SETBACK FROM SHORE LINE

MATCH LINE

Upper Isatkoak Lagoon

site plan, AREA D (NEW TOWN CENTER) HEALTH CARE / HOUSING / COMMERCIAL 2

SCALE: 1" = 200'

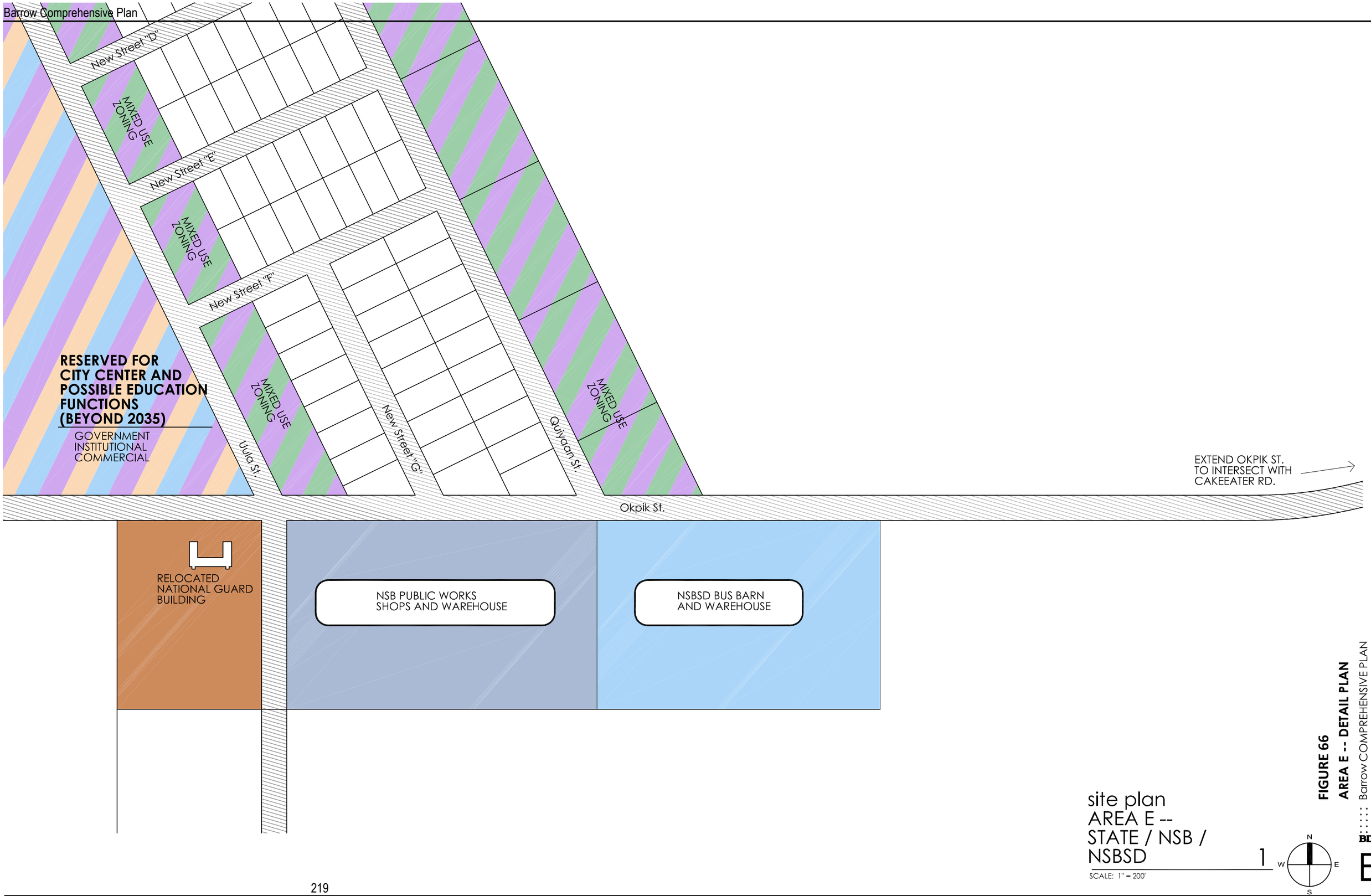
FIGURE 65
AREA D -- DETAIL PLAN -- 2 of 2
Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

NOTE: TITLED FACILITIES ARE PROPOSED

BDS

D

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NOTE: TITLED FACILITIES ARE PROPOSED

FIGURE 66
AREA E -- DETAIL PLAN

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

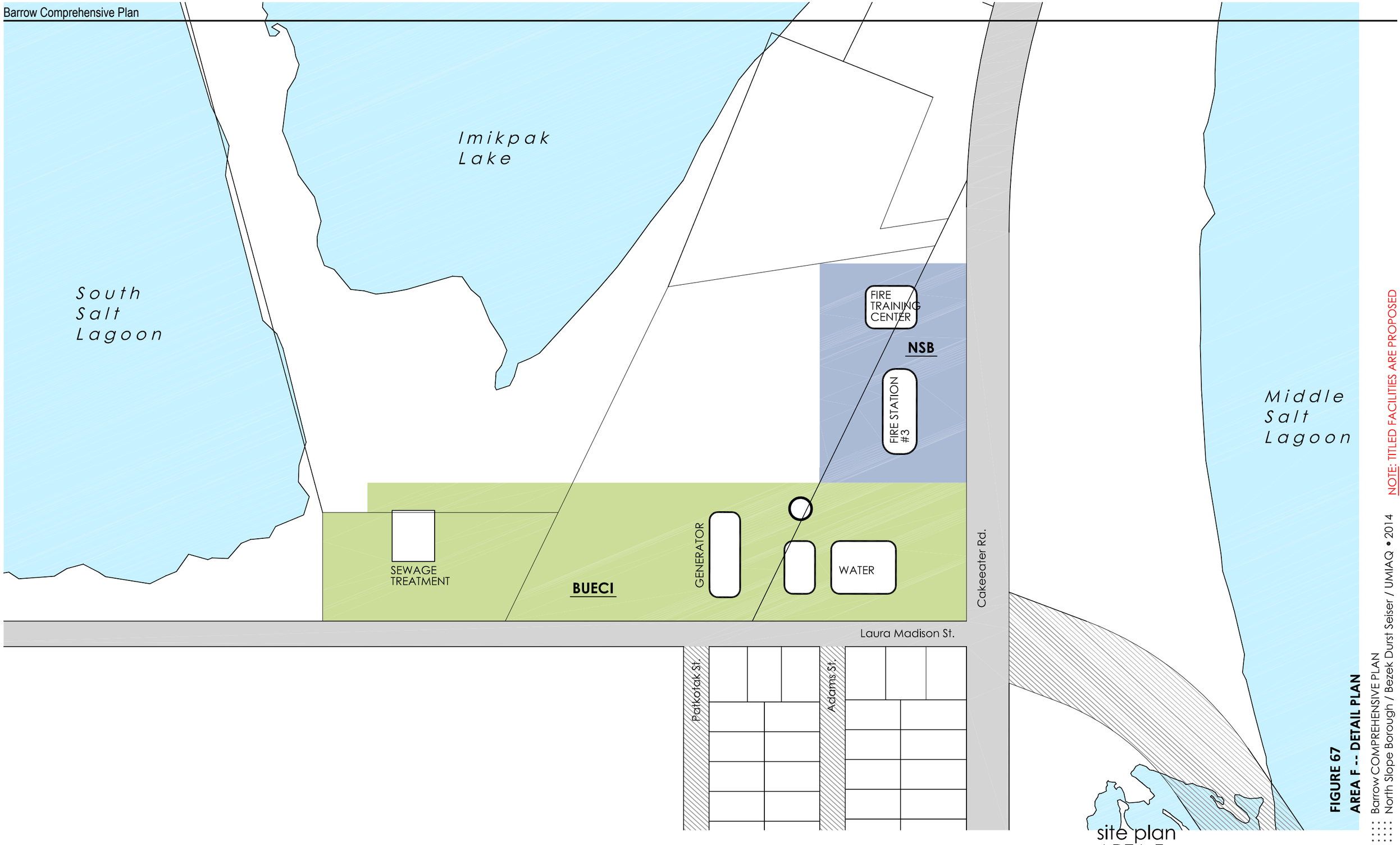
BDS

site plan
AREA E --
STATE / NSB /
NSBSD

SCALE: 1" = 200'

E

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NOTE: TITLED FACILITIES ARE PROPOSED

FIGURE 67
AREA F -- DETAIL PLAN

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

BDS

F

site plan
AREA F --
BUECI / NSB 1

SCALE: 1" = 200'

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NOTE: TITLED FACILITIES ARE PROPOSED

FIGURE 68
AREA G -- DETAIL PLAN
Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

site plan
AREA G --
NSB / JUSTICE CENTER 1

SCALE: 1" = 200'

BDS

G

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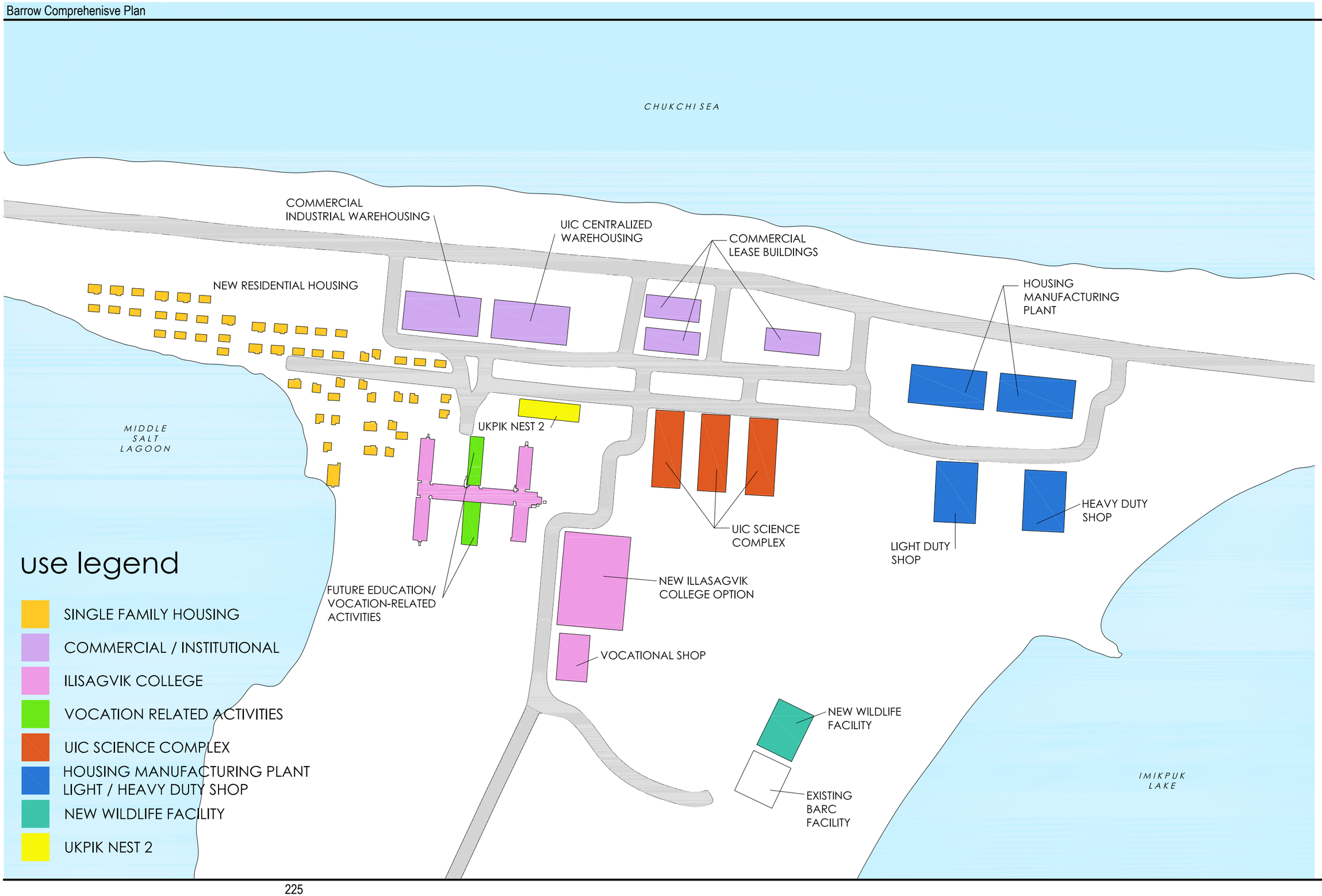


FIGURE 69
NARL
Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ 2014
BDS

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Chukchi Sea

Lower Isatkoak Lagoon

Upper Isatkoak Lagoon

South Salt Lagoon

Imikpak Lake

Middle Salt Lagoon

ROAD PROJECT NO. 1
OKPIK ST. FROM D ST. TO UULA ST.
AND UULA ST. FROM
ANGEAK ST. TO OKPIK ST.

ROAD PROJECT NO. 2
AHMAOGAK ST. FROM
YUGIT ST. TO OKPIK ST.

ROAD PROJECT NO. 3
RESIDENTIAL
STREETS

ROAD PROJECT NO. 4
REALIGNMENT OF
AHKOVAK ST.
(STATE OF AK DOT PROJECT)

ROAD PROJECT NO. 5
SOUTH AIRPORT
ACCESS ROAD

ROAD PROJECT NO. 6
OKPIK ST. FROM UULA ST.
TO CAKEEATER RD.

ROAD PROJECT NO. 7
UULA ST. FROM BOXER ST.
TO STEVENSON ST.

ROAD PROJECT NO. 8
FUTURE STREETS

ROAD PROJECT NO. 9
FUTURE STREETS

road
legend

- EXISTING
- FUNDED / UNDER CONST.
- PLATTED
- PROPOSED
- OTHER
- CLOSURES
- N.V.B. WALKWAY

site plan
OVERALL 1

SCALE: N.T.S.

NOTE: TITLED FACILITIES
ARE PROPOSED

FIGURE 70
ROADS DIAGRAM

Barrow COMPREHENSIVE PLAN
North Slope Borough / Bezek Durst Seiser / UMIAQ • 2014

BDS

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18.0 GOALS, OBJECTIVES AND STRATEGIES

The goals and supporting objectives and strategies are intended to reflect the values of Barrow residents. The goals and objectives were developed during issue identification and drafting the comprehensive plan. They were refined based on resident input during the strengths, weaknesses, opportunities and threats identified during community meeting in Barrow.

- Goals are broad statements that describe long-term desired outcomes.
- Objectives provide more specific information of what can be done to achieve a goal.
- Strategies describe specific steps to implement each objective.

Each goal and related objectives and strategies are presented in separate tables. The format allows the community to track progress in implementing strategies by updating the tables during a five year review and update cycle.

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18.1 Natural Environment

Table 32 Goal 1: Protect the community's natural resources.

Objectives	Strategies / Policies	Implementing Entities
Use updated and comprehensive data about the natural environment to support informed decision-making.	Identify and map sensitive natural environments such as wetlands and vegetation and critical habitats / nesting areas of threatened and endangered species.	NSB Wildlife Department; NSB Planning Department.
	Investigate the feasibility of obtaining a soil survey and mapping services from the USDA Natural Resources Conservation Service.	NSB Planning Department; NSB Wildlife Department; U.S. Department of Agriculture.
	Create an inventory of abandoned/unused infrastructure that could be potentially be removed, such as power lines and poles that may hamper use of the natural environment by threatened and endangered species.	NSB Public Works; NSB Planning Department.
	Create an inventory of culverts that may need to be increased in size to prevent tundra damage.	NSB Public Works; NSB Planning Department.
	Seek research on the effect of invasive species as the Arctic experiences increased maritime traffic.	NSB Wildlife Department; NSB Planning Department.
Use regulatory measures to protect natural environment when and where possible.	Review NSBMC Titles 18 and 19 to determine if subdivision and zoning regulations provide incentives for development on already disturbed land and land that is less environmentally sensitive.	NSB Planning Department
	Develop a wetlands compensatory mitigation banking program to support the creation, ongoing management and enforcement of land set aside for conservation and subsistence use.	NSB Planning Department; U.S. Environmental Protection Agency; U.S. Army Corps of Engineers
	Develop regulations to protect tundra from development and ATV damage.	NSB Planning Department; NSB Wildlife Department; UIC.
	Consider eider nesting areas and other threatened, endangered or candidate species when siting roads, extension of electrical utilities aboveground or focusing future development.	NSB Planning Department; NSB Wildlife Department; UIC.

Objectives	Strategies / Policies	Implementing Entities
Use policy measures to protect natural environment when and where possible.	Protect tundra near snow fences by more effectively channeling water during breakup.	NSB Public Works
	Prioritize culvert replacement to prevent tundra damage and prevent residential flooding.	NSB Public Works
	Protect natural drainageways and wetlands as valuable water retention areas and, where possible, find ways to restore and enhance these areas.	NSB Public Works; NSB Planning Department
Enhance coordination between stakeholders on activities related to the natural environment and resources of the Barrow area.	Include the numerous stakeholders and research when making land use decisions.	NSB, NVB, UIC, ICAS, City of Barrow, state and federal agencies.
	Create or support an awareness program to educate residents and visitors about the fragile environment and preserving habitats of threatened and endangered species with specific ways that residents, industry and other can help.	NSB Mayor's Office; NSBSD; NSB Wildlife Department.

18.2 Hazards

Table 33 Goal 2: Protect existing infrastructure from flooding, erosion and other natural disasters.

Objectives	Strategies / Policies	Implementing Entities
Seek proactive ways to protect the community's critical infrastructure.	Establish policies and procedures to protect the community's water source, the Upper Isatkoak Lagoon.	NSB Public Works
	Establish policies and procedures to protect both the Middle and South Salt lagoons from excessive erosion and subsequent breaching that would contaminate the shoreline and subsistence areas with solid waste and wastewater.	NSB Public Works
	Include hazard mitigation considerations in water and wastewater treatment, solid waste and natural gas policies and procedures.	NSB Public Works
Relocate or provide additional protective measure for existing infrastructure.	Consider relocation of the NSB Public Works shops that are being threatened by erosion along Stevenson Street.	NSB Public Works
	Evaluate the cost and benefit of relocating or otherwise protecting critical infrastructure from erosion, especially utilidor systems and sewer pump stations.	NSB Public Works

Table 34 Goal 3: Minimize construction of facilities and other land uses in hazard prone zones.

Objectives	Strategies / Policies	Implementing Entities
Integrate regulatory and policy requirements with hazard avoidance measures.	Review the NSB zoning and subdivision regulations to avoid construction of facilities in known hazard areas and assure consistency of definitions and zoning maps. Revise if necessary.	NSB Planning Department; NSB Public Works.
	Review regulations regarding permitting construction in hazard zones and adopt regulations if necessary to ensure appropriate design and siting to minimize risk from hazards.	NSB Planning Department; NSB Public Works.
	Develop criteria for evaluating and funding future capital facilities regarding location and hazard vulnerability.	NSB Planning Department; NSB Public Works; NSB CIPM
Utilize natural features to control development that could result in increasing hazard susceptibility.	Consider erosion and drainage patterns when siting, constructing and maintaining culverts and snow fences.	NSB Planning Department; NSB Public Works; NSB CIPM
	Locate critical public facilities, such as police and fire stations and emergency operation centers, in safe locations that are not likely to be affected by hazards.	NSB Planning Department; NSB Public Works; NSB CIPM

Table 35 Goal 4: Protect the health and welfare of the Barrow community through safe and efficient management of contaminated sites and hazardous waste.

Objectives	Strategies / Policies	Implementing Entities
Facilitate remediation of contaminated sites.	Develop plans to remediate contaminated waste disposal sites within the Barrow Area of Influence.	NSB Mayor's Office; NSB Planning Department; NSB Public Works; ADEC; EPA; state and federal agencies
	Plan for future remediation activities, including delineating potential staging areas and logistical needs.	NSB Mayor's Office; NSB Planning Department; NSB Public Works; UIC; ADEC; EPA; BLM; state and federal agencies
	Work with the Restoration Advisory Board (RAB) to facilitate the clean-up of former military sites within the Barrow Area of Influence.	NSB Public Works; Department of Defense; ADEC
Promote safe handling and disposal of hazardous and toxic waste.	Keep a current inventory of locations where hazardous materials might pose a danger to the public, including storage and transportation areas.	NSB Public Works
	Provide information about proper disposal of hazardous or toxic waste to Barrow residents.	NSB Public Works, NSBSD, City and tribal governments.

Table 36 Goal 5: Ensure effective community emergency preparedness.

Objectives	Strategies / Policies	Implementing Entities
Use updated and comprehensive data about the hazards to support informed decision-making.	Identify and map hazard zones within the Barrow Area of Influence. Continue to revise and compile mapping of vulnerable areas using municipal, state and federal data. As additional surveying and other data collection are produced for infrastructure improvements, integrate this information into the mapping system. Require digital mapping files for all infrastructure and development projects.	NSB Planning Department
Coordinate hazard vulnerability assessments.	Create an erosion mitigation plan and corresponding shoreline protection program.	NSB Administration and Finance; NSB Risk Management; NSB Planning Department
	Update and maintain the North Slope Borough Emergency Operations Plan to ensure essential governance and public safety services are available during a disaster.	NSB Risk Management
Coordinate hazard vulnerability assessments. (continued)	Create a Barrow preparedness plan that provides contingencies for disasters, both natural and man-made that includes continually updated and accurate information regarding natural hazard risks and past events.	NSB Risk Management
	Map the location and track the stability of ice cellars.	NSB Wildlife, NSB Planning
Ensure resources are available for training, facilities and projects related to hazard mitigation and emergency preparedness.	Review budget to ensure that hazard reduction projects and tasks are funded and can be executed on a regular basis.	NSB Administration and Finance
	Offer ongoing responder training and exercises for emergency service providers and risk management staff	NSB Administration and Finance
	Provide support as needed for retrofitting the Risk Management Office to also serve as an effective Emergency Operations Center.	NSB Mayor's Office; NSB Administration and Finance.
	Provide facility space as needed to store materials and equipment intended for response to community emergencies.	NSB Administration and Finance

Objectives	Strategies / Policies	Implementing Entities
Coordinate related activities among North Slope Borough departments and other governmental agencies.	Coordinate public facility planning with public safety providers (police, fire, search and rescue) to ensure capability to respond to hazard-related situations. Assess impacts of capital facility locations on emergency response capabilities.	NSB Fire Department, NSB Police Department; NSB Search and Rescue Department; NSB Risk Management Office, NSB Public Works; NSB CIPM; City of Barrow; other local, state and federal entities
	Support the development of Tom Gordon Expressway / Uivaqsaagiaq Road and utilities along this roadway as an alternative to Stevenson Street to provide reliable access and services to NARL.	NSB Fire Department, NSB Police Department; NSB Search and Rescue Department; NSB Risk Management Office, NSB Public Works; NSB CIPM; other local, state and federal entities
	Interconnect service networks, such as roads and pipelines and allow more than one route to any point so that they are less vulnerable to local failures because individual sections can be isolated as necessary.	NSB Public Works; NSB CIPM
Strengthen public awareness and preparedness	Continue to disseminate information, such as family disaster supply kit contents, to residents and business about disaster preparedness to protect both people and assets.	NSB Risk Management

18.3 Population

Table 37 Goal 6: Use community demographics to plan for future needs.

Objectives	Strategies / Policies	Implementing Entities
Ensure that demographics accurately reflect the Barrow community.	Evaluate trends in population changes, including how changes relate to the borough budget, with and without oil and gas development.	NSB Mayor's Office; NSB Administration and Finance; City of Barrow
	Provide educational information to Barrow residents about the importance of participating in the U.S. Census.	NSB Mayor's Office; NSB Administration and Finance; City of Barrow

18.4 Housing

Table 38 Goal 7: Understand the complexities of the housing issues in Barrow and coordinate planning activities.

Objectives	Strategies / Policies	Implementing Entities
Assess current and future housing needs in Barrow.	Commission an in-depth comprehensive housing study on the multitude of housing issues that have led to the current deficiency.	NSB Mayor's Office; NSB Administration and Finance; NSB Planning Department; City of Barrow; TNHA; NSBSD; NVB; ICAS
	Undertake a lot by lot infill study, especially of Barrow and older portions of Browerville to determine ownership status.	
	Document ongoing housing needs and incorporate into a short and long-term housing strategy.	
	Track housing prices and rents with increases / decreases in wages.	
	Ensure ongoing research of new funding opportunities, strategies for creating affordable housing.	
Access resources collaboratively as a community.	Establish a mechanism to advocate for ongoing state, federal and private funding support for housing.	
Increase awareness of housing and affordable housing issues.	Encourage a higher level of publicity regarding housing loans and other programs.	NSB Mayor's Office; TNHA; City of Barrow; NVB
	Support efforts to provide continuing education for elected and appointed officials and community leaders regarding the need for and benefit of sufficient, safe and affordable housing.	NSB Mayor's Office; TNHA; City of Barrow; NVB
	Promote financial literacy programs offered by lenders and non-profits that help prepare residents for future homeownership.	NSB Mayor's Office; TNHA; City of Barrow; NVB
Promote coordination to remedy the housing crisis	Analyze existing housing programs within different entities in Barrow to determine gaps and duplicative efforts.	NSB Mayor's Office; TNHA; City of Barrow; NVB.
	Develop cooperative agreements between landowners, the City of Barrow, NVB, TNHA, NSB and funding agencies to coordinate construction funding and logistics.	NSB Mayor's Office; NSB Administration and Finance; City of Barrow; NVB; TNHA; UIC
	Coordinate efforts to offer developable land from large landowners in Barrow.	NSB Mayor's Office; NSB Planning Department; City of Barrow; UIC

Table 39 Goal 8: Ensure an adequate supply of housing to meet the needs of current and future Barrow residents.

Objectives	Strategies / Policies	Implementing Entities
Ensure that sufficient and appropriately zoned land is available for residential development for current and future residents over the next 20 years and beyond.	Utilize the NSB Census, U.S. Decennial Census, American Community Survey (ACS), building permits and other available data to monitor both the Barrow population and housing starts to determine if current demand is being met and the extent of the surplus or deficiency.	NSB Planning Department; NSB Mayor's Office; NSB Administration and Finance, Assessing Division; TNHA; NVB.
	Develop a standard methodology for projecting future population growth with housing needs at specific points in time to evaluate future need. Review the projections regularly and consider when prioritizing community needs and funding.	NSB Mayor's Office; NSB Administration and Finance, Assessing Division, NSB Planning Department; TNHA; NVB.
	Evaluate the NSB subdivision and zoning regulations and recommend changes where necessary to ensure that a sufficient amount of land is appropriately zoned and available for a variety of housing types and densities, including mixed-use development.	NSB Planning Department; NSB Law Department.
	Coordinate with local landowners to identify land availability for residential development for both shareholders and non-shareholders.	NSB Mayor's Office; NSB Planning Department; UIC; large landowners.
	Rezone land near higher traffic intersections from lower-density to higher-density residential and mixed use for multi-family housing and provide a transition into less dense residential development.	NSB Planning Department; NSB Law Department.
	Explicitly allow for assessory structures, including homes, on a single lot in the NSB municipal code.	NSB Planning Department; NSB Law Department.
Support both short and long-term housing options for itinerant workers and off-slope employee recruitments to ease housing constraints on existing residents.	Support UIC in developing an extended stay hotel.	Barrow community
	Employers that hire off-slope workers, such as teachers and medical professionals, should coordinate efforts in locating and developing housing for those moving to Barrow.	ASNA; NSBSD; NSB; other employers that routinely hire off-slope workers.
Consider the needs of many different populations when planning for housing.	Encourage the distribution throughout the community of housing types through regulations and programs that accommodate special population groups such as the elderly, physically challenged, large families and single room occupants.	NSB Mayor's Office, NSB Health Department, NSB Planning Department, TNHA, NVB

Table 40 Goal 9: Facilitate availability of a variety of housing types and prices to provide current and future Barrow residents with greater choice in both rental and ownership opportunities.

Objectives	Strategies / Policies	Implementing Entities
Develop strategies for development / redevelopment that incorporate an integrated mix of residential dwelling types to address affordability.	Encourage higher density housing and development / redevelopment where appropriate through incentives (such as reduced setbacks and parking requirements).	NSB Planning Department; NSB Law Department
Seek ways to reduce costs of constructing housing to facilitate greater affordability.	Set up a recycled building material program for demolished structures.	NSB Public Works; NSB CIPM
	Work with Cold Climate Housing Research Center (CCHRC) to build affordable and energy efficient homes.	NSB Mayor's Office; TNHA
	Develop a workforce of Barrow residents that can form a cooperative to construct homes in Barrow, using sweat equity.	City of Barrow; NVB; NSB; TNHA
	Assemble manufactured / modular housing in Barrow to save shipping costs of assembled homes with assembly line construction and large staging areas.	UIC
	Research the feasibility of ordering, delivering and assembling kit houses.	NSB Mayor's Office; TNHA, NVB
	Streamline an approach to providing multiple housing to reduce costs and time.	
	Explore funding opportunities for tribal housing authorities, elder housing and low-income housing, such as federal and state grants and assistance from the oil and gas industry.	

Table 41 Goal 10: Improve the condition of housing stock in Barrow to ensure safe and sanitary living conditions.

Objectives	Strategies / Policies	Implementing Entities
Demolish unoccupied and unsafe homes.	Implement a program that facilitates demolishing homes or structures that are not suitable for occupancy.	NSB Administration and Finance
	Adopt ordinances that require property owners to demolish and clean up abandoned and derelict structures.	NSB Planning Department; NSB Law Department
Improve conditions of existing homes.	Provide assistance to homeowners to renovate homes that are so deteriorated that they are not suitable for occupancy.	TNHA; NVB; NSB Administration and Finance.

Table 42 Goal 11: Guide development toward a cohesive, cost-effective and orderly development of the community.

Objectives	Strategies / Policies	Implementing Entities
Cooperatively develop roads and utilities to support new and expanded housing development.	Create a development phasing plan that includes potential financing for the construction of roads and utilities in Barrow.	NSB Mayor's Office; NSB Planning Department; NSB Public Works, NSB CIPM; UIC, NVB
	Investigate funding opportunities for additional road and utility development from Bureau of Indian Affairs, State of Alaska, Denali Commission, Housing and Urban Development (HUD) and federal transportation funds.	NSB Grants Division; UIC, NVB
	Focus new subdivision and platting efforts to those areas that cost the least to build (i.e. wetlands mitigation) and close to existing development.	NSB Planning Department
Encourage residential infill development.	Identify vacant and underutilized residential properties with road access and utilities that have the potential for redevelopment.	NSB Planning Department, NVB Realty
	Create a program that provides assistance in resolving probate issues for vacant residential restricted lots.	NSB Mayor's Office, NVB, ICAS

18.5 Public Facilities and Services

Table 43 Goal 12: Provide reliable utility service to Barrow residents.

Objectives	Strategies / Policies	Implementing Entities
Provide redundant back-up services to prevent interruptions in service and downtimes for major repairs.	Identify and investigate the potential of designating an alternate water source for community use.	NSB Public Works; BUECI
	Plan for redundant water and wastewater treatment plants and power plant.	NSB Public Works; BUECI
	Provide an alternative routing of the natural gas pipeline in the event of damage to the main line.	NSB Public Works
Ensure sufficient capacity for current and future residents and industry.	Increase feeder capacity to accommodate growth, especially south of the airport.	NSB Public Works; BUECI
	Increase capacity of WWTP by operating on full capacity using both treatment trains.	NSB Public Works; BUECI
	Repair thermal oxidation system (TOS) incinerator facility for municipal waste to reduce waste in landfill.	NSB Public Works
	Consider establishing an industry service area for operation of a landfill, wastewater and water facility.	NSB Public Works; BUECI
	Commission an in-depth and comprehensive study of the costs of drilling and developing the gasfields as well as deliverability and reserves to ensure that community growth can be sustained.	NSB Public Works; BUECI
	Investigate and incorporate conservation measures whenever practicable in facilities and by consumers.	NSB Public Works; BUECI

Objectives	Strategies / Policies	Implementing Entities
Continue to develop gravel resources and other sources of energy.	Research past material use and analyze potential demand to determine future needs.	NSB CIPM; NSB Public Works; NSB Planning.
	Expand existing material sources as practical and feasible.	UIC, City of Barrow, ASRC/SKW
	Continue to investigate gravel sources to support future development.	NSB Public Works; NSB CIPM; NSB Planning; ASRC/SKW; UIC
	Consider regulatory changes to facilitate expansion or development of a material pit, such as creating or modifying existing zoning to more easier facilitate this type of development.	NSB Planning
	Support ASRC in development of gasoline and oil storage facilities.	Barrow Community

18.6 Emergency Services

Table 44 Goal 13: Provide emergency services to ensure the safety and welfare of Barrow residents.

Objectives	Strategies / Policies	Implementing Entities
Provide adequate facilities for emergency service personnel and equipment.	Construct a third fire station to better serve Cakeeater Road residents, the new Samuel Simmonds Memorial Hospital and NARL	NSB Fire Department
	Develop a Fire Training Center, potentially housed within a third fire station facility, to offer training for volunteer fire fighters from all villages.	NSB Fire Department
	Retrofit the fire station in Barrow to accommodate more equipment and eventually serve the area south side of the airport.	NSB Fire Department
	Construct a facility appropriate to house current and future aircraft for search and rescue operations.	NSB Search and Rescue Department
	Seek a new location for the Police Department before the current lease expires.	NSB Police Department
Facilitate increased response time during emergencies.	Construct the extension of Uula Street in Browerville and Okpik Street in Barrow for a direct connection between the new Samuel Simmonds Memorial Hospital and the Search and Rescue facility.	NSB Mayor's Office; NSB Public Works

18.7 Health and Social Services

Table 45 Goal 14: Provide medical services to ensure the health and wellbeing of Barrow and North Slope Borough residents.

Objectives	Strategies / Policies	Implementing Entities
Plan for future health and social service needs	Create a master plan for healthcare services and facilities, including future uses of facilities that will no longer be used for health-related services, such as the Wellness Center.	ASNA; NSB Health Department; NSB Mayor's Office; NSB Administration and Finance; NVB
	Evaluate the need for establishing or expanding the following facilities and associated programs: long-term care facility; hospital staff housing; senior housing addition; mental health facility; homeless shelter; expanded CYS facility; adult and adolescent detox and substance abuse treatment center.	ASNA; NSB Health Department; NSB Mayor's Office; NSB Administration and Finance; NVB
	Reestablish childcare services in Barrow to facilitate greater participation in the local workforce.	NSB Mayor's Office

18.8 Transportation

Table 46 Goal 15: Maintain and improve Barrow's transportation system to consistently provide mobility for people and goods in a safe and efficient manner.

Objectives	Strategies / Policies	Implementing Entities
Collaborate to plan for future growth and development.	Set and maintain a schedule to review the NSB Comprehensive Transportation Plan and the Native Village of Barrow Long Range Transportation Plan every two years and update as needed.	NSB Planning Department; NVB; City of Barrow
	Establish a phased roads and utilities development plan to provide for future development.	NSB Mayor's Office; NSB Planning Department; NVB; ICAS; NSB Public Works; BUECI
	Prioritize transportation projects that receive funding from sources other than the NSB.	NSB Mayor's Office; NSB Planning Department; NVB; ICAS; City of Barrow
	Collect and analyze data to provide support to non-Borough transportation-related funding requests.	NSB Mayor's Office; NVB; ICAS, City of Barrow
	Develop cooperative agreements between major landowners, the City of Barrow, NSB, NVB, ICAS and funding agencies to coordinate funding and logistics.	NSB Mayor's Office; NVB; ICAS; City of Barrow
	Support and facilitate ICAS and NVB participation in the BIA transportation program.	NSB; NVB; ICAS; City of Barrow**;** UIC
	Consider future transportation needs that may include: developing a safer connection at the east end of airport property to the south side of the airport; road connections between the hospital and the Search & Rescue facility; docking/port facility; and industry airport needs.	NSB Mayor's Office; Planning Department; NSB Public Works Department; NVB; City of Barrow
	Create a priority system for capital funding that more highly considers projects that can reduce maintenance costs or extend the life of existing assets.	NSB Planning Department

Objectives	Strategies / Policies	Implementing Entities
Promote and participate in public review for proposed transportation or utility corridors, plans or routes undertaken by the NSB, state and/or federal government within Barrow.	Actively solicit resident comments regarding future transportation plan and projects.	NSB Mayor's Office; NSB Planning Department; NVB; ICAS; City of Barrow; UIC
	Coordinate with ADOT regarding development plans and projects in Barrow.	
	Engage ADOT and Alaska Airlines about potential locations for a new Alaska Airlines Terminal.	
	Support the realignment of Ogrook Street as proposed in the ADOT Airport Master Plan update.	
	Continue to support the development of the Tom Gordon Expressway / Uivaqsaagiaq Road.	

18.9 Recreational Facilities

Table 47 Goal 16: Offer a variety of recreational opportunities to meet the needs of Barrow residents, especially for families and youth.

Objectives	Strategies / Policies	Implementing Entities
Plan collaboratively for future recreational opportunities for Barrow residents.	Investigate combined resource opportunities to meet multigenerational recreational activities through linking Barrow High School and Piuraaġvik facilities.	City of Barrow; NSBSD
	Explore the possibility of combining aquatic uses at Barrow High School and Piuraaġvik for public use.	
	Explore the development of a public indoor playground space similar to Ipalook Elementary School.	City of Barrow

18.10 Communications

Table 48 Goal 17: Facilitate adequate communication and telecommunications systems for Barrow residents and businesses.

Objectives	Strategies / Policies	Implementing Entities
Maintain and upgrade communication services.	Support and maintain bypass mail.	NSB Mayor's Office; U.S. Postal Service
	Support the extension of fiber optics into Barrow and coordinate land use planning and permitting when needed.	NSB Mayor's Office; NSB Planning Department

18.11 Economy

Table 49 Goal 18: Ensure that Barrow has a strong and diversified local economy that provides employment opportunities for residents.

Objectives	Strategies / Policies	Implementing Entities
Foster economic development activities that are culturally relevant.	Support a UIC vision for a Traditional Center that would host communitywide events and larger meetings that can be accommodated currently.	UIC; NSB; NVB; ICAS; City of Barrow
	Support ASRC in its development of an artesian work studio adjacent to the Top of the World Hotel to support local artists.	
Foster economic development activities that expand services for residents.	Support the NVB Comprehensive Economic Development Strategy.	
	Consider the development of an Alaska Regional Development Organization (ARDOR) to facilitate greater economic development potential.	
	Explore the feasibility of expanded commercial enterprises, especially those that are of interest to residents, such as a movie theater, bowling alley, additional restaurants / food service, culturally relevant community services (i.e. a butchery / tannery or sewing cooperative), small engine repair or self-service repair shop, arctic community greenhouse, washeteria, native store, commercial kitchen.	
Support tourism development.	Support NVB and ASRC in eco-tourism development	
	Collaborate with NSB Wildlife Management Department and BARC on eco-tourism and arctic science opportunities to attract tourists.	

18.12 Education

Table 50 Goal 19: Continue to develop coordinated educational and training opportunities.

Objectives	Strategies / Policies	Implementing Entities
Collaborate on establishing joint uses of facilities to maximize resources.	Explore shared educational space between Barrow High School and Iḷisaġvik College, such as vocational education.	NSBSD; Iḷisaġvik College
	Locate a new site for Kiita Learning Community so that the current facility can be returned to daycare.	NSBSD
	Study alternative sites for relocating Iḷisaġvik College.	Iḷisaġvik College
	Revisit two out-of-date PARs for Barrow High School that address a multi-purpose room addition and school renovations.	NSB Mayor's Office; NSB Planning Department; NSB CIPM Department.
	Explore the feasibility of decongesting the Barrow High School site through the realignment of Ogrook as proposed by ADOT and relocating / repurposing facilities to better accommodate educational functions.	NSBSD; NSB Mayor's Office; ADOT; NSB Public Works Department; NSB CIPM Department
	Explore consolidating NSBSD administrative offices.	NSBSD
Facilitate better learning opportunities for all students across the North Slope.	Establish a Residential Learning Center to serve all the North Slope villages.	NSB Mayor's Office; NSBSD

18.13 Subsistence

Table 51 Goal 20: Protect and enhance traditional, historical, cultural and subsistence resources and activities.

Objectives	Strategies / Policies	Implementing Entities
Facilitate preservation of the Inupiaq language through improving Native language fluency.	Establish a daycare center that includes an Inupiat language immersion program.	NSBSD; NSB Mayor's Office; IHLC.
	Encourage native speakers to speak Inupiaq at home, especially to children.	IHLC
	Expand the Inupiaq Immersion Program.	NSBSD
	Continue and expand the use of the Rosetta Stone program for language preservation and develop Native language education programs for adults.	IHLC
Protect and preserve areas where traditional hunting, fishing and gathering occurs.	Document access routes and areas where traditional sources of subsistence foods are gathered.	IHLC
	Create lessons for children to learn about traditional subsistence culture in school that is specific to Barrow.	NSBSD
	Encourage modification of the NSBMC to further protect subsistence lands.	NSB Planning Department; NSB Law Department; IHLC
Protect structures that are an important part of Barrow's history	Work with property owners to nominate the Presbyterian Church and other historically significant buildings for inclusion on the National Registry of Historic Places.	NSB Mayor's Office; IHLC

18.14 Land Use and Zoning

Table 52 Goal 21: Guide development toward a cohesive, cost effective and orderly development of the community.

Objectives	Strategies / Policies	Implementing Entities
Redevelop areas with existing utilities	Utilize future development opportunities to update and renew older portions of the community that have declined into underutilization.	NSB Mayor's Office; NSB Planning Department; NVB.
	Research property ownership issues of restricted lots to facilitate the redevelopment of abandoned properties to maximize use of the existing utilities.	NSB Planning Department; NVB; ICAS; NSB Public Works Department
	Identify and evaluate the development feasibility for unused or underutilized properties that are already connected to the water and sewer system. Identify vacant and underutilized properties, structures and areas that have the potential for redevelopment.	NSB Planning Department; NSB Public Works Department
	Create a program that specifically addresses unoccupiable structures and vacant restricted lots to increase the housing stock that facilitates resolution of probate issues.	NSB Mayor's Office; NSB Planning Department; NSB Assessing Division
	Establish policies that maximize valuable infrastructure current and proposed.	NSB Planning Department; NSB Law Department
Encourage community collaboration on future development.	Encourage interagency cooperative efforts through combined agency master planning	NSB; NVB; ICAS; City of Barrow; NSBSD; Iḷisaġvik College; TNHA; UIC; ASNA
	Establish multi-lateral stakeholder groups to resolve property ownership and agency transfers of property ownership.	
	Consider consolidating NSB Administrative Offices to maximize efficiency and free up facilities for other uses.	NSB Mayor's Office
	Relocate the NSB Wildlife Management Department to facilitate improved coordination and research opportunities with BARC.	NSB Wildlife Department

19.0 IMPLEMENTATION AND PLAN REVISION

19.1 Implementing the Comprehensive Plan

The purpose of this implementation chapter is to provide direction and a process for implementing the plan and for continued community planning. The plan is the community's guide for all stakeholders, including residents and local governmental entities, in making decisions regarding land use and revitalization of old Barrow, economic development, capital facilities and infrastructure improvements, among others.

Plan implementation includes the following tools:

- Subdivision regulations and the zoning ordinance, NSBMC Titles 18 and 19. Ideally, zoning and subdivision ordinances implement the vision and goals of a comprehensive plan.
- The NSB 6 Year Plan and NSB Repair and Replacement Schedule can guide essential infrastructure investments in transportation, water and sewer facilities and other improvements;
- NSB Planning Commission, Barrow Zoning Commission and Assembly and City of Barrow City Council; and
- Partnerships among NVB, UIC, NSBSD, ASNA, TNHA, other stakeholder groups, citizens and the borough government.

The most important method of implementing any plan, including the Barrow Comprehensive Plan, is a day-to-day commitment by elected and appointed officials, NSB and City staff members and Barrow residents. The comprehensive plan should be referenced in planning studies and planning staff reports as well as informal discussion situations.

Additionally, this and any comprehensive plan must be evaluated to ensure that its goals and strategies continue to reflect changing community needs and attitudes. Barrow's comprehensive plan will likely require modifications and refinements to be kept current. Some strategies may be unworkable given changing circumstances and new solutions may emerge. These should be incorporated when conducting a regular plan review and update. The review and update could also include recent accomplishments, implementation obstacles and identification and recommendations for action over the next review period including reassessing priorities.

19.2 Capital Project Planning

19.2.1 Potential Capital Project Needs

The Community Planning Options presented in Chapter 17 provide a path for future development. Additionally, Appendix B provides a sequencing of capital projects to implement the preferred future development scenario. This section provides anticipated capital needs in Barrow outside of the future development scenario presented in this plan. The anticipated capital needs are based on the NSB 6 Year Plan projections, stakeholder meetings and research.

Table 53 Potential Capital Project Needs Over a 5, 10 and 20 Year Period

Project Type	1 - 5 Years	6 – 10 Years	11 – 20 Years
Education	Ipalook School upgrades	Barrow High School major renovations and addition	NSBSD Central Office renovation or consolidation of office space
	Hopson Middle School upgrades	New Ilisagvik Campus	
	New Kiita facility or relocation	Residential learning center	
		Additional teacher housing and renovation of existing housing	
Erosion and Flooding	Coastal erosion mitigation that may include pump station 4 protection; tower installation in existing manhole to raise access; revetment construction; fill Tasigrook Lagoon to protect Upper Isatkoak Lagoon	Additional coastal erosion mitigation measures as needed	Additional coastal erosion mitigation measures as needed
Water	Continued maintenance and construction of new water and sewer system as needed	Continued maintenance and construction of new water and sewer system as needed	Continued maintenance and construction of new water and sewer system as needed
		Redundant water source analysis	Redundant water treatment plant and distribution system
Sewer	Continued maintenance and construction of new sewer collection lines	Continued maintenance and construction of new sewer collection lines	Continued maintenance and construction of new sewer collection lines
Energy	Evaluation of expanded capacity of distribution / feeder lines	Expansion of distribution / feeder lines as needed	Expansion of distribution / feeder lines as needed
		Redundant power source analysis	Redundant power plant
Roads	Construction of Tom Gordon Expressway / Uivaqsaagiaq Road	Road expansions for new residential development	Road expansions for new residential development
	Yugit Street extension	Nunavaak Road upgrade	Ahkovak Street relocation in front of airport
	Laura Madison Road extension		
Transit	Improved transit system including expanded service and GPS notification		
Housing	Residential housing development	Residential housing development	Residential housing development
	Hospital staff housing		

Recreation Facilities	Expanded recreation opportunities for youth and families	Expanded recreation opportunities for youth and families	Expanded recreation opportunities for youth and families
Natural Gas	Walakpa Gas Field Generators		
	Redundant gas supply line analysis and construction		
Fuel	Marine header and pipeline relocation analysis and construction	Fuel Farm relocation to access gravel resources underneath.	
Facilities	New NSB Wildlife Department facility	NSB Consolidated Admin Facility	Inupiat Heritage Center expansion and renovation
	Daycare facilities	Coast Guard facility	Justice center / jail facility
	New BUS Warm Storage building	Port development analysis	Port development
	Shop II Wash Bay Building	CYS replacement or expansion	Substance abuse treatment center
	12-plex housing upgrades and renovations		Mental health facility
			Homeless Shelter
			Long term care facility
			Traditional center that would accommodate several hundred people.
Emergency Services	NSB Police Department facility repairs/upgrade	New NSB Police Station	New Cakeeater Road fire station and regional fire training center
	Search and Rescue hangar expansion and upgrade		
Landfill	Thermal oxidation system upgrade		Development a new landfill cell
	Development a new landfill cell		
Communications	Fiber optic land connections		
Airport			New or expansion of terminal

19.2.2 Potential Funding Sources for Capital Projects

General obligation bonds have historically been the primary funding source for North Slope Borough capital projects. As NSB funding and bond capabilities decline, it becomes increasingly important that the Barrow community identify other sources of funding for capital projects. The funding that would be needed to implement the capital projects identified in this plan are greater than the North Slope Borough capital program can absorb. Capital project funding would also need to be secured from federal and state sources. Many of these funding sources are

competitive. Demonstrating support for specific capital projects through a comprehensive plan such as this one demonstrates to potential funders that the community has completed a thorough process to identify future improvements.

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21.0 APPENDICES

21.1 Appendix A: Strengths, Weaknesses, Opportunities & Threats Workshops

On July 7 and 8, 2014, Barrow residents were invited to the City of Barrow Council Chambers to participate in a public information meeting for the Barrow Comprehensive Plan. In addition to providing updates on the plan and presenting a model of potential future development scenarios, four Strengths, Weaknesses, Opportunities and Threats (SWOT) workshops were held to better understand the issues that matter most to the Barrow residents. Below is the lists created at each of the four SWOT exercises.

SWOT Workshop July 7, 2014 at 3pm

Strengths

- Cleaning up older sections of Barrow and urban renewal
- Traditional family / multi-generational knowledge and sharing
- Oil and gas revenue
- Community will volunteer in all emergencies
- Wide range of traditional and institutional knowledge
- Tribal sovereignty - able to exercise power, land use
- RAB (Restoration Advisory Board) and longevity planning
- Elder knowledge
- Protection of traditional sites and ongoing program development
- Iñupiat values
- Iñupiat language

Weaknesses

- Development encroaches on wildlife
- Lack of communication between multiple agencies regarding restricted properties
- There has been a change to traditional subsistence routes due to land use expansion
- Lack of housing
- Lack of communication
- Lack of youth activities
- Lack of emergency preparedness - no infrastructure and need more equipment for new threats - marine, fire oil spill, S&R
- Actual plan is not well defined for emergency response
- Lack of infrastructure implemented by industry
- Permit process weak (possible NSBMC revision)
- Difficult to monitor boundaries that we place on the permits approved - industry misleads actual work planned
- Funding sources
- Aging infrastructure/facilities areawide
- Lack of retention of training - scarcity of trained individuals
- Planning and capacity for need infrastructure

- Need to include publicity for this comprehensive plan
- Emergency planning committee - members don't recognize importance of roles (homeland security and biological threats)
- No shallow water harbor
- No spill response
- No customs / harbor master
- Historical trauma

Opportunities

- Landowners have opportunity to relocate (erosion)
- Change to traditional routes
- Public trails
- Work together - multiple organizations
- Northwest passage
- Youth activities
- Strong community response
- Increased international arctic coordination
- Oil and gas development will increase consumer goods, reduce cost
- Revise Title 18 and 19
- Strengthen tribal sovereignty for land development
- Opportunity to build / expand training opportunities
- Renewable energy
- Opportunity to plan and discuss risks
- Better technology is available for new additions and expansion
- Restoration Advisory Board - increased opportunity for planning and increases to land availability
- Transporting goods with increased maritime traffic
- Shallow water harbor
- Centralized educational facilities
- Correcting historical trauma

Threats

- Beach erosion
- Climate change/infrastructure
- Increased industry
- Road construction
- Northwest passage - not prepared for increased traffic
- Emergency response
- Offshore development
- Road connection to the rest of Alaska and increased traffic
- Health risks from exposure to oil and gas development activities
- International visitors without customs

- Emergencies such as breach of international boundary, biological agents being introduced into the community

SWOT Workshop July 7, 2014 at 7pm

Strengths

- Opportunity to communicate with potential industry with each other, encourages team work
- Willingness to work together
- Inupiat values
- New technology available
- Natural gas reserve

Weaknesses

- AC's non-complete clause
- Lack of available land
- UIC - first right of refusal
- Lack of private business
- High cost of materials/freight
- Lack of stake holder interaction
- Lack of youth activities - bowling alley, mall, movie theater, water park, off-road track
- High cost of liability (parents can assume risk) hinders business opportunities
- Snow machines trails run thru residential areas
- Lack of housing - residential, industry
- Public transportation with gaps

Opportunities

- Private business can be encouraged
- Room for youth activities can be part of the plan
- Support economic diversity
- Open communication can reduce costs and improve efficiency
- New facilities can be built-snow, skate, biking, trails, shooting range, track/field, archery, shooting range, group trails
- Culturally influenced tourism
- Blending of traditional and cultural w new transplant residents
- Renewable energy

Threats

- Coastal erosion
- Liability risks
- Lack of housing

SWOT Workshop July 8, 2014 at 3pm

Strengths

- Top of the world location
- Birding / wildlife as a tourism attraction
- Ilisagvik
- No road access
- Barrow is land of opportunity, especially financially
- Inupiaq culture / family / friends focus
- Tourism

Weaknesses

- 4 wheeler tundra damage (regular trails are worn out; new routes are being established)
- Lack of freight / transportation options (competition)
- Lack of cohesion at the airport
- Lack of commercial / industrial buildings
- Lack of detox and rehab center
- Lack of juvenile and adult detention center
- Dust (roads)
- SBS closing
- No outside road connections
- Lack of requirements for infrastructure including internet and power through permitting process with oil and gas development
- Internet access
- Housing
- Limited commerce into barrow
- Cost of maintaining assets and infrastructure
- Lack of housing contractor
- Fragmented tourism infrastructure
- No customs or federal presence, especially USCG

Opportunities

- Better subsistence access (2 bridges)
- City of Barrow land south of airport developed for industrial use
- City of Barrow shooting range
- Combined recreational activity center (indoors)
- Tourism
- Chamber of Commerce
- Economic development potential for reindeer herding, tanning, canning
- Revenue from alcohol sales in Barrow
- Road hardening and/or asphalt
- New economic opportunities such as hardware store
- Fiber optics

- Housing expansion
- Better communication and working together with State of Alaska and industry especially in planning stages
- Natural gas infrastructure planning with gas line combining efforts for local communities
- NSB revenue from increases oil and gas activity and local employment

Threats

- Alcohol abuse issues from city run liquor store
- Lack of competition (airlines, freight, AC)
- Alaska airlines changes may not benefit residents
- Potential of road access
- Increased oil and gas activity - cultural / environmental impact
- Revenue impact if oil and gas activity decreases

SWOT Workshop July 8, 2014 at 7pm

Strengths

- Resourcefulness of people
- Willingness of residents to be trained and employed
- Responsiveness of Ilisagvik to change programs to meet employer needs
- Subsistence activity
- Traditional knowledge
- Iñupiat values
- Natural gas auto conversion kits available

Weaknesses

- Cost of liability
- Lack of recycling
- No scrap metal disposal
- High cost of freight
- Unemployment - especially for youth
- Homeless people a growing population
- Public comment too short
- Lack of meeting locations
- Lack of places to learn cultural diversity - for youth to learn about traditional ways
- Lack of supplemental water source
- Too many chemicals in drinking water
- Lack of public transportation
- Lack of housing

Opportunities

- Paddle boat - Recreational summer indoor/outdoor activities
- Turn snow piles into snow part

- Dirt bike/skate part
- If new water source identified would free up current water source for activities
- Back haul scrap metals and recycling
- New opportunities for jobs and training
- Build homeless shelter
- Marketing can be improved through this process
- Door prizes (gas card)
- Iñupiaq language learning center/cultural activities
- KBRW radio show for obtaining comment from public
- Greater advertise meeting for community events - advertise boards needed
- Find resources - sequence plans in a logical order - water - roads- power
- Supplemental water supply
- Increase public transportation with GPS
- CNG
- 4G fiber optics

Threats

- Erosion
- Oil spill
- Cruise ships
- Climate change
- Contamination of water supply
- Lack of housing

21.2 Appendix B: Adoption Ordinance and Resolutions

North Slope Borough Assembly Ordinance

North Slope Borough Planning Commission Resolution

Barrow City Council Resolution

Barrow Zoning Commission Resolution

Native Village of Barrow Resolution

Ukpeaġvik Inupiat Corporation Resolution

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Appendix B: North Slope Borough Assembly Ordinance

NORTH SLOPE BOROUGH
ORDINANCE SERIAL NO. 75-06-64

AN ORDINANCE ADOPTING THE UPDATED COMPREHENSIVE PLAN FOR BARROW, ALASKA

WHEREAS, pursuant to North Slope Borough Municipal Code of Ordinances (NSBMC) § 2.12.160(a)(l), the Planning Commission is charged with preparing a Comprehensive Plan consisting of maps and related texts, for the systematic development of the North Slope Borough (Borough) and making recommendations to the Assembly; and

WHEREAS, starting in 2014, members of the general public, Ilisagvik College, North Slope Borough School District, Ukpeagvik Inupiat Corporation, City of Barrow, Native Village of Barrow, the Barrow Zoning Commission, Arctic Slope Regional Corporation, and other stakeholders residing within the community of Barrow collaborated with the Borough to create the goals for outlining the Comprehensive Plan for Barrow; and

WHEREAS, the Borough tasked Bezek Durst & Seiser (BDS) and Umiaq LLC with assisting in the development of the Barrow Comprehensive Plan that met the requirements set forth under NSBMC § 2.12.170; and

WHEREAS, after a presentation to the Barrow Zoning Commission on August 14, 2014, the Barrow Zoning Commission adopted Resolution 2014-04 recommending the approval of the Barrow Comprehensive Plan on October 9, 2014; and

WHEREAS, after a presentation to the Native Village of Barrow on August 18, 2014, the Native Village of Barrow adopted Resolution 2014-12 recommending the approval of the Barrow Comprehensive Plan on September 15, 2014; and

WHEREAS, after a presentation to the City of Barrow on July 24, 2014, the City of Barrow adopted Resolution 34-2014 recommending the approval of the Barrow Comprehensive Plan on October 23, 2014; and

WHEREAS, after a receiving a presentation of the Barrow Comprehensive Plan on October 30, 2014, the Planning Commission adopted Resolution 2014-19 recommending the approval of the Barrow Comprehensive Plan on November 20, 2014; and

WHEREAS, pursuant to NSBMC § 2.12.160(a)(2), the Planning Commission is charged with preparing and recommending to the Assembly a zoning ordinance to implement the Comprehensive Plans.

NOW, THEREFORE, BE IT ENACTED:

SECTION 1. Classification. This ordinance is a non-code ordinance.

SECTION 2. Severability. If any provision of this ordinance or any application thereof to any person or circumstance is held invalid, the remainder of this ordinance and the application to other persons and circumstances shall not be affected thereby.

SECTION 3. Effectiveness. This code ordinance shall become effective upon adoption.

SECTION 4. Adoption of Comprehensive Plan. The Barrow Comprehensive Plan is hereby enacted as referenced in Exhibit B.

SECTION 5. Attachments Incorporated by Reference. Planning Resolution 2014-19, attached as Exhibit A, and the Barrow Comprehensive Plan, attached as Exhibit B, are hereby incorporated by reference.

INTRODUCED: February 04, 2015
ADOPTED: ~~March 03, 2015~~

F. D. O.

Forrest D. Olemaun, President
Date: 3-3-15

ATTEST:
Sheila H. Burke
Sheila H. Burke, Borough Clerk
Date: 3/3/2015

Rob O. for CB

Charlotte E. Brower, Mayor
Date: 3/3/15

Appendix B: North Slope Borough Planning Commission Resolution

NORTH SLOPE BOROUGH PLANNING COMMISSION
RESOLUTION 2014-19

A RESOLUTION RECOMMENDING TO THE ASSEMBLY APPROVAL OF THE BARROW COMPREHENSIVE PLAN 2015-2035

WHEREAS, the Planning Commission is charged under North Slope Borough Code of Ordinances 2.12.160 (a) with the responsibility to prepare and recommend to the Assembly a comprehensive plan (Plan) for the systematic development of the Borough; and

WHEREAS, the Planning Commission is further charged under North Slope Borough Code of Ordinances 18.20.020 to establish one or more districts using approved Village Comprehensive Plans as a guideline; and

WHEREAS, the Planning Commission is further charged under North Slope Borough Code of Ordinances 19.40.060 (A) (2) to ensure that the incorporated villages accommodate uses in accordance with both the Borough Comprehensive Plan and Comprehensive Development Plan for the community; and

WHEREAS, the Planning Commission is further charged under North Slope Borough Code of Ordinances 19.70.020 to follow policies intended to guide the approval of development and uses in the village districts consistently with the relevant adopted Village Comprehensive Plan, and

WHEREAS, the common goals of local control and self-determination, the protection of the land, water and subsistence resources, mitigation of the impacts which may occur as a result of oil and gas development, the maximization of economic benefits and employment opportunities for Barrow today and into the future are fully shared by all of the organizations working together on this project; and

WHEREAS, the Barrow Comprehensive Plan was developed with significant public involvement, including public meetings in Barrow, numerous meetings with stakeholders, and website solicitation for comments; and

WHEREAS, the Barrow Zoning Commission has reviewed the Plan and supports its recommendation by the Planning Commission under Barrow Zoning Resolution 2014-04; and

WHEREAS, The Native Village of Barrow has reviewed the Plan and supports its recommendation by the Planning Commission under Native Village of Barrow Resolution 2014-12; and

WHEREAS, The City of Barrow has reviewed the Plan and supports its recommendation by the Planning Commission under City of Barrow Resolution 34-2014; and

WHEREAS, Ukpeaġvik Iñupiat Corporation, the primary landowner implicated in the new development areas considered under the Plan, has reviewed this Plan and support its recommendation by the Planning Commission under UIC Resolution 2014-92; and

WHEREAS, the Barrow Comprehensive Plan was found to be sufficient to guide the future development of Barrow for the next 20 years.

NOW, THEREFORE, BE IT RESOLVED THAT:

The North Slope Borough Planning Commission adopts the Barrow Comprehensive Plan and recommends its approval to the North Slope Borough Mayor and the North Slope Borough Assembly.

THAT a copy of this Resolution be forwarded to the North Slope Borough Clerk.

INTRODUCED: November 20, 2014
ADOPTED: November 20, 2014

Daisy Sage, Clerk for
Date: 11/20/14

Paul Bodfish, Chairman for
Date: 11/20/14

Appendix B: Barrow City Council Resolution

CITY OF BARROW

"Farthest North Incorporated City"

RESOLUTION 34-2014

A RESOLUTION OF THE BARROW CITY COUNCIL FORMALLY SUPPORTING 2015-2035 BARROW COMPREHENSIVE PLAN DEVELOPED BY THE NORTH SLOPE BOROUGH

WHEREAS, the North Slope Borough Planning and Community Services Department has prepared a Final Draft Version of the Barrow Comprehensive Plan 2015-2035 dated August 2014 in consultation with BDS, Inc. and UMIAQ, LLC; and

WHEREAS, the Barrow Comprehensive Plan is a long-range planning document, the intent of which, is to assist the Barrow community in preparing for and managing its resources and providing for its residents over the next 20 years; and

WHEREAS, the City of Barrow is an integral partner in facilitating a planned and coordinated future for the residents of the City of Barrow; and

WHEREAS, the City of Barrow as a First Class City is charged with specific powers that relate directly to land use in Barrow that include but are not limited to recreation facilities and playgrounds, cemeteries, docks and harbors, as well as, the removal of abandoned vehicles and nuisances; and

WHEREAS, the City of Barrow seeks to proactively plan for future development in a coordinated manner utilizing a unified strategy for achieving goals on behalf of the community of Barrow; and

WHEREAS, the City of Barrow has reviewed the Final Draft Barrow Comprehensive Plan and has determined that it is an appropriate and effective guide for future development of Barrow for the next 20 years; and

WHEREAS, the Barrow City Council indicates that the Final Draft Barrow Comprehensive Plan should provide additionally for and include the following items:

1. Plan shall be further developed to address all the comments listed in Bezek Durst Seiser Letter to the North Slope Borough Community Development Planner dated September 23, 2014 from the following stakeholders; City of Barrow, Barrow Zoning Commission, and Ukpeagvik Inupiat Corporation;

2. Plan will include as an attachment under new *Appendix C - The City of Barrow 5-Year Strategic Plan dated September 15, 2014.*

NOW, THEREFORE, BE IT RESOLVED, that the Barrow City Council formally endorses and approves of the Final Draft 2015 - 2035 Barrow Comprehensive Plan developed by the North Slope Borough with the inclusion of the elements listed above.

PASSED AND APPROVED UNANIMOUSLY BY THE BARROW CITY COUNCIL ON THIS 23rd DAY OF OCTOBER, 2014.

Bob Harcharek, Mayor

Attest:



Lele Samuelu, City Clerk

Appendix B: Barrow Zoning Commission Resolution

NORTH SLOPE BOROUGH BARROW ZONING COMMISSION
RESOLUTION SERIAL NO. 2014-04

A RESOLUTION ADOPTING AND RECOMMENDING THE NORTH SLOPE BOROUGH PLANNING COMMISSION AND ASSEMBLY APPROVE THE 2014 BARROW COMPREHENSIVE PLAN

WHEREAS, the Barrow Zoning Commission is charged under North Slope Borough Municipal Code (NSBMC) § 19.30.060 (a) with adopting and recommending to the North Slope Borough Assembly a Comprehensive Plan for Barrow; and

WHEREAS, the Barrow Zoning Commission is further charged under the NSBMC § 19.30.020 with implementing the Comprehensive Development plan for Barrow; and

WHEREAS, the Barrow Zoning Commission is further charged under NSBMC § 19.30.060 with making recommendations to the Administrator and Assembly regarding rezonings, conditional uses, and other planning issues within Title 19 that rely upon the guidance of the Barrow Comprehensive Plan; and

WHEREAS, the Barrow Zoning Commission seeks to proactively plan for future development in Barrow in a coordinated manner utilizing a unified strategy for achieving goals on behalf of the community of Barrow; and

WHEREAS, the North Slope Borough, through its Department of Community Planning and Development (Planning Department), developed a Barrow Comprehensive Plan for the years 2014 to 2035, utilizing the services of Umiaq, LLC and Bezek Durst Seiser, Inc. (BDS).; and

WHEREAS, a final draft Comprehensive Plan for Barrow was submitted to interested parties on August 2014 and comments on the Plan were received until September 23, 2014; and

WHEREAS, on September 23, 2014, BDS submitted a letter to the Planning Department outlining requested modifications to the Barrow Comprehensive Plan, dated August 2014; and

WHEREAS, the Barrow Zoning Commission has reviewed the Barrow Comprehensive Plan, along with the submitted comments, and determines it is an appropriate and effective guide for future development in Barrow until 2035.

NOW, THEREFORE, BE IT RESOLVED THAT:

The Barrow Zoning Commission adopts the 2014 Barrow Comprehensive Plan, submitted by the North Slope Borough in August 2014 and modified by comments listed in the letter submitted by Bezerk Durst Seiser, Inc. on September 23, 2014, and recommends that the North Slope Borough Planning Commission and Assembly approve the Plan by ordinance.

INTRODUCED: October 9 2014
ADOPTED: October 9 2014

Chairman
Date: 10/9/2014

ATTEST:

Clerk
Date: 10/9/2014

Appendix B: Native Village of Barrow Resolution

NATIVE VILLAGE OF BARROW
IÑUPIAT TRADITIONAL GOVERNMENT

RESOLUTION 2014-12

A RESOLUTION OF THE NATIVE VILLAGE OF BARROW REGARDING THE 2014 BARROW COMPREHENSIVE PLAN DEVELOPED BY THE NORTH SLOPE BOROUGH FOR THE PERIOD 2015-2035

WHEREAS, the Native Village of Barrow is the federally listed and recognized tribal entity for the community of Barrow, and

WHEREAS, the Native Village of Barrow maintains consultation privileges as the respective tribe for the community of Barrow; and

WHEREAS, the common goals of local control and self-determination, the protection of the land, water and subsistence resources, mitigation of the negative impacts which may occur as a result of oil and gas development, the maximization of economic benefits and employment opportunities for Barrow today and into the future is fully shared by the tribal organization; and

WHEREAS, the Native Village of Barrow Tribal Council received a presentation of the Barrow Comprehensive Plan FINAL DRAFT by representatives of the North Slope Borough Planning Department and their consultants BDS Inc. and Umiaq LLC on August 18, 2014; and

WHEREAS, The Native Village of Barrow Tribal Council has reviewed the 2014 Barrow Comprehensive Plan document labeled FINAL DRAFT dated August 2014, as prepared by BDS Inc. and UMIAQ, LLC; and

WHEREAS, The 2014 Barrow Comprehensive Plan was found to be sufficient to guide the future development of Barrow for the next 20 years;

Exhibit language for modifying the body of the resolution that may be entertained during the Council's deliberation process of the original draft resolution language

WHEREAS, as an amendment, The Native Village of Barrow Tribal Council indicates as conditional approval that the Barrow Comprehensive Plan also provide for the following items;

- ***List amendment items here***

THEREFORE BE IT RESOLVED; that the Native Village of Barrow, as represented by the Tribal Council, recommends approval of the 2014 Barrow Comprehensive Plan by the North Slope Borough.

Adopted this 15th day, of September 2014.

APPROVED

Thomas Olemaun, President

Fannie Suvlu, Secretary

P.O. Box 1130 • Barrow, Alaska 99723 • Phone: (907) 852-4411 • Fax: (907) 852-8844

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Appendix B: Ukpeagvik Inupiat Corporation

UKPEAĠVIK IÑUPIAT CORPORATION

Resolution 2014-92
A Resolution In Support of the 2014 – 2035 Barrow Comprehensive Plan
Developed by the North Slope Borough

WHEREAS, Ukpeaġvik Iñupiat Corporation (UIC) is a for-profit village corporation created and established under the Alaska Native Claims Settlement Act of 1971; and

WHEREAS, UIC represents approximately 2,900 shareholders of record, many of which reside in the City of Barrow; and

WHEREAS, the common goals of local control and self-determination, the protection of the land, water and subsistence resources, mitigation of the negative impacts which may occur as a result of oil and gas development, the maximization of economic benefits and employment opportunities for Barrow today and into the future is fully shared by all Barrow stakeholders; and

WHEREAS, the North Slope Borough Planning and Community Services Department has prepared a Barrow Comprehensive Plan 2014 – 2035 dated August 2014 in consultation with BDS, Inc. and UMIAQ, LLC; and

WHEREAS, the Barrow Comprehensive Plan is a long-range document that assists the Barrow community in preparing for and managing its resources and providing for its residents over the next 20 years; and

WHEREAS, UIC is the primary landowner for new development and redevelopment areas within the community; and

WHEREAS, UIC seeks to proactively plan for future development in a coordinated manner utilizing a unified strategy for achieving goals on behalf of the community of Barrow; and

WHEREAS, the UIC is an integral partner in facilitating a planned and coordinated future for the residents of the City of Barrow; and

WHEREAS, the UIC has reviewed the Barrow Comprehensive Plan and has determined that it is an appropriate and effective guide for future development of Barrow for the next 20 years; and

WHEREAS, as an amendment UIC indicates that the Barrow Comprehensive Plan should also include the following items:

1. The draft Comprehensive Plan includes a brief narrative on contaminated sites. Given new federal funding for clean-up of contaminated wells, some further discussion should be included on the need for a contaminated sites remediation staging area and legacy wells within the NPR-A and Barrow Area of Influence.
2. The need for additional gravel resources in Barrow and across the North Slope is undeniable. To adequately plan for future development, the plan should more thoroughly consider how much gravel will be needed for future development. Two potential recommendations to facilitate gravel exploration and mining are 1) establishing a Mining Zoning District and 2) allowing mining by-right in the Conservation and/or Reserve Districts for community use.
3. A new master plan has been approved for the Wiley Post / Will Rogers Memorial Airport that will allow access to the airport from the south. The Barrow Comprehensive Plan should expound on potential development south of the airport, including the need for additional industrial facilities to support oil and gas development and the potential for an expanded United States Coast Guard presence. The Barrow Comprehensive Plan should also include in general how gas, electric, water, and sewer utilities will be served to the south airport industrial area including plans for all future necessary easements. UIC strongly suggests that an alternative Walakpa natural gas supply line should come up through the Emiksoun Road route. This alternative gas line will serve as the community's redundant natural gas supply line.
4. The Plan includes land use maps for Barrow, Browerville and South Barrow. Another should be included that illustrates land use at NARL.

NOW THEREFORE BE IT RESOLVED, that Ukpeaġvik Iñupiat Corporation supports the adoption of the Barrow Comprehensive Plan.

AND BE IT FURTHER RESOLVED, that Ukpeaġvik Iñupiat Corporation strongly urges that the draft Barrow Comprehensive Plan be amended to include the four items detailed above.

DULY APPROVED this 26th day of October, 2014, in Anchorage, Alaska, at a Special Meeting of the Ukpeaġvik Iñupiat Corporation Board of Directors.

Price E. Brower, Chairman

UKPEAGVIK INUPIAT CORPORATION CORPORATE SEAL 1973 BARROW ALASKA

ATTEST:

Richard Ungarook Sr., Corporate Secretary

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
Mayor's Office, Assembly and Clerks Office, Administration and Finance, CIPM, Health and Social Services Administration, Human Resources, Law, Planning and Community Services and Public Works Administration				
1	New Consolidated Office Facility		2018	A Draft PAR projects needs thru 2020. It estimates facility size at 72,000GSF (3 stories) on a site of 3.2 acres.
2	Repurposed NSB Admin Building #1274			The Comprehensive Plan selected planning option sees repurposing this facility for Ilisagvik College use along with the Nurses quarters on the old hospital site. Funding for Ilisagvik is assumed separate from NSB.
3	Repurposed CIPM/Public Works Building			This facility would be relocated to decongest the Barrow High School site and make room for Barrow High School expansions , parking and student drop off both parent and bus.
4	Repurposed Planning and Community Services Building #0251		2020	The Health Department would consider this building to be repurposed for a Homeless Center once the NSB consolidated facility is completed. NVB recently stated that it is establishing a homeless center.
5	Shipping and Receiving Warehouse# 1795			This facility will remain for its current purposes. It currently has a project to include an emergency response center.
NSB Health and Social Services				
Children's services				
1	Re-establish Browerville Daycare #1 - 44 children			As replacing the KITTA program in a new facility will take a period of time for design and construction, consideration should be given to building the first of two additional day cares and letting KITTA stay in the Browerville daycare structure until it can be more ideally sited. The end time frames are potentially the same under both scenarios with the later having a less disruptive result with better community placement for KITTA.
2	New Daycare #2 - 125 Children	1	2018	A PAR has been completed. It calls for a single day care for 249 children. The Comprehensive Plan suggests dividing this into two facilities to provide greater accessibility to different community centers.
3	New Daycare #3 - 125 Children		2020	See item 2 above
4	Children and Youth Services		2017	The Health Department states that this facility has two issues - size, and location. Assume that the facility doubles in bed count and assume a new facility. The current facility is 5,802 SF.
5	ITTC, Iñupiat Teens Taking Control			This is the old Matsutani building and although it is beyond its useful life its current function is not replaced in this Comp Plan.
Adult Services				
1	Pre Maternal Home		2025	This facility is currently run by ASNA. It is at 274 Pisokak. ASNA would ultimately like to reestablish this facility near the new hospital. The current facility appears to be +/-1,600 SF and could be returned to housing.
2	Substance Abuse Treatment Center		2019	The past Adult Substance Abuse Treatment Facility is now the Wellness Center. Health has indicated that a new center is needed.
3	Detox Facility			This does not appear to be in the Justice Center PAR for adults. Although the Justice center PAR provides for Juveniles it does not appear to provide for adults. Should detox be a function managed by the Police and staffed by the Health Department.
4	Mental Health			The Health Department sees this as a congregate facility vs. group homes. The Health Department sees it located near the new Hospital. Currently six persons are served with a need for 30 persons by 2035.

21.3 Appendix C: Barrow 2035 by Agency/Department (continued

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
5	AWIC			A New Facility specifically designed for this purpose is projected at a location near the new Police Station. The 12 Plex it is currently housed in would be returned to standard housing.
6	Homeless Center			Assumes some homeless may be families with children. The Health Department projects a need for 40 people by 2035. NVB reported that it is working on a Homeless shelter. When the NSB Consolidated facility is completed a number of facilities will be available for repurposing. The current Planning Department offices at 251 Pisokak might be repurposable as a homeless Center. it is 6,156SF. This analysis makes this assumption.
7	Dental Care			Located at new hospital and provided by ASNA
8	Eye Care			Currently being transferred to new Hospital. Service to be provided by ASNA
9	Wellness Center			Currently Public Health Nursing and the CHAP program are located in this Facility. These services may be transferred to ASNA in the future which would bring the use of this facility into question. As it has a kitchen it may also be a candidate for a Homeless Center.
10	Administration			Assume this function to be included in the NSB Consolidated Office facility.
	Senior Services			
1	Long Term Care/Skilled Nursing			This assumes that the long term care facility will be attached to the Hospital. It also assumes that ASNA would run it. Several other Rural Communities in Alaska have gone this way due to sharing staff with the hospital. Kotzebue has 18 beds connected to its hospital and the facility size is approximately 15,000 SF. Using this background information 30 beds in Barrow would require a +/- 25,000 SF facility. Kotzebue has double occupancy rooms.
2	Assisted Living			The current need is +/- 18. Need projected by 2035 at 50 beds
3	Independent living			The current need is 20 beds going to 50 beds by 2035
	Repurposed structures (housing/other)			
1	12 Plex # 4370			To be given to TNHA for repurposing as housing
2	12 Plex # 5200			To be given to TNHA for repurposing as housing
3	12 Plex # 5125 currently AWIC			To be given to TNHA for repurposing as housing
4	Existing CYS Facility # 2000			This facility could possibly be relocated and expanded on a new site.
	Public Works Department			
1	New Storage/Shop (Note: Items 1,2,3 and 4 may all be one facility)		2018	This is replacement for the current facility building # 3429
2	New and expanded Heavy Equipment Shop and Warehouse		2018	This is replacement for the current facilities building #'s 3427 and 3425
3	New and expanded Light Duty Service Shop		2018	This is replacement for the current facility building # 3431
4	New Mechanical Building/Fuel Division replacing old Bus Barn # 1685 / 1683.2		2018	This is replacement for the current facility building # 1685
5	Administration			Assume the Public Works administration is to be located in the new NSB Consolidated Facility.
6	Demolish/Interim Repurpose (erosion)DMS Storage/Shop # 3429		2035	As Public works shops are replaced the old facilities could be used by various NSB agencies for interim uses such as storage until such time that erosion causes demolition. Or one of the shops may make a satellite Public works equipment storage facility.
7	Demolish/Interim Repurpose (erosion) DMS Heavy Equipment Shop # 3427		2035	Same as Item 6
8	Demolish/Interim Repurpose (erosion) DMS Heavy Equipment Shop Warehouse # 3425		2035	Same as Item 6
9	Demolish/Interim Repurpose (erosion) DMS Light Duty Service Shop # 3431		2035	Same as Item 6

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
10	Demolish Mechanical Building # 1685		2035	
11	Perhaps repurpose. Public Works Building # 1689		2035	Assume worst case-relocate & repurpose back to housing
12	Shop III # xxx1.1			
13	Expanded Thermal Oxidation Facility Capacity			
14	New Landfill Cells			
15	*Road/ utility expansions*			
	1. Okpik St. to Uula St. extension with extension of Uula St. to Okpik St.		2017	Includes significant crossing at the upper end of the Upper Isatkoak Lagoon.
	2. Ahmaogak St. ext. to Okpik St. ext.		2019	
	3. Residential streets		2020	These streets are needed to support currently platted and proposed new residential lots. The following streets are included: Qaiyaan (4,000Lf), Kignak (4,400LF), Simic (2,300), Solomon (2,300LF), Aiken (2,300LF), Kaleak (2,300LF), Proposed streets A thru G (3,600LF). All of these streets require sewer, water, power and gas.
	4. Ogrook/Ahkovak Street repositioning		2020	Funded by the State of Alaska DOT.
	5. Uula St. from Okpik St. ext. around east and south sides of Airport		2025	This road project would primarily serve the proposed industrial area on the south side of the Airport and could possibly be funded by those interests.
	6. Okpik St. from Uula St. to Cakeeater road		2026	This road could have significance in sharing right of way for a gas line feeder to the south side of the airport.
	7. Uula St. from Boxer to Stevenson St.		2030	
	8. Residential Roads			
	9. Residential Roads			
16	Erosion Mitigation / coastal revetment		2017	This issue is just now going into a study and Design Phase. The cost would most probably be spread over several years.
17	Lower Isatkoak Lagoon Filling		2017	An earlier COE study suggested this as part of a mitigation solution.

Search and Rescue

1	New Facility planned for North side of airport		2015	A PAR is completed and Option 3 in that PAR was selected which is for an entirely new facility on the north side of the airport.
2	Repurpose Search and Rescue building # 1797A		2017	Risk Management would like to take over this facility when Search and Rescue get their new Facility. Risk Management needs a fast response storage space for supplies and equipment for emergency preparedness.

Fire

1	Fire Station #1 replacement and expansion		2018	This replacement / expansion will allow the new NSB Consolidated Facility to have the prominent site location if located on the old weather station site. Additionally it would allow the Fire station to better accommodate new equipment and possibly relocate the Fire Departments Administration functions adjoining the NSB Consolidated Facility.
2	New Fire Station # 3 combined with Training Center		2020	This facility will serve Cakeeater and NARL

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts		Priority / Target Year	Remarks
Police				
1	Justice Center			Information for this project comes from the Draft PAR dated 5-27-09. It is important to note that this PAR assumes multiple funding sources. This PAR includes Juvenile Substance Abuse. It includes 2 cells and nine treatment beds for Juveniles. Option 2 has been used. Other considerations would be the State Superior Court and Native Court to be co located.
2	Police Station		2018	Same as item 1
3	Jail		2025	Same as Item 1
4	Adolescent Substance Abuse Center		2025	Same as Item 1
5	Demolition of current Police Station and Quonset.		2019	It is assumed that the old police station would be demolished after replacement
Wildlife Management				
1	New Facility		2017	New Facility adjacent to BARC @ NARL currently in design.
BUECI				
1	Existing Power Plant Bldg. #1295G			This facility is to remain for its current purpose but due to age should have a condition survey to assess its needs from a foundation and building enclosure perspective
2	Relocation of BUECI Office Bldg.			This line item goes with repurposing the combined CO2 /Old Hospital/BUECI sites - see Community Plan Option 4
3	New Redundant Power Plant		2025	A new redundant power plant is proposed. Should anything happen to the existing plant the community would be in dire straights. Also considering demographic projections the community will be out of capacity by 2035. A redundant facility should be planned for community safety . BUECI said its generators are constantly upgraded and renewed such that generators are always on a new life cycle. This does not account for new technology. Also the condition of the existing facility and its foundations is unknown.
4	New Distribution Lines			Growth will require new distribution lines.
5	Redundant water source identification and development			The issue of redundancy in the interest of Community Safety was heavily discussed with the thought that a redundant water source would add to Community safety should something happen to contaminate the current water source.
6	Redundant water treatment facility			Demographic projections and water usage analysis indicate that capacity will be reached in 2035. Therefore, an approach may be to create a Redundant Water Treatment Facility.
7	Redundant water distribution facility			Same as item 7
8	New Water distribution			Demographic growth and current unmet housing needs will require additional water distribution.
9	Workout Bldg. #1295E			See item 2. Note: this building does not appear to be accounted for in the six year plan.
10	Tool Room			This may be the TSP building identified in the six year plan as BABS04.
11	Storage			This building is not accounted for in the six year plan.
12	Expanded Sewer pump stations			Same as item 9
13	New Wastewater Treatment Capacity			Same as item 9
14	New Sewer Collection Lines			Same as item 9
Natural Gas / Gas Fields				
East				
1	Unknown			
South				
1	Unknown			
Supply Line from Gas Fields				
1	New redundant gas supply line		2015	

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

NSBSD

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
1	New Consolidated Central Offices		2020	CIPM reported that a current PAR is not for consolidation of NSBSD offices in general but for renovations to the CO2 main structure building number 1849. This PAR was scheduled for completion in April 2014. In interviews over time with the SD there has been discussion of a more universal consolidation including offices in the Districts Central Facility building number 0829.
2	New Residential Learning Center		2020	The School District has stated that there are several concepts being explored. One of those concepts would only include housing and utilize Barrow High School and Ilisagvik educational spaces.
3	Renovations and Additions Barrow High School		2020	For this analysis we have combined the SD Six Year Plan PAR's for both Major Renovations and Multi Purpose room addition. The perspective is that a complete look at the function of the high school as a community facility (including community recreational uses) would be beneficial with a single project that is Phased. As a residential Learning Center is now a part of the greater picture it could also be studied in a new PAR.
4	New Kiita school		2020	The Kiita school currently occupies the old Browerville Day Care. The Mayor has indicated that she wants the Day Care Facility to return to its original purpose. The current facility occupies 10,021 SF and serves 50 students. The District projects the need thru 2035 at 70 students. Current PAR efforts are for an interim solution. That solution could be studied further based on opportunities described in the Comp Plan.
5	New Bus Barn		2018	This facility could be co located with new Public Works shops and can include SD warehousing.
6	New Warehouse		2018	Should the CO2 site be renewed this facility would either be relocated or replaced.
7	Repurposed School District Administration Building # 0829		2021	Repurpose use to be identified such as ICAS central office relocation
8	Relocated Duplex # 18949N		2019	To clear the CO2 site for alternative uses and renewal teacher housing should be replaced. Housing on the CO2 site could be put out to bid for removal. This could at the bidders choice be either demolished or relocated and restored. New multifamily housing for teachers, Search and Rescue, BUECI and residents at large would have to be constructed first. The city owns a site that could accommodate from 80 to 100 units of multi family housing that is conveniently located east of Block A. A Developer/City with lease agreements in hand could secure financing to construct such a project. A feasible completion date would be 2018.
9	Relocated six Plex # 1849L		2019	see Item 8 remarks
10	Demolished CO2 Offices #1849 except for old Gym Old gym to be restored as historical facility and Roller Rink function retained.		2019	Note this facility in the six year plan is called out as 36,738 GSF. Approximately 29,000sf of the facility would be demolished and the old gym +/- 7,000sf would be restored.
11	Relocated CO2 10 Plex # 1849A		2019	see item 8 remarks
12	Relocated CO 2 Duplex # 1849J		2019	see item 8 remarks
13	Relocated CO2 Duplex # 1849P		2019	see item 8 remarks
14	Relocated/Demolished and replaced CO2 Warehouse # 1849H		2019	see item 8 remarks
15	Relocated CO2 Duplex # 1849K		2019	see item 8 remarks
16	Relocated CO2 Four Plex 3 1849C		2019	see item 8 remarks
17	Relocated/Repurposed CO2 Grants # 1849D.1		2019	see item 8 remarks
18	Relocated/repurposed CO2 Grants # 1849D.2		2019	see item 8 remarks
19	Relocated CO2 Duplex # 1849R		2019	see item 8 remarks
20	Relocated CO2 Single Family # 1849I		2019	see item 8 remarks

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
21	Relocated CO2 Single Family #1849G		2019	see item 8 remarks
22	Relocated CO2 Duplex #1849B		2019	see item 8 remarks
23	Relocated CO2 Single Family #1849M		2019	see item 8 remarks
24	Demolished CO2 Utilidors #1849J		2019	
25	Demolish School District / Bus Barn # 1683.1		2019	Demolishing and replacing the SD bus barn and adjoining facility(s) will make room for Barrow High School expansion , parking and better parent & bus drop-off. Should a new Alaska Airlines terminals be constructed across from the High School and Ahkovak St. be relocated high school parking could serve as overflow parking for the Terminal as well.

Ilisagvik College

1	New Campus		2021	The space projects a site size of 8 acres - Rise Alaska January 24,2012 Space Program Study. The Comp Plan identifies four alternative sites.
2	Ilisagvik Browerville Center # 4493			This facility may become obsolete when the new campus is in place.

IHLC Museum (Inupiat History, Language and Culture) **and Tuzzy Library**

1	New PAR in progress			The NSB Six Year Plan indicates that an addition is being planned. If Ilisagvik were to move to a the new campus that included the Tuzzy library function would this current plan be relevant? The current facility is 26,966SF.
2	Tuzzy Library			Ilisagvik indicated that they just spent considerable dollars to upgrade this facility. The question is how does this function impact new campus plans? If new campus includes a library function will Tuzzy space become available for Museum expansion.

ICAS

1	ICAS Administrative Offices			ICAS wishes to move its offices into Barrow. There will be a number of structures up for repurposing should the NSB Consolidated Facility and or NSBSD Consolidated Facility be constructed.

NVB

1	Home Construction			NVB is pursuing the construction of 20 homes per Year using tribal funding sources.
2	IRR			NVB is able to access tribal moneys (IRR) for roads . They have contributed to local road projects in the past and will continue to do so.
3	Foster Care			NVB manages foster care for displaced Native children. More housing is needed to facilitate this option. The estimate by 2035 is 40 to 60 children. Should foster care not become more viable then an orphanage would be an alternative.
4	Repurposing Facilities			NVB might have opportunities for repurposed spaces when consolidated facilities are constructed.

ASNA

1	Long Term Care			Long Term Care/ Nursing Facility is a highly likely adjunct to the hospital and likely will need to share hospital staff and therefore be managed by ASNA. This is the case in similar size Facilities in Nome an Kotzebue.
2	Pre Natal Facility - ASNA runs the current facility			ASNA has indicated a desire to center health related services and facilities around the new Hospital. The NSB Health Department concurs.

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
3	Nurses/Staff Housing			Currently ASNA controls 84 housing units. They project their need thru 2035 at 100 units. The Nurses housing adjacent to the old hospital is relatively new but no longer in the most advantages location. ASNA occupies housing throughout the community in addition to Nurses quarters at the old Hospital site. In order to relinquish the Nurses housing at the old Hospital site ASNA will need that housing replaced at the New Hospital site.
4	Status of old hospital site			The condition of the old Hospital is unknown. ASNA plans on maintaining control of the old hospital site but expressed a willingness to work with other Stakeholders regards this site. ASNA has submitted paper work to gain control of the old hospital site.
5	Other Health Facilities			There is a current trend to have ASNA assumer and more of the services that are currently provided thru NSB Health Department.

TNHA

1	New Housing			Between NVB, TNHA and most recently UIC 800 to 900 housing units need to be developed thru 2035. A number of repurposed structures are likely to be freed up for return to housing. This element of the Comp Plan will require further study.

City of Barrow

1	Football Field			The City has expressed an interest in relocating the football field adjacent to Piuraaġvik.
2	Boat Harbor			Should UIC build a port, the Cities boat harbor could be affected.
3	Block A Housing			The City owns a large parcel of property East of Block A. One use for this property would be multi family housing. It is estimated that the site could accommodate 80 to 100 units. It is ideally located to severe a combination of users inclusive of teachers, search and rescue pilots, BUECI staff and tribal members at large.
4	Retail			The City in the past has looked for revenue sources to und its programs. Should the City and School district study their joined sites there may be a possibility for retail space on these joined sites.

UIC

1	Gravel Resource Development			reference 2.6.6 in this Comp Plan.
2	Extended Stay Facility			UIC envisions an extended stay facility in the vicinity of the new Hospital. This could free up some community housing from itinerant use.
3	Port/Harbor			UIC has visions of a port in either the North Salt Lagoon or Elson Lagoon. UIC plans on initiating studies for a port and the NSB has proposed a Port Authority to accommodate this vision.
4	Logistics Area -NARL			A possible repurposing of some areas of NARL.
5	Pre-Fab Housing Plant-NARL			Given the large projection of needed housing units over the next 20 years UIC is planning on implementing a pre fab housing manufacturing facility at NARL.
6	Iḷisaġvik College Option-NARL			UIC is interested in seeing Ilisagvik college stay at NARL. NARL is one of several options that the Comp Plan has documented for Ilisagvik.
7	Residential Learning Center Option-NARL			UIC is interested in accommodating the proposed Residential Learning Center at NARL. This is one of several Options for this proposed function captured in the Comp Plan.
8	Residential Housing-NARL			UIC has stated its intentions to remove older structures at NARL and to build new housing there that will be open to all residents seeking to purchase /lease housing.

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
9	Revitalization Building 360-NARL			Several tenants have indicated a desire to exit this structure due to age and technology. UIC indicates that this structure will continue in use and it is presumed that upgrades are in the future.
10	Traditional Center			UIC has expressed interest in building a Traditional Center for upwards to 300 people. They indicated that this would not be a gym type space.
11	Shell Oil Camp			UIC is building a pad in anticipation of oil development on the south side of the airport.
12	USCG Camp			See Shell Camp. UIC is planning its pad for both Shell and the USCG. Various stakeholders put the shell camp size at 400 persons and he USCG camp as a seasonal 50 persons.
13	Multi-Family Housing			UIC has not in the recent past build houses but their current stated interest in a housing manufacturing plant at NARL would suggest that is about to change. It is assumed that they will also pursue multi-family housing.
14	Commercial/Retail Mall			The community has asked for development of retail space in a Mall? Type structure including a food court, movie theater, bowling alley and small specialty shops.

ASRC

1	Resolution of damaged old Top of The World Hotel			
2	New Fuel Farm			ASRC pointed out that the current fuel farm sits on the remaining gravel resource and likely will need to be moved and expanded. No new site is known at this time.
3	Relocate Existing Gas Station			ASRC is planning on relocating it's current gas station and adding one more. Locations to be determined.
4	New Second Gas Station			
5	Arts Colony			
6	New Top of the World hotel			ASRC has competed construction of a new Hotel In Browerville. They are also converting the old Brower Café to a tourist artist shop with additional artist studios in adjacent structures.
7	Commercial/Retail Mall			Unknown. ASRC is another stakeholder that could answer the desire for a mall.

State of Alaska

1	Airport			Airport planning for oil impacts and new aircraft is completed. DOTPF has stated that no new airport properties are needed. The States Master plan includes moving Ogrook/Ahkovak St. street between Kiogak street to Okpik street North on a narrow bank of land it controls to ease traffic congestion on that street. UIC has indicated that Alaska airlines wants a new terminal.

National Guard

1	Relocation Existing Facility			To free up the CO2 site for repurposing of this valuable property this facility needs to be relocated.

Coast Guard

1	Camp-Oil Development			see remarks under UIC
2	Hanger			

21.3 Appendix C: Barrow 2035 by Agency/Department

This is a beginning list of projects to be sequenced/prioritized

	Infrastructure Projected Impacts	Priority	Target Year	Remarks
Navy				
1	Unknown			The Navy sold the NARL site to UIC some years back. The Navy still owns 500 acres north and east of the Middle Salt Lagoon and south of Imikpuk Lake. It was reported that UIC was trying to acquire this property. This property could be important to Barrow beyond 2035 for housing. The Navy maintains control of the old NARL airstrip that runs parallel to the North Salt Lagoon and a Hanger structure that is at the North end. Given increased interest in the Northwest Passage Navy plans in the area could change. The City of Barrow has been discussing the acquisition of the hangarand runway with the Department of the Navy for the past five years.
1	Unknown			The Air Force also has a hanger at the North end of the old NARL airstrip. The air force indicated that the US is far behind other countries along the Northwest Passage. Although there is no identifiable air force impact presently the importance of the Northwest Passage would indicate possible Air force presence in Barrow in the future.
Alaska Airlines				
1	New Terminal			UIC indicated that there is discussion of putting it on the Southside of the airport meaning that literally everyone would require land transportation to reach even Barrow proper. Currently that means around the west end of the airport. The question is would it not be better to expand the terminal on the north side and move Ogrook/Ahkovak street north?? The Comp Plan is suggesting a new terminal location on the north side across from the High School. This area appears to be designated for tie down which could happen in other locations.
2	Unknown			
ARMY				
1	Unknown			
NOAA				
1	Unknown			

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21.4 Appendix D: City of Barrow 5 Year Strategic Plan

City of Barrow

5 Year Strategic Plan

September 15, 2014

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

Dear Citizens:

The City of Barrow Administration have prepared the attached 5 Year Strategic Plan. The document contains goals, objectives and strategies for the City of Barrow to pursue in the coming years.

The key elements of the City of Barrow 5 Year Strategic Plan are its goals, objectives, and strategies. Goals are general achievements that the City wishes to accomplish in the future. Objectives are specific and achievable statements in support of a goal. Strategies are task-oriented events that lead to an assignment and timeframe.

The goals, objectives and strategies in this document are recommendations subject to the public input at the October 3, 2014 Barrow City Council Meeting. This document will be part of the Barrow Comprehensive Plan, and attached as an addendum.

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

City of Barrow

MISSION STATEMENT

The City of Barrow is dedicated to providing the highest achievable standard of public service to all who live, visit, or work in Barrow by:

1) Promoting parks, trails, and recreational facilities and programs;
2) Developing more diverse economic activities, capitalizing on Barrow's location as a regional hub for transportation, education, healthcare, government services, telecommunications and potential hydrocarbon development;
3) Protecting, enhancing and preserving cultural and subsistence resources;
4) Diligently performing cemetery maintenance and burial functions with the highest duty of care for the bereaved, the deceased, and the community;
5) Protecting free and enjoyable access to oceans, waves and beaches for all people, through conservation, activism, research and education; and
6) Providing exemplary customer and public service.

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

CITY MAYOR
Bob Harcharek
TERM: 10/2013 – 10/2016

CITY COUNCIL

Seat A
Frederick Brower
Term: 10/2013 - 10/2016

Seat B
Fannie Suvlu
Term: 10/2013 - 10/2016

Seat C
Rebecca Brower
Term: 10/2012 – 10/2015

Seat D
Vincent Paul Nageak III
Term: 10/2012 - 10/2015

Seat E
George Olemaun
Term: 10/2011 - 10/2014

Seat F
Qaiyaan Harcharek
Term: 10/2011 – 10/2014

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

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21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

Goal 1: Increase Non-Grant Funded Revenues

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Develop alternative means of generating revenue from alcohol sales	Acquire or renovate a facility to be converted into an alcohol sales facility	City Mayor's Office, Finance Department	Project Manager, Finance Director, Mayor	September 1, 2015
Perform a property and sales tax analysis for potential earnings and facilitate rate increases	Compare with Economic Impact Assistance from NSB	Finance Department	Finance Director	July 1, 2015
Provide municipal run recreation activity fees	Develop an appropriate fee schedule for City sponsored recreation activities and rentals of City Facilities	Finance Department, Recreation Department	Finance Director, Recreation Director, Grants Administrator, Mayor	January 1, 2015
Development and promotion of current land assets to supplement all city activities	• New lease agreements • Land sales • Capital Improvement Projects	Mayor's Office	Mayor, Special Assistant to the Mayor	January 1, 2015
Increase donations from local, State and national organizations for City sponsored community activities	Submit donation letters to local agencies, oil companies and national granting entities	Mayor's Office, Recreation Department, Finance Department	Mayor, Finance Director, Recreation Director	January 1, 2015

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

Goal 2: Increase Funding for Capital Improvements

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Secure funding to acquire or renovate an alcohol sales facility	• Apply for local, state, and federal funding opportunities to help construct the facility	City Mayor's Office, Finance Department	Project Manager, Finance Director, Grants Administrator	September 1, 2015
Secure funding to construct Phase III, the final construction phase, of the Piuraaġvik Addition	• PR Campaign for Piuraaġvik Addition • Secure grant funding, major donor, and foundation funding	Finance Department, Mayor's Office	Finance Director, Grants Administrator Project Manager	April 1, 2016
Secure funding to construct a Municipal run recreation shooting range	Apply for FNRA grant funding	Finance Department, Recreation Department	Finance Director, Grants Administrator, Project Manager	April 1, 2015
Secure funding to upgrade facilities at Piuraaġvik to provide a movie theater	Apply for local, state, and federal grant funding opportunities to secure funding	Finance Department, Recreation Department	Finance Director, Recreation Director, Grants Administrator	September 1, 2015
Secure funding to conduct a feasibility study for a Sports Complex	Apply for local, state, and federal grant funding opportunities to help fund the study	Finance Department	Finance Director, Grants Administrator, Project Manager	June 1, 2019

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

Goal 3: Increase Economic Development

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Create economic development opportunities for residents of Barrow	• Research strategies for attracting new industries and investment • Develop activities for Barrow to increase its viability as a hub for the NSB • Support local residents with training programs through the Eben Hopson Memorial Scholarship Program • Work with local agencies to develop a Chamber of Commerce • Develop strategies to promote tourism activities • Support regional businesses	Finance Department, Administration Department	Finance Director, Mayor, Special Assistant to the Mayor	September 1, 2016

Goal 4: Enhance the Quality of Life for Barrow Residents

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Increase healthy community efforts	• Partner with local organizations such as NVB, NSB, ASNA, and ICAS to develop and implement healthy community initiatives • Provide activities that promote healthy lifestyles and support public health initiatives • Provide activities for youth	Recreation Department	Recreation Director	July 1, 2015
Launch a program to beautify Barrow	• Collaborate with local entities to beautify Barrow • Impound Abandoned Vehicles • Provide trash clean-up crew services during the summer months	Maintenance Department	Maintenance Supervisor	July 1, 2015

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

Goal 5: Increase Recreation Opportunities for All User Groups

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Develop recreational opportunities and facilities to meet future needs	• Coordinate with NSBSD and Ilisagvik College to provide increased recreational activities • Promote regional recreation events and competitions • Complete Piuraaġvik Recreation Center Addition	Recreation Department	Recreation Director	December 30, 2016

Goal 6: Develop Quality and Affordable Housing

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Assist local agencies to provide housing for local residents	• Coordinate with TNHA, NSB, NVB, and other various local agencies to provide housing opportunities to local residents • Encourage areas for multi-family housing	• Mayor's Office	Mayor, Special Assistant to the Mayor, Finance Director	September 1, 2016

21.4 Appendix D: City of Barrow 5 Year Strategic Plan (continued)

Goal 7: Guide the Use of Land to Provide Community Growth

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Develop a management plan for all city properties	• Establish guidelines for managing city cemeteries • Promote development of vacant lots	Mayor's Office, Maintenance Department	Maintenance Supervisor, Mayor	July 1, 2016

Goal 8: Preserve Barrow's Cultural and Subsistence Resources

Objectives	Strategies/Policies	Implementing Department	Position Responsible	Implementation Date
Identify means to strengthen and preserve the Inupiaq culture	• Support efforts of the Heritage Center • Protect subsistence use areas • Support local arts and crafts • Participate in planning meetings to help guide development away from areas that will have an adverse impact.	Mayor's Office	Mayor, Special Assistant to the Mayor	July 1, 2015

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Appendix E: BDS Letter to North Slope Borough

BDS

Bezek Durst Seiser
3330 C Street, Suite 200
Anchorage, Alaska 99503
T (907) 562-6076 F (907) 562-6635
www.bdsak.com

September 23, 2014

Robert Shears, Community Development Planner
North Slope Borough
Department of Planning & Community Services
1250A Eben Hopson Street
Barrow, AK 99723

RE: **Barrow Comprehensive Plan Comments**

Dear Bob,

The following changes have been suggested from the City of Barrow, Barrow Zoning Commission and Ukpeaġvik Iñupiat Corporation. The page numbers provided here are from the final draft (not necessarily the page number cited from the commenters). *Italicized* text indicates the suggested changes.

City of Barrow Requested Revisions

1. Including the City of Barrow logo has been requested. (the City's logo along with other community stakeholders will be added before the plan is finalized)

2. Add the City of Barrow in the Acknowledgements, including the Mayor, City Council members, finance director and grants administrator. (This is already done. We apologize for the oversight)

3. Page 100, Section 7.6 Gravel, first bullet.
   The plan currently reads: "SKW operates a pit located at the southwest end of the airport." The City of Barrow is requesting that it read: "SKW operates a pit *on land owned by the City of Barrow* and located at the southwest end of the airport."

4. Page 100.
   The City of Barrow is suggesting to change the second bullet under 7.6 Gravel from "UIC operates a pit four miles south of Barrow located off of Eastfield Road near the landfill" to "UIC operates a pit four miles south*east* of Barrow located off of Eastfield Road near the landfill. The City is suggesting the same

change in the second paragraph, second sentence that currently reads "It is located about four miles south of Barrow and is accessed from Eastfield Road" and would be changed to "It is located about four miles south*east* of Barrow and is accessed from Eastfield Road."

5. Page 104, Figure 21.
   The City is requesting that City-owned property be indicated on the map. [Adding landfill locations to this map may provide additional clarity].

6. Page 131, Section 10.3.4 Subsistence Boating.
   The City suggests adding text to the second paragraph, third sentence. It currently reads: "A new boat launch, dock, and breakwater are being constructed in the northeast corner of the North Salt Lagoon and are expected to be completed in the summer of 2014." The City changes would be: "A new boat launch, dock, and breakwater *have been constructed* in the northeast corner of the North Salt Lagoon *and has been operating since* summer of 2014. *The dock was constructed with NPR-A grant funds and is owned and maintained by the City of Barrow*."

7. Page 135, Section 11.0 Recreational Facilities.
   Remove football field from the last sentence because it erroneously states that it is managed by the City of Barrow. Replace with "The City of Barrow manages the greatest share of recreational needs in Barrow, including Piuraaġvik, the roller rink and baseball fields*. The NSBSD manages the football field.*"

8. Page 135, Section 11.1 Piuraaġvik.
   The City suggests changing "The Piuraaġvik Recreation Center was originally constructed in 1984 and is currently undergoing a renovation and expansion" to "The Piuraaġvik Recreation Center was originally constructed in 1984. *A renovation was completed in 2010; an expansion began in 2011. Currently, another $13 million is needed to complete the work*."

9. Page 136, Section 11.4 Playgrounds.
   The City suggests changes to playground information. The suggested changes had already been made for the final draft.

10. Page 135, Section 11.5 Aquatics.
    The City suggests changing "there is not an aquatics center in Barrow but there is a pool available for public use during non-school hours" to "there is not an aquatics center in Barrow but there is a*n indoor* pool *at the Barrow High School that is* available for public use during non-school hours. *During the summer months, the BHS pool is open for the community use and is operated as part of the City of Barrow Recreation Department Programs.*"

11. Page 171, 16.1.4 City of Barrow.

The text currently reads "The City of Barrow owns over 50 acres of land." The City has requested that this changed to "The City of Barrow owns over *200* acres of land *mostly zoned as industrial. Additional land acquisition is underway."*

12. Page 198, 17.2 Option 4 - Consolidated Plan, 3. Area C has three sub areas.
    Currently, the text reads: "Sub Area 1 is a potentially contiguous site that combines Ipalook Elementary School, Piuraaġvik, Barrow High School, a segment of Okpik Street, the CYS facility, KBRW, the North Slope Borough School District maintenance facility and an area currently occupied by the School District bus barn and Public Works Fuel Division." The City suggests changing this text to: "Sub Area 1 is a potentially contiguous site that combines Ipalook Elementary School, *Barrow City Hall, City of Barrow-owned Tupikpuk (ice hockey facility), softball field,* Piuraaġvik, Barrow High School, a segment of Okpik Street, the CYS facility, KBRW, the North Slope Borough School District maintenance facility and an area currently occupied by the School District bus barn and Public Works Fuel Division."

13. The City suggests that it be added as an implementing entity to the following strategies:
    - Page 228: Objective "Enhance coordination between stakeholders on activities related to the natural environment and resources of the Barrow area" and strategy "Include the numerous stakeholders and research when making land use decisions."

    - Page 231: Objective: "Coordinate related activities among North Slope Borough departments and other governmental agencies" and strategy "Coordinate public facility planning with public safety providers (police, fire, search and rescue) to ensure capability to respond to hazard-related situations. Assess impacts of capital facility locations on emergency response capabilities."

    - Page 232: Objective "Ensure that demographics accurately reflect the Barrow community" and strategies 1) "Evaluate trends in population changes, including how changes relate to the borough budget, with and without oil and gas development" and 2) "Provide educational information to Barrow residents about the importance of participating in the U.S. Census."

    - Page 233: Goal 7 "Understand the complexities of the housing Issues in Barrow and coordinate planning activities." Add the City of Barrow to every under this goal.

    - Page 240: Strategies 1) "Set and maintain a schedule to review the NSB Comprehensive Transportation Plan and the Native Village of Barrow Long Range Transportation Plan every two years and update as needed"; 2) "Prioritize transportation projects that receive funding from sources other than the NSB"; 3) "Consider future transportation needs that may include: developing a safer connection at the east end of airport property to the south side of the airport; road

connections between the hospital and the Search & Rescue facility; docking/port facility; industry airport needs."

- Page 271, Navy.
  The City of Barrow suggests adding the following text to the Remarks column under the Navy heading: "The City of Barrow has been discussing the acquisition of the hangar and runway with the Department of Navy for the past five years."

- The City has requested that its Capital Recreation Plan be included in the Appendix of the Barrow Comprehensive Plan.

Barrow Zoning Commission Requested Revisions

1. Pages 86 - 87, 7.3 Natural Gas.
   Energy is profiled as relatively inexpensive due to the NSB subsidies. For real energy costs, try using amortized costs that include NSB exploration drilling and development.

2. Page 89, Figure 17, Gas Utilities.
   Add producing wells not shown: East Barrow Gas Field well #14; Walakpa wells #3, 4, 5, 6, 7, 8, 9, 10; South Barrow Gas Field, various wells. Otherwise there is undue emphasis on recent wells.

3. Page 171, 16.1.3 North Slope Borough.
   The land ownership is not correct. The NSB shares subsurface rights with the federal government, not with ASRC and UIC (except for a weird situation in the three townships outside the map area that are owned by ASRC).

4. Missing in this study (and maybe it is a standalone document yet to be made).
   Someone has told the document authors that we "have enough" natural gas. This may not be a valid assumption. The rest of the document does a great job of forecasting demand of things like water (gallons), power (mw), sewer, etc. But it does not do this for gas. Going forward, how can we sustain any growth?
   a) Deliverability. How much gas is produced per day, per year in the scenarios?
   b) Reserves. How much gas do we have? How long will it last given the scenarios?
   c) Conservation. What happens if we conserve more? Less? Mid-range?

Ukpeaġvik Iñupiat Corporation Suggested Revisions (*tenative)*

1. The draft Comprehensive Plan includes a brief narrative on contaminated sites. Given new federal funding for clean-up of contaminated wells, some further discussion should be included on the need for

a contaminated sites remediation staging area and legacy wells within the NPR-A and Barrow Area of Influence.

2. The need for additional gravel resources in Barrow and across the North Slope is undeniable. To adequately plan for future development, the plan should more thoroughly consider how much gravel will be needed for future development. Two potential recommendations to facilitate gravel exploration and mining are 1) establishing a Mining Zoning District and 2) allowing mining by-right in the Conservation and/or Reserve Districts for community use.

3. A new master plan has been approved for the Wiley Post / Will Rogers Memorial Airport that will allow access to the airport from the south. The draft Comprehensive Plan should expound on potential development south of the airport, including the need for additional industrial facilities to support oil and gas development and the potential for an expanded United States Coast Guard presence.

4. The Plan includes land use maps for Barrow, Browerville and South Barrow. Another should be included that illustrates land use at NARL.

Native Village of Barrow - no suggested changes

Sincerely,



Victor Valenote, AIA, LEED AP
Principal
Bezek Durst Seiser

cc: Bob Bezek, BDS
Erika Green, UMIAQ

FINAL
March 2016

Land Use Control Plan

Former Distant Early Warning (DEW) Line Station, Point McIntyre, Alaska

Department of the Navy
Naval Facilities Engineering Command Northwest
1101 Tautog Circle, Suite 203
Silverdale, Washington 98315-1101



CONTRACT N62470-13-D-8007
TASK ORDER JP02

FINAL
LAND USE CONTROL PLAN

FORMER DISTANT EARLY WARNING LINE STATION
POINT MCINTYRE, ALASKA

PREPARED BY:

TETRA TECH EC, INC.

DCN: 4659-JP02-16-0081

MARCH 2016

DOCUMENT IDENTIFICATION

Document Title:	Final Land Use Control Plan Former DEW Line Station
Location:	Point McIntyre, Alaska
Delivery Order No.:	JP02
Document Control No.:	4659-JP02-16-0081
Document Coverage:	This document presents the procedures for implementing the institutional and engineering controls required at the former Distant Early Warning Line Station at Point McIntyre, Alaska. This land use control plan was completed as part of U.S. Navy Contract No. N62470-13-D-8007, Task Order JP02 for Naval Facilities Engineering Command Northwest.
Organization Title: Address:	Naval Facilities Engineering Command Northwest 1101 Tautog Circle Silverdale, Washington 98315
Prime Contractor: Address:	Tetra Tech EC, Inc. (TtEC) 19803 North Creek Parkway Bothell, Washington 98011 (425) 482-7600
Navy Remedial Project Manager:	Kendra Leibman
TtEC Program Manager:	Carl Tippmann
TtEC Project Manager:	Andrew Schmeising

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APPENDICES

Appendix A Excavation Notification Form

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ABBREVIATIONS AND ACRONYMS

AAC	*Alaska Administrative Code*
ADEC	Alaska Department of Environmental Conservation
BP	British Petroleum
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DEW	Distant Early Warning
IC	institutional controls
LUC	land use control
LUCP	Land Use Control Plan
Navy	U.S. Navy
NAVFAC	Naval Facilities Engineering Command
PCMP	Post-Construction Monitoring Plan
ROD	Record of Decision
TtEC	Tetra Tech EC, Inc.

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1.0 INTRODUCTION

This Land Use Control Plan (LUCP) describes the procedures for implementing the institutional and engineering controls required by the Record of Decision (ROD) for the U.S. Navy's (Navy's) former Distant Early Warning (DEW) Line Station at Point McIntyre, Alaska. Figure 1-1 shows the general vicinity of the Point McIntyre site and the site map, and Figure 1-2 shows the site plan with descriptions of the pertinent site features. The property is owned by the Bureau of Land Management and managed by the Navy pursuant to Public Land Order 3780.

The Navy and the Alaska Department of Environmental Conservation (ADEC) are in the process of executing the ROD (Navy 2012a). The ROD selects land use controls (LUCs) as a component of the remedy and generally identifies the LUCs. The purpose of this LUCP is to provide more specificity regarding LUCs and to document how the Navy will support the continuation of LUCs if the property is transferred from Navy management.

LUCs include both engineering and institutional controls. Engineering controls encompass a variety of engineered remedies to contain and/or reduce contamination and/or limit access to property by the use of physical barriers. In contrast, institutional controls (ICs) are a variety of legal devices imposed to ensure that the engineering controls stay in place.

LUC requirements to be implemented will be the following:

- Excavation restrictions at the Freezeback Landfill to protect the cover of the Freezeback Landfill
- Inspection and monitoring requirements of thermistors at the Freezeback Landfill to verify that contents remain frozen
- Groundwater use restrictions at the former Eroding Landfill area to prohibit the use of seasonal groundwater
- Maintenance of signage
- Protection of site control monuments used to locate groundwater sampling points in the area of the remediated former Eroding Landfill area, reference points for inspection photographs, and survey control points for periodic surface mapping to monitor site erosion
- Administrative controls to prohibit use of airstrip by implementing a notice to airmen
- Restrictions to limit use of the property and provision in conveyance documents allowing the Navy property access to manage the LUCs at this site if the Government disposes of the property

Some requirements and procedures described in this LUCP overlap with those described in the Post-Construction Monitoring Plan (PCMP) (Navy 2015b). The post-construction activities at

the former DEW Line Station involve site inspections, aerial surveying, protection of control monuments (including groundwater monitoring location monuments, photographic location monuments and survey control points), groundwater monitoring, and monitoring of the temperatures of the Freezeback Landfill. Inspections and reporting under both this LUCP and the PCMP will be necessary to ensure the continued protectiveness of the remedy. Where these plans overlap, the Navy will combine inspection and reporting requirements that satisfy both plans.

The land use control restrictions prescribed herein are recorded and maintained at the Naval Facilities Engineering Command (NAVFAC) Northwest office in Silverdale, Washington.

1.1 DEFINITION OF LAND USE CONTROLS

The term "land use control" means "any restriction or administrative action, including engineering and institutional controls, arising from the need to reduce risk to human health and the environment" (Navy 2003).

The Department of Defense further clarifies the meaning of land use controls as follows:

> LUCs include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to property, such as fences or signs. The legal mechanisms used for LUCs are generally the same as those used for institutional controls (ICs) as discussed in the National Contingency Plan. ICs are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting or other existing land use management systems that may be used to ensure compliance with use restrictions (U.S. Department of Defense 2001).

1.2 CONTENTS AND USE OF THE LUCP

The LUCP contains the following:

- Description of current land users and uses
- Description of the LUCs for the former DEW Line Station at Point McIntyre
- Post-construction maps of the Freezeback Landfill and former Eroding Landfill, listing the applicable LUCs (Figures 1-3 and 1-4)

- Identification of LUC requirements and a designation of roles and responsibilities for meeting these requirements
- Description of the mechanisms that will be used by the Navy to meet the LUC requirements
- Schedule and process for inspecting and reporting ongoing compliance with LUC requirements

This LUCP is to be used as a reference for Navy personnel responsible for implementing and maintaining the LUC requirements. This LUCP may be updated when facilities require additional or different LUCs than currently described herein.

1.3 RESPONSIBILITIES

As the lead agency, the Navy is responsible for ensuring the effectiveness of the LUCs until the presence of hazardous substances has been reduced to allow unrestricted land use. To implement these LUCs, the Navy will:

- Assign a LUC point of contact responsible for implementing, maintaining, monitoring, and enforcing land use controls
- Secure funding to support LUC management
- Notify ADEC prior to any changes in the health risk estimates for the site, changes to the remedy, or changes to land use (including any LUC failures and proposed corrective action)
- Consult with ADEC at least 30 days prior to making substantive changes to the LUC Implementation Plan
- Notify ADEC prior to any conveyance of property subject to LUCs, including federal-to-federal transfers

The commanding officer will designate Navy environmental personnel to implement this LUCP.

Each of the identified LUCs must be continued should the property be transferred prior to cessation of LUC requirements by the Navy and ADEC.

1.4 INSPECTIONS AND REPORTING

The Navy will put the land restrictions into the LUC database for environmental restoration inspection accountability. The Navy's LUC tracking tool is referred to as the LUC tracker. The LUC tracker is an application used to track LUC information, notify stakeholders when inspections are due, track the status and completion of these inspections, and provide a search tool for data mining and information retrieval.

The Navy will perform an annual inspection of the former DEW Line Station at Point McIntyre, Alaska in accordance with the PCMP (Navy 2015b). The findings of the inspection will be

discussed and evaluated in a report forwarded to ADEC within 90 days of the inspection. The frequency of future inspections may be modified, subject to approval by ADEC. The LUC monitoring report, at a minimum, will contain the following:

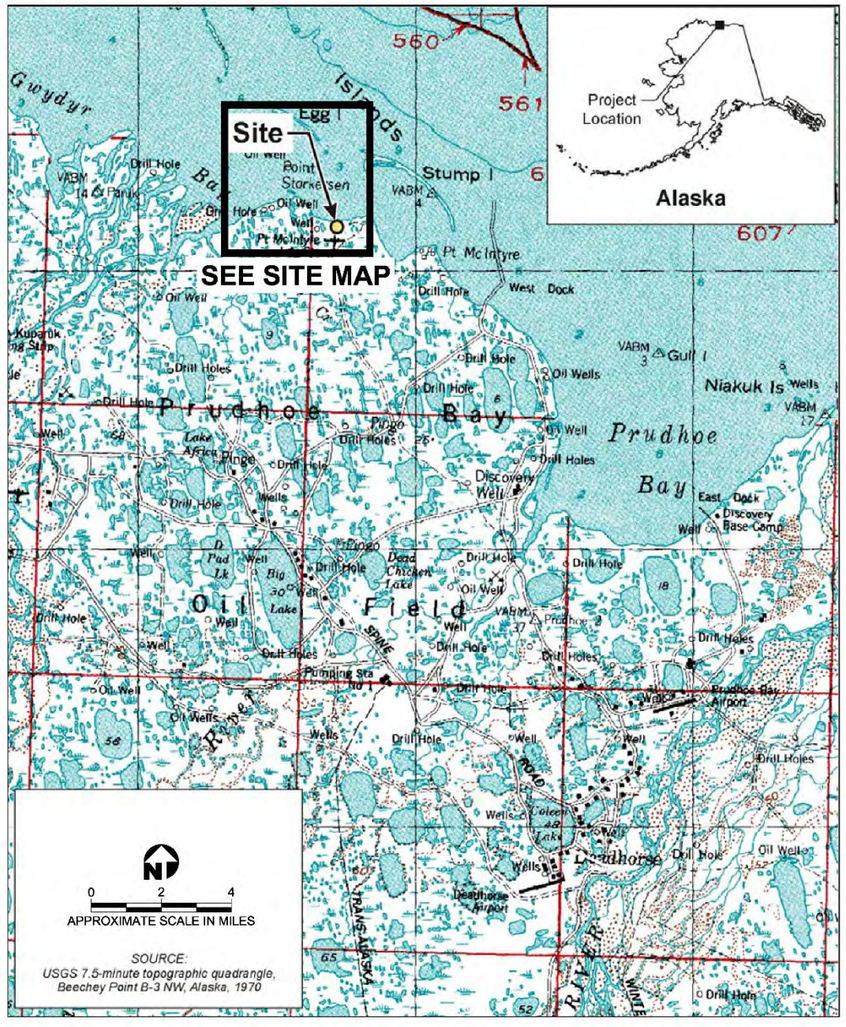
- A description of how the remedial measures are meeting the site-wide LUC requirements
- A description of how the remedial measures are meeting the site-specific objectives, results of visual field inspections of all areas including the Freezeback Landfill, former Eroding Landfill, and groundwater conditions
- An evaluation of whether or not all the site-wide LUC requirements are being met
- A description of any deficiencies and what efforts or measures have been or will be taken to correct problems

Inspections will include field inspection, document review, and review of administrative controls in place, such as the current land use, any new land users, status of restrictions, security and any past request or authorization of excavation at the site. Land use by unauthorized users will be documented if evidence exists of such use.

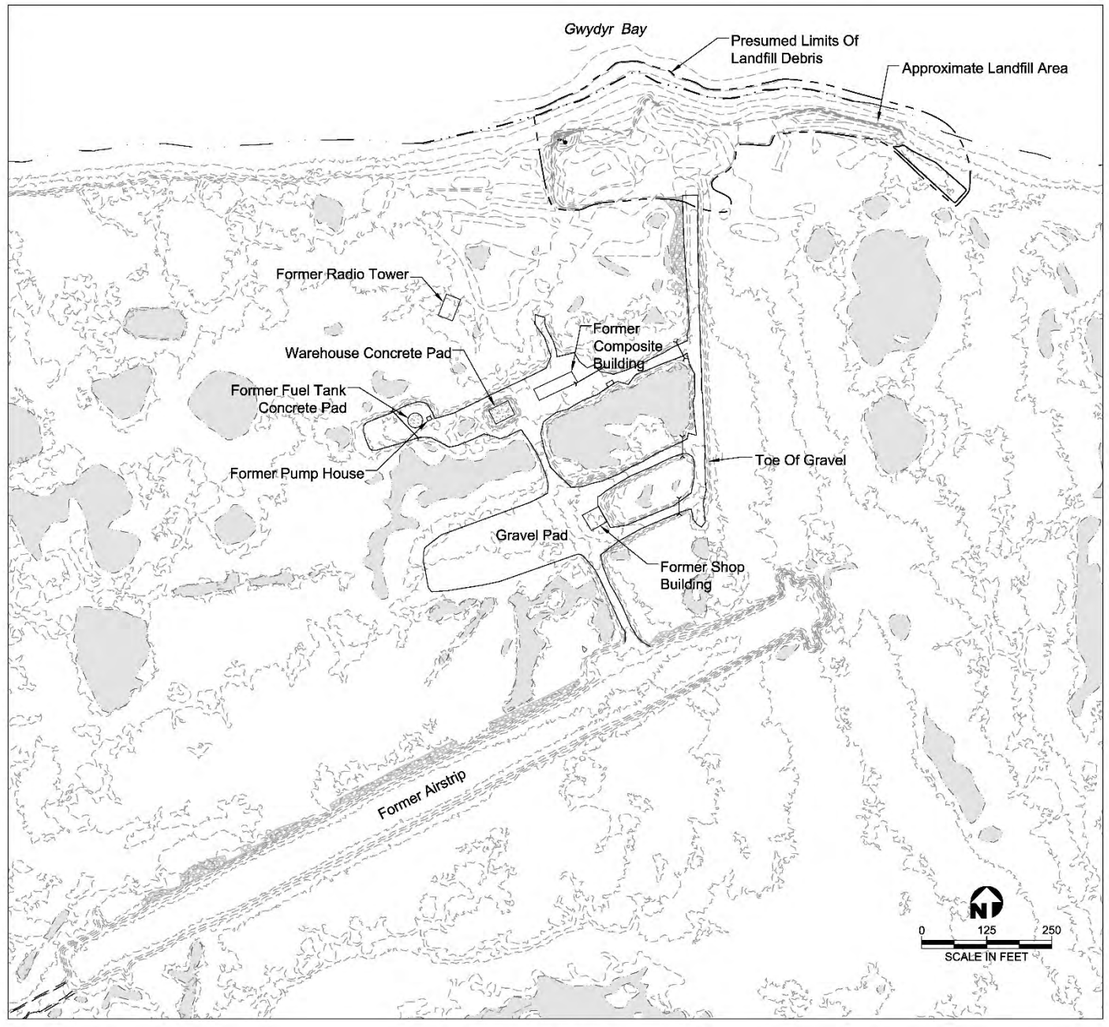
The Navy will notify ADEC immediately, but no later than 30 working days, after discovery of any activity or condition that is inconsistent with the site-specific LUC objectives, use restrictions, or any activity that may interfere with the effectiveness of the LUCs. The Navy will work together with ADEC to determine a plan of action to rectify the situation should it occur and will notify ADEC regarding how the issue(s) has been addressed within 30 working days of addressing the activity with ADEC. The Navy will also identify what went wrong with the LUC process, evaluate how to correct the process to avoid future problems, and implement these changes after consulting with ADEC.

The post-construction monitoring inspections will begin 1 year after completion of construction and continue on an annual basis for years 2 through 5. Assuming acceptable monitoring results and ADEC approval, inspections will continue at 5-year intervals thereafter. The requirement for these inspections will end when the Navy and ADEC determine that inspections are no longer needed as a component of the selected remedy to maintain the protectiveness of the remedy. In addition to the annual reports, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 5-year review process will be used to evaluate the effectiveness of the LUCs.

The government will notify ADEC 6 months prior to any transfer, sale, or lease of any property to a federal or non-federal party that is subject to LUCs required by the ROD. The purpose of the notification is to allow ADEC to be included in transfer discussions to ensure that appropriate provisions to maintain the effectiveness of the LUCs are included in conveyance documents. At a minimum, the Navy will notify ADEC of any proposed transfer within 60 working days of the proposed transfer and provide ADEC a copy of the conveyance documents.



LOCATION MAP

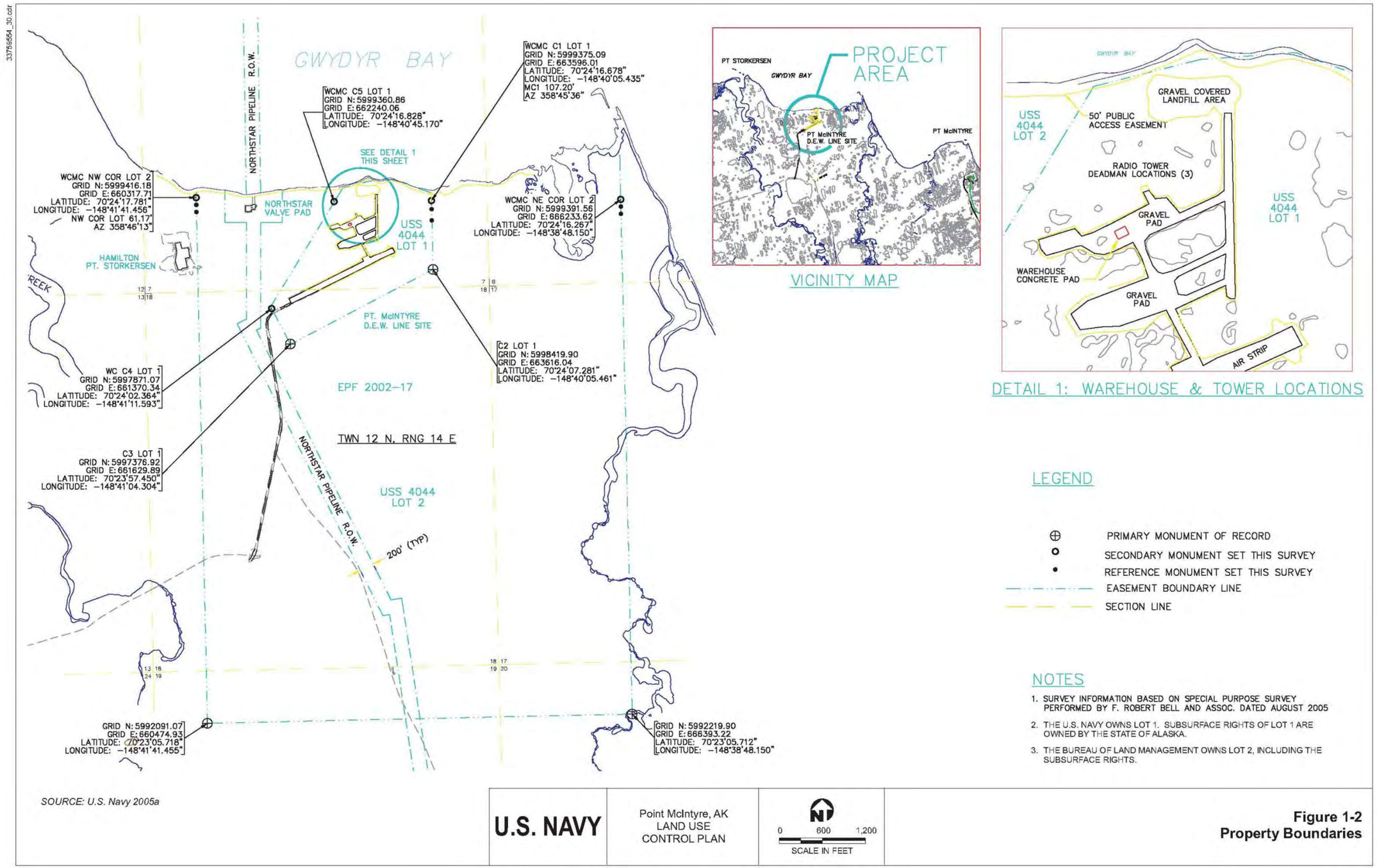


SITE MAP

U.S. NAVY	Delivery Order 0008 Point McIntyre, AK LAND USE CONTROL PLAN	Scale as Shown	**Figure 1-1** **Point McIntyre Location Map**

T:\NAVY\Point McIntyre, AK\SubTasks\DO 8\LUCP\Fig 1-1 Site.dwg
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33755554_30.cdr
GWYDYR BAY
NORTHSTAR PIPELINE R.O.W.
WCMC C5 LOT 1
GRID N: 5999360.86
GRID E: 662240.06
LATITUDE: 70°24'16.828"
LONGITUDE: −148°40'45.170"
SEE DETAIL 1 THIS SHEET
WCMC C1 LOT 1
GRID N: 5999375.09
GRID E: 663596.01
LATITUDE: 70°24'16.678"
LONGITUDE: −148°40'05.435"
MC1 107.20'
AZ 358°45'36"
WCMC NW COR LOT 2
GRID N: 5999416.18
GRID E: 660317.71
LATITUDE: 70°24'17.781"
LONGITUDE: −148°41'41.456"
NW COR LOT 61.17'
AZ 358°46'13"
NORTHSTAR VALVE PAD
USS 4044 LOT 1
WCMC NE COR LOT 2
GRID N: 5999391.56
GRID E: 666233.62
LATITUDE: 70°24'16.267"
LONGITUDE: −148°38'48.150"
HAMILTON PT. STORKERSEN
PT. McINTYRE D.E.W. LINE SITE
C2 LOT 1
GRID N: 5998419.90
GRID E: 663616.04
LATITUDE: 70°24'07.281"
LONGITUDE: −148°40'05.461"
WC C4 LOT 1
GRID N: 5997871.07
GRID E: 661370.34
LATITUDE: 70°24'02.364"
LONGITUDE: −148°41'11.593"
EPF 2002−17
TWN 12 N, RNG 14 E
C3 LOT 1
GRID N: 5997376.92
GRID E: 661629.89
LATITUDE: 70°23'57.450"
LONGITUDE: −148°41'04.304"
NORTHSTAR PIPELINE R.O.W.
USS 4044 LOT 2
200' (TYP)
GRID N: 5992091.07
GRID E: 660474.93
LATITUDE: 70°23'05.718"
LONGITUDE: −148°41'41.455"
GRID N: 5992219.90
GRID E: 666393.22
LATITUDE: 70°23'05.712"
LONGITUDE: −148°38'48.150"
PT STORKERSEN
GWYDYR BAY
PROJECT AREA
PT McINTYRE D.E.W. LINE SITE
PT McINTYRE
VICINITY MAP
GWYDYR BAY
GRAVEL COVERED LANDFILL AREA
USS 4044 LOT 2
50' PUBLIC ACCESS EASEMENT
RADIO TOWER DEADMAN LOCATIONS (3)
USS 4044 LOT 1
GRAVEL PAD
WAREHOUSE CONCRETE PAD
GRAVEL PAD
AIR STRIP
DETAIL 1: WAREHOUSE & TOWER LOCATIONS
LEGEND
PRIMARY MONUMENT OF RECORD
SECONDARY MONUMENT SET THIS SURVEY
REFERENCE MONUMENT SET THIS SURVEY
EASEMENT BOUNDARY LINE
SECTION LINE
NOTES
1. SURVEY INFORMATION BASED ON SPECIAL PURPOSE SURVEY PERFORMED BY F. ROBERT BELL AND ASSOC. DATED AUGUST 2005
2. THE U.S. NAVY OWNS LOT 1. SUBSURFACE RIGHTS OF LOT 1 ARE OWNED BY THE STATE OF ALASKA.
3. THE BUREAU OF LAND MANAGEMENT OWNS LOT 2, INCLUDING THE SUBSURFACE RIGHTS.
SOURCE: U.S. Navy 2005a
U.S. NAVY
Point McIntyre, AK
LAND USE
CONTROL PLAN
0 600 1,200
SCALE IN FEET
Figure 1-2
Property Boundaries

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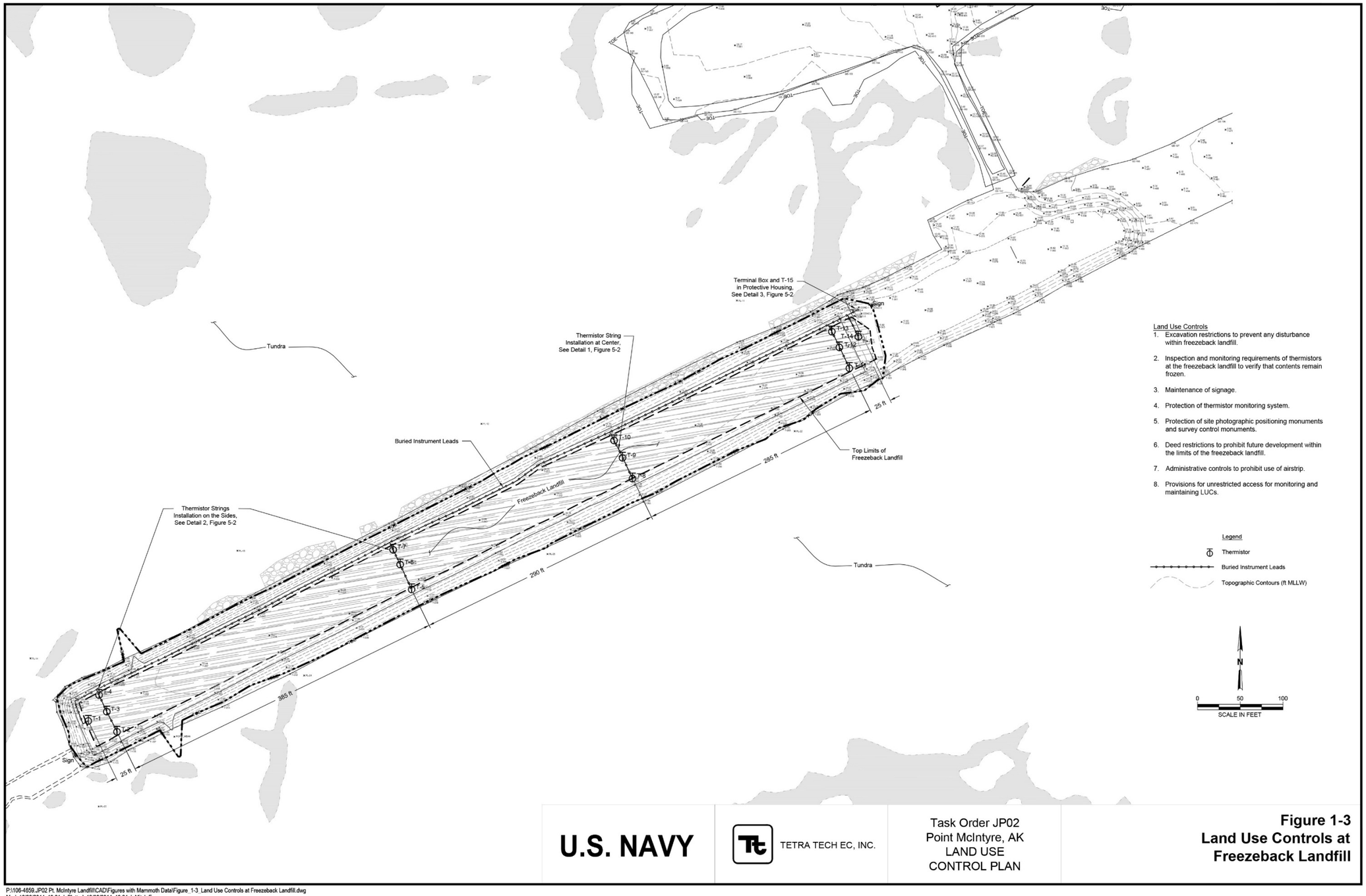
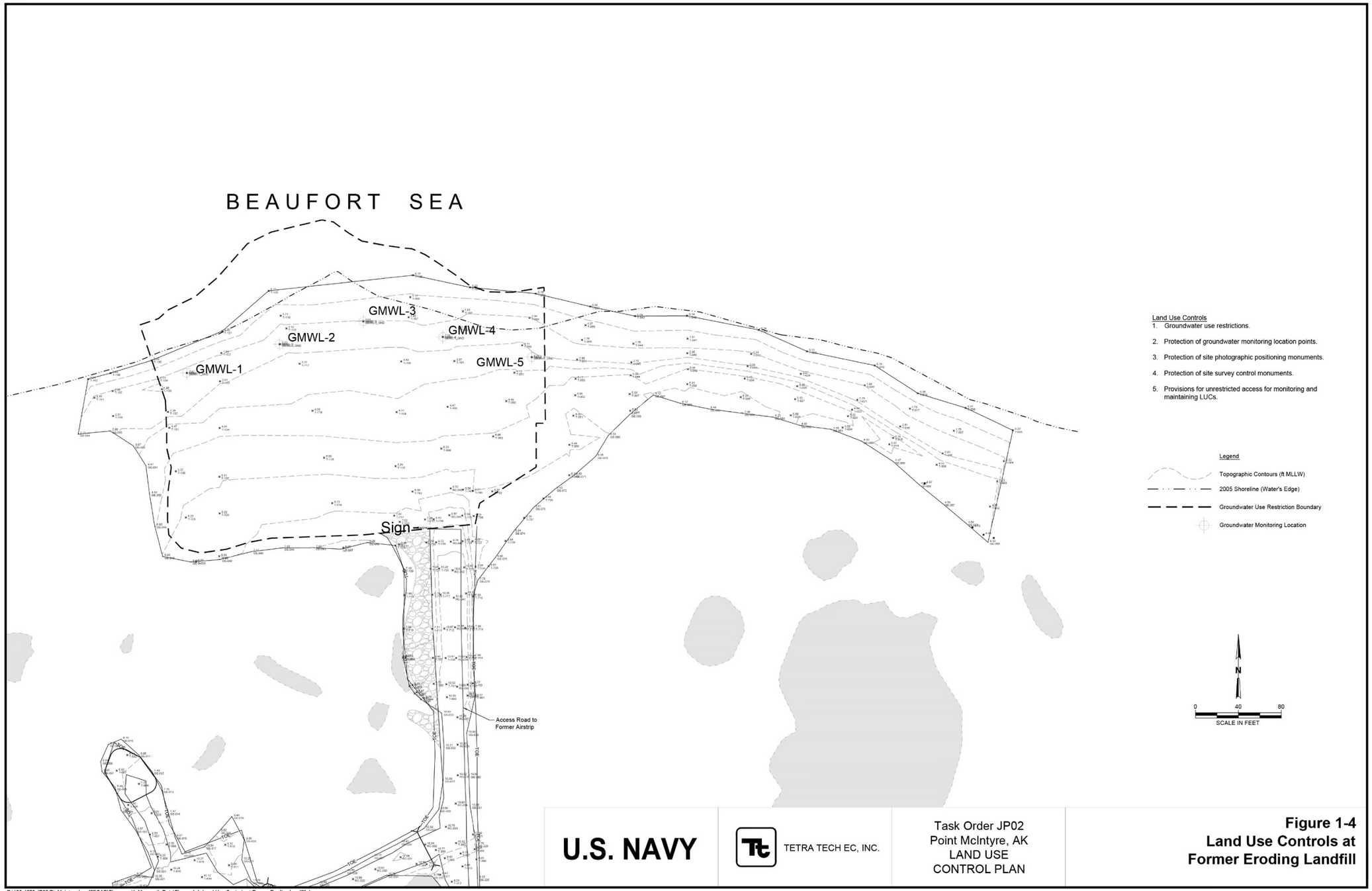


Figure 1-3
Land Use Controls at Freezeback Landfill

P:\106-4659.JP02 Pt. McIntyre Landfill\CAD\Figures with Mammoth Data\Figure_1-3_Land Use Controls at Freezeback Landfill.dwg
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BEAUFORT SEA
GMWL-1
GMWL-2
GMWL-3
GMWL-4
GMWL-5
Sign
Access Road to Former Airstrip
TOE
Land Use Controls
1. Groundwater use restrictions.
2. Protection of groundwater monitoring location points.
3. Protection of site photographic positioning monuments.
4. Protection of site survey control monuments.
5. Provisions for unrestricted access for monitoring and maintaining LUCs.
Legend
Topographic Contours (ft MLLW)
2005 Shoreline (Water's Edge)
Groundwater Use Restriction Boundary
Groundwater Monitoring Location
N
0
40
80
SCALE IN FEET
U.S. NAVY
TETRA TECH EC, INC.
Task Order JP02
Point McIntyre, AK
LAND USE
CONTROL PLAN
Figure 1-4
Land Use Controls at
Former Eroding Landfill
P:\106-4659_JP02 Pt. McIntyre Landfill\CAD\Figures with Mammoth Data\Figure_1-4_Land Use Controls at Former Eroding Landfill.dwg
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2.0 BACKGROUND AND FACILITY DESCRIPTION

The Point McIntyre site is located approximately 15 miles northwest of Deadhorse, Alaska (Figure 1-1). The Point McIntyre former DEW Line Station is within Lot 1 and covers approximately 65 acres (Figure 1-2). This site is not part of an operable unit, and there are no individual operable units at the Former DEW Line Station at Point McIntyre. Cleanup at all portions of the Former DEW Line Station, with the exception of the Eroding Landfill, were completed during remediation activities in 2004. Cleanup at the Eroding Landfill was completed during remediation activities in 2013 and 2014. Remediation activities are documented in the closure report for demolition and environmental cleanup (Navy 2005) and in After Action Reports for the 2013, 2014, and 2015 remediation activities (Navy 2014, 2015a, 2016).

During its operations period, the site was serviced by an unpaved airstrip and contained an active landfill along the coast of the Beaufort Sea (Figure 1-2). After activities at the site ceased, erosion along the northern boundary of the landfill had occurred as a result of wave action during storms. Evaluation of the site was accomplished through monitoring and inspections used in the development of a feasibility study and ROD. The Navy agreed to perform remedial actions at the site as a part of the ROD. The remedial action includes relocating the waste to the rarely used airstrip located greater than 1,000 feet landward and performing seasonal groundwater monitoring at the former Eroding Landfill location. The remediation activities were conducted in a manner that ensures that the cleanup of the hazardous and nonhazardous contaminated soil and debris meets the cleanup levels in the approved ROD for this site and that only nonhazardous materials remain at the site contained in a Freezeback Landfill.

Inspections and sampling events were conducted from 2004 through 2011 to support remedy alternatives evaluation and remedy design, and to monitor site conditions.

The remedial cleanup action included relocation of existing non-hazardous contaminated soils and landfill debris to a new landfill located within the air strip greater than 1,000 feet inland of the current shoreline. Containment of the materials is provided by inducing “freezeback” conditions in the new landfill by use of suitable cover and insulation. Thermistors were installed in the new landfill to monitor temperatures to verify that “freezeback” conditions are achieved and maintained. Materials exceeding allowable levels for placement in the Freezeback Landfill location were removed for off-site disposal at an acceptable hazardous waste disposal facility. Monitoring locations were established in the vicinity of the former Eroding Landfill location to monitor seasonal groundwater quality.

The excavated Eroding Landfill area has been capped with clean soil and was seeded, but no insulation or thermistors were installed in this area. Temporary monitoring points have been established in the vicinity of the excavated Eroding Landfill area. These locations will be monitored for groundwater quality until the chemical concentrations in seasonal groundwater no longer exceed the ADEC groundwater cleanup levels, and approval is obtained from ADEC to

terminate groundwater monitoring. No ICs relating to soil at the former Eroding Landfill area are currently planned. Impacted soil has been removed or covered with clean backfill.

Ecological risk associated with residual impacted soil is currently under evaluation. This statement refers to the residual soil contamination that was left in place above the cleanup levels in the former Eroding Landfill area. The Navy had to prioritize the decision units that were excavated toward the end of the field season due to time constraints in order to finish the Freezeback Landfill and backfill the shoreline area. The Navy and ADEC need to discuss the in-place waste characterization and confirmation data results to determine if further excavation is necessary, or if the levels remaining beneath the clean backfill do not pose a significant risk to human and ecological health.

The Point McIntyre remedial design (Navy 2012b) and remedial action After Action Reports (Navy 2014, 2015a, 2016) provide a more detailed description of the remedial cleanup action. Post-construction inspection and monitoring requirements are detailed in the PCMP (Navy 2015b) and involve site inspections, aerial surveying, inspection of control monuments (including groundwater monitoring location monuments, photographic location monuments, and survey control points), groundwater monitoring, and monitoring of the temperatures of the Freezeback Landfill.

3.0 CURRENT AND FUTURE LAND USE

3.1 CURRENT SITE HABITATION AND USE

There is currently no activity at the site. No structures remain at the site, and the site is uninhabited. No roads provide access to the site. Potential visitors to the site include snow machine operators, hunters, and oil exploration companies, such as British Petroleum (BP) and Bureau of Land Management representatives. Although no development of the site is planned, hypothetically, homes could be built in the future to support a subsistence residential population. The property surrounding the Navy's property is used by petroleum companies for oil exploration and or production purposes.

3.2 GROUNDWATER

Groundwater has not historically been used as a drinking water source at the former DEW Line Station, nor is it currently being used as such. Groundwater is not expected to be used as a future drinking water source at the site. Groundwater at the site is only present seasonally, when interstitial water above the permafrost thaws during the summer months (late June through mid-September). In addition, the shallow occurrence of the seasonal groundwater does not provide sufficient distance between the ground surface and groundwater surface for the placement of a 10-foot-thick watertight seal, as required by Alaska regulations for water wells (18 *Alaska Administrative Code* [AAC] 80.015). Finally, it may not be possible to obtain potable water from a well installed at the site because of the potential for salt-water intrusion from the Beaufort Sea.

3.3 FUTURE END USE PLANS

Following remediation of the site, the Navy intends to relinquish the Public Land Order to the Bureau of Land Management for return of the property to the public domain. End use of the property will be consistent with federal property regulations and LUCs included in the conveyance documents.

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4.0 DESCRIPTION OF REQUIRED LAND USE CONTROLS

The following contains the revised or proposed area-specific LUC/PCMP requirements for the remediated site. These requirements define the location where each LUC is required, the objective of the control or restriction, and a description of the types of restrictions that need to be in place.

The Point McIntyre former DEW Line Station covers approximately 65 acres (see Figure 1-2). The site will continue to be remediated, as required, and will be monitored for groundwater contamination related to potential residual effects from the former Eroding Landfill. The following LUCs will be applied to the overall site:

- Use of restrictions placed on the site to be maintained until the presence of hazardous substances has been reduced to allow unrestricted land use
- ADEC notified of any property transfer and provided with copies of all conveyance documents
- Continuation of LUCs for any property transfer unless otherwise approved by ADEC and the Navy and/or the presence of hazardous substances has been reduced to allow unrestricted land use

Land use controls will be recorded and maintained at the Alaska Lands Record Office and the Administrative Record at the NAVFAC Northwest office in Silverdale, Washington.

4.1 FREEZEBACK LANDFILL

The Freezeback Landfill is approximately 1,010 feet long by 110 feet wide, and contains nonhazardous contaminated soils, solid waste, and debris consolidated from the former Eroding Landfill and other areas approved by ADEC on the site. The limits of the Freezeback Landfill are shown on Figure 1-3.

The following LUCs or restrictions will be applied to this area:

- Ensure no disturbance to the Freezeback Landfill cap, except as necessary for authorized cap maintenance and other maintenance activities.
- Inspect and monitor thermistors at the Freezeback Landfill to verify that contents remain frozen.
- Maintain signage.
- Protect site photographic positioning monuments and site survey control monuments.
- Include restrictions in conveyance documents to prohibit any future development within the limits of the Freezeback Landfill.

- Include provision in conveyance documents allowing property access by the Navy to manage the LUCs at this site if the Government disposes of the property.
- Implement a notice to airmen to prohibit use of airstrip.

4.2 FORMER ERODING LANDFILL AREA

The former Eroding Landfill covered an area approximately 350 feet long by 170 feet wide along the shoreline of the Beaufort Sea. In addition, the remedy addressed an area of debris about 450 feet long and 40 feet wide that extended along the shoreline to the east of the main Eroding Landfill (Figure 1-4).

The following LUCs or restrictions will be applied within this area:

- Ensure no groundwater use from, or downgradient of, the area except for monitoring and remediation as approved by ADEC.
- Protect groundwater monitoring location points until removal is approved by ADEC and the Navy.
- Protect site photographic positioning monuments and site survey control monuments.
- Include provision in conveyance documents allowing the Navy access to manage the LUCs at this site if the Government disposes of the property.

5.0 IMPLEMENTING MECHANISMS

5.1 EXCAVATION NOTIFICATION

Excavation restrictions will be imposed in the vicinity of the Freezeback Landfill as shown on Figure 1-3. No active utility is present at the site. Unknown inactive utilities may be present from former DEW Line Station operations; however, none were noted during construction of the remedy. An excavation notification process will be implemented to control the location of potential excavations at the site. The excavation notification process will be as follows:

1. The requester will submit to the Navy, at least 1 calendar month in advance of the excavation date, the Navy IC Excavation Notification Form for Point McIntyre with an attached map indicating the exact location of the proposed excavation. This request may be faxed to Environmental Restoration, Code EV3 12 at 1-360-396-0857.
2. In the IC Excavation Notification Form, the requester's name, company (if appropriate), telephone number, date of request, and location of excavation will be provided. The purpose of the excavation must be provided in enough detail to determine if the land use restrictions will be followed. Information concerning the start time, completion time, planned method of digging, and the planned depth of the excavation must also be provided.
3. The Navy will evaluate the notification to determine whether the proposed excavation activities are consistent with the ICs in place at the site. After the Navy reviews the notification, the original request will be returned to the requester as reviewed. The Navy will recommend that excavation not be conducted if LUCs will not be followed as a result of the planned excavation. An example would be excavating in the Freezeback Landfill area for purposes other than maintenance or repair. The Navy will request that excavation not be conducted if the proposed excavation will disturb the protective cover of the Freezeback Landfill.
4. The excavation will be performed consistent with the Navy's requirements. This includes ensuring that all workers have been made aware of site conditions and excavation limitations prior to beginning excavation.
5. The IC excavation notification will expire after 120 days. If an IC Excavation Notification expires, resubmittal will be necessary.

5.2 ENVIRONMENTAL CODE REVIEW OF PROPOSED PROJECTS

Construction and repair projects at the Point McIntyre former DEW Line Station are to be reviewed by the currently assigned NAVFAC NW RPM. The purpose of the environmental code review is to review construction and repair projects, to identify projects that may require special

protective measures, and to establish health requirements as needed for potential excavation into or adjacent to contaminated material in the Freezeback Landfill and the former Eroding Landfill area.

5.3 SECURITY AND ACCESS CONTROLS

The Point McIntyre former DEW Line Station does not have specific security procedures. Access to the site is generally initiated from Deadhorse, Alaska. Travel to the site from Deadhorse requires transit through BP controlled property. Specific procedures and clearances are required to access BP property. Therefore, BP procedures and clearance requirements are made part of the LUCP. Access must be requested via email by a NAVFAC NW RPM to AKOPSSecurityCapt@bp.com. The email request must include the following:

- Contract mechanism under which the work is being performed
- Name of the company requiring access
- Name of personnel requiring access
- Dates of work
- Area to be visited (i.e., Point McIntyre DEW Line Station) and transport mechanism
- Escort transit badge number

To access the site, the inspecting contractor must complete a three-step process. This process could take up to 6 weeks after completing step one. A Federal Bureau of Investigation background check will be conducted for any non-U.S. citizen requesting access and will require a minimum of 4 weeks. The access process is as follows:

1. One person in the inspection team will be required to complete a safety course presented by the North Slope Training Cooperative. This is an 8-hour course provided by several commercial providers and is available in Anchorage.
2. The contractor accessing the site will be required to procure a "Road Use Agreement" with BP. This is a contractual document requiring execution by a representative from the contractor with signature authority and can commit the contractor to terms and conditions of Road Use Agreement and Transit Badge issue (discussed in Step 3). The contractor will apply for the Road Use Agreement through BP, and the agreement is issued by the Prudhoe Bay unit operator.

   As of this LUCP publication date, Road Use Agreements are procured through:

   Mr. Westin Nash, Prudhoe Bay Unit Operator, BP Joint Venture
   Telephone: (907) 564-4931
   Email: Weston.nash@bp.com

An insurance certificate for vehicle coverage is required, and security will request to review this document prior to transit through the property.

3. The Road Use Agreement authorizes the inspector to request a Transit Badge from security. Procedures for procuring a Transit Badge will be specified in the Road Use agreement.

Once these steps have been completed, the inspecting contractor will be able to transit BP property to BP's West Dock facility, board a boat or other marine transport vessel authorized by BP to use the facility, and access the Point McIntyre site.

Alternatively, direct site access and/or emergency evacuation via helicopter can be obtained directly from vendors located in Deadhorse.

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6.0 REFERENCES

U.S. Department of Defense. 2001. Policy on Land Use Controls Associated with Environmental Restoration Activities. Memorandum for Assistant Secretaries of the Army, Navy, Air Force, and Director, Defense Logistics Agency. January 17.

U.S. Navy (Navy). 2016. Draft After Action Report Addendum Landfill Removal and Freezeback Landfill Construction (2015 Field Season), Former Distant Early Warning Line Station, Point McIntyre, Alaska. Prepared by Tetra Tech EC, Inc. for Naval Facilities Engineering Command Northwest under Contract N62470-13-D-8007. Silverdale, Washington. February.

———. 2015a. Final After Action Report Landfill Removal and Freezeback Landfill Construction, Former Distant Early Warning Line Station Point McIntyre, Alaska. Prepared by Tetra Tech, EC, Inc. for Naval Facilities Engineering Command Northwest under Contract N62470-13-D-8007. Silverdale, Washington. February.

———. 2015b. Final Post-Construction Monitoring Plan Former Distant Early Warning Line Station Point McIntyre, Alaska. Prepared by Tetra Tech, EC, Inc. for Naval Facilities Engineering Command Northwest under Contract N62470-13-D-8007. Silverdale, Washington. March.

———. 2014. Final After Action Report Landfill Removal and Freezeback Landfill Construction Former Distant Early Warning Line Station Point McIntyre, Alaska. Prepared by AGVIQ CH2MHill for Naval Facilities Engineering Command Northwest under Contract N62470-08-D-1006. Silverdale, Washington. October.

———. 2012a. Final Record of Decision, Former DEW Line Station, Point McIntyre, Alaska. Prepared by URS Group, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-05-D-5100. Silverdale, Washington. June.

———. 2012b. Final Landfill and Stabilization Design, Former DEW Line Station, Point McIntyre, Alaska. Prepared by URS Group, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-09-D-4001. Silverdale, Washington. October.

———. 2005. Final Closure Report, Demolition and Environmental Cleanup, Point McIntyre, Alaska. Prepared by Tetra Tech FW, Inc., for Naval Facilities Engineering Command Northwest under Contract N44255-01-D-2000, RAC 3/Task Order 25. Poulsbo, Washington. March.

———. 2003. Monitoring and Enforcement of Land Use Controls. Memorandum for Deputy Under Secretary of Defense (Installations and Environment). April 2.

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APPENDIX A

EXCAVATION NOTIFICATION FORM

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EXCAVATION NOTIFICATION FORM
Former Distant Early Warning (DEW) Line Station
Point McIntyre, Alaska
Naval Facilities Engineering Command Northwest (NAVFAC NW)

This form must be received by Naval Facilities Engineering Command Northwest at least 10 working days prior to mobilization to the site for excavation and the answers to questions in Section 4 must be yes for approval of site access. The Requestor must have an approved copy of this form in order to mobilize to the site for excavation. **Excavation is not permitted within the footprint or side slopes of the Freezeback landfill unless it is for NAVFAC NW approved maintenance, repair, or integrity verification.**

Section 1: Submittal Date Requestor Contact Information

Date: _____
Requestor Name: _____ Phone No.: _____
Requesting Company: _____ Email: _____
Address: _____

Section 2: Contract and Project Manager Contact Information Navy Project (circle one): Yes No

Contract and Task Order under which Excavation is required _____
NAVFAC NW RPM for
the Task Order: _____ Phone No.: _____ Email: _____

Section 3: Excavation Location and Purpose (attach copy of SOW and Work Plan as appropriate)

Description of Excavation Location (please attach map showing excavation location):
_____
_____
_____

Purpose of Excavation:
_____
_____
_____

Dates of Excavation: _____ to _____

Section 4: Access Readiness (See Section 5.3 of the Land Use Controls Plan for details)

The answer must be yes to ALL of the following questions for access to the site:
North Slope Training Cooperative (NSTC) 8 hour training complete for one team member (circle one) **YES NO**
BP Road Access Agreement in place (circle one) **YES NO**
BP Transit Badge Application Submitted (circle one) **YES NO**

Section 5: Request Submittal

This form must be received at least 10 working days prior to mobilization to the site for excavation
Submit form to:
Attention: Environmental Restoration (EV3)
Naval Facilities Engineering Command Northwest
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101
Telephone: To Be Determined
Fax: (360) 396-0857

Section 6: Acknowledgement

By signing below, the requestor indicates understanding of the excavation limitations and restrictions at the site as prescribed by the existing Land Use Controls. Signature indicates that the information provided herein is accurate and complete to the best of the requestor's knowledge. Signature also indicates the requestor's agreement that excavation will not be performed until this notification has been reviewed and approved by Naval Facilities Engineering Command Northwest.

Requestor Signature: _____ Date: _____

Section 7: Approval or Rejection

Approved Rejected

NAVFAC NW Reviewer Printed Name/Signature: _____ Date: _____

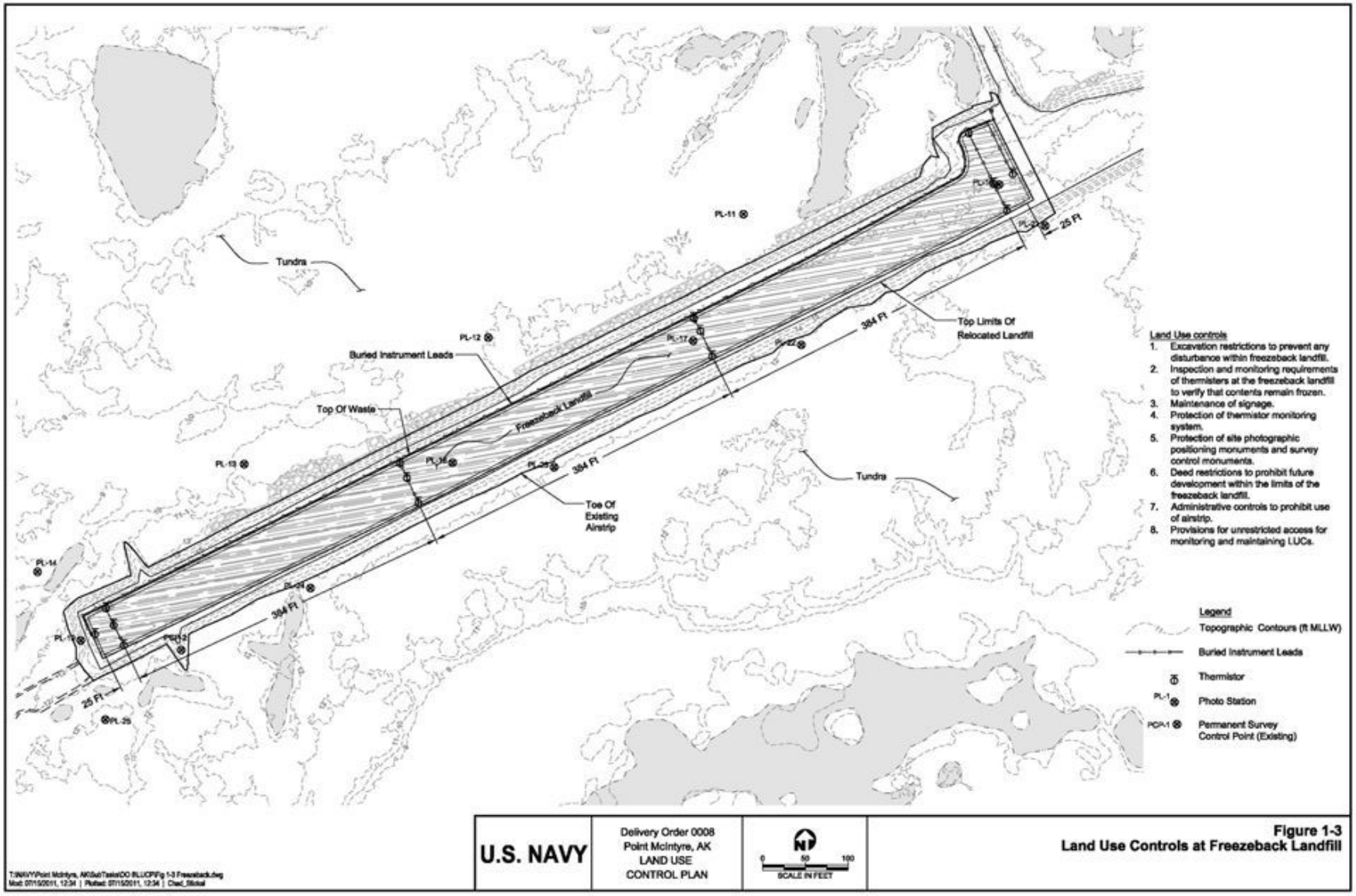


Figure 1-3
Land Use Controls at Freezeback Landfill

United States Dept. Agriculture TERM SPECIAL USE PERMIT Act of October 21, 1976 (43 USC 17(a(1))	a. Record no. 70	b. Region 10	c. Forest 05
	d. District 02	e. User no. 0009	f. Kind of use 420
	f. State 02	g. County 000	h. Card no. 1

Permission is hereby granted to Department of Navy, represented by the Commander, Western Division, Naval Facilities Engineering Command, hereinafter called the holder, to use subject to the conditions set out below, the following described lands or improvements from the date of this permit to January 1, 2018: (See clause #17.)

A site on Back Island, located in Behm Canal on the Tongass National Forest, approximately 16 miles northwest of Ketchikan, Alaska, as shown on Exhibit A. T.73 S., R.90 E., sec. 17, NE1/4, C.R.M.

This permit covers 15 acres and is issued for the purpose of:

Constructing, maintaining, operating and occupying the Behm Canal Acoustic Range and Measurement Facility, Back Island, Alaska, subject to the jurisdiction of the United States within the Tongass National Forest.

The facility improvements (as shown on Exhibit B) will include the following:

a. Range Operations, Personnel Support Center consisting of a two story building of steel frames, siding and roofing with a concrete foundation. 56' x 156'.
b. Utility, Maintenance, Storage Building with concrete foundation and steel frames, roof and siding. 160'x 60'.
c. Waiting Shelter consisting of steel frames siding and roof with concrete foundation.10'x 10'.
d. Access Road, 550' long with 16' wide paved surface and 2' wide gravel shoulders totaling 20'.
e. Water System consisting of roof catchment, above ground 120,000 gallon storage tanks, pumpstation and treatment plant.
f. Fuel Oil Storage consisting of 21,000 gallon above ground tank.
g. Sewage and Wastewater Treatment Plant consisting of septic tank, with direct outfall to saltwater.
h. Electrical Transformer Station.
i. Water and Fuel Lines running from building complex to dock.
j. Facility Pad consisting of paved pad 200K sq.ft. and shot rock pad 15,000 sq.ft.
k. Trestle 16' x 290'; Pedestrian Float, 12' x 30'; Breasting and mooring dolphins for 48' x 261' Barge; small boat ramp.
l. Overburden Disposal Site, 3 acres.
m. Buried submarine cable across island. 1,250'
n. Two (2) 500 gal. fuel tanks on facility pad with 2 dispensors.

ALL ATTACHED EXHIBITS (A & B) ARE HEREBY MADE A PART OF THIS PERMIT.

APPROVED AS TO FORMAT AND SUBSTANCE Judy A. Conlow
JUDY CONLOW ESQ.

	NAME OF HOLDER DEPARTMENT OF THE NAVY	SIGNATURE OF AUTHORIZED OFFICER TITLE Head, Facilities Planning and Real Estate Department	DATE 03 MAY 1989
ISSUING OFFICER	NAME AND SIGNATURE J. Michael Lunn	TITLE Forest Supervisor Ketchikan Area Tongass N.F.	DATE May 16, 1989

N6247489RP00E43

1. Construction or occupancy and use under this permit shall begin within 12 months, and construction, if any, shall be completed within 36 months, from the date of the permit. This use shall be actually exercised at least 365 days each year, unless otherwise authorized in writing.

2. In consideration for this use, the holder shall pay to the Forest Service, U.S. Department of Agriculture, the sum of: Fee waived under 36 CFR 251.57(c).

3. This permit is accepted subject to the conditions set forth herein, and to conditions 1 to 30 attached hereto and made a part of this permit.

4. This permit may be amended to reflect applicable laws and U.S. Forest Service regulations.

5. All applications for additions to this facility will be made to the Forest Supervisor 90 days in advance of construction. The Navy is encouraged to consult with the authorized forest officer during the preparation of the plans to ensure that they are adequate.

Development plans, lay-out plans, construction, reconstruction, or alteration of improvements, or revision of lay-out or construction plans must be approved in advance and in writing by the Forest Supervisor. In situations requiring significant ground disturbance or projects of a controversial nature, it is understood that additional lead time will be required to allow for processing of the requirements and provisions of the National Environmental Policy Act.

Operations and maintenance plans will be submitted annually for Forest Service approval where site maintenance includes clearing or disturbance of ground cover or material, reconstruction or physical changes to the site.

6. Trees or shrubbery on the permitted area may be removed or destroyed only after the forest officer in charge and the Navy Staff Forester has approved and has marked or otherwise designated that which may be removed or destroyed. Timber cut or destroyed will be paid for by the holder as follows: Merchantable timber at appraised value; young-growth timber below merchantable size at current damage appraisal value; provided that the Forest Service reserves the right to dispose of all merchantable timber (not used in the construction of the Navy's facilities) to others than the holder at no stumpage cost to the holder.

7. The holder shall maintain the improvements and premises to standards of repair, orderliness, neatness, and safety acceptable to the forest officer in charge.

8. This permit is subject to all valid claims.

9. The holder, in exercising the privileges granted by this permit, shall comply with the regulations of the Department of Agriculture and all Federal, laws, ordinances, or regulations which are applicable to the area or operations covered by this permit.

10. The holder shall take all reasonable precaution to prevent and suppress forest fires. No material shall be disposed of by burning in open fires without a written permit from the forest officer in charge or his authorized agent.

11. The holder shall exercise diligence in protecting from damage the Tongass National Forest land and property covered by and used in connection with this permit, and shall, subject to the availability of the appropriated funds, pay the Department of Agriculture, U.S. Forest Service for any damage resulting from negligence or from the violation of the terms of this permit or of any law or regulation applicable to the National Forests by the holder, or any agents or employees of the holder acting within the scope of their agency or employment.

12. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit that may arise herefrom unless it is made with a corporation for its general benefit.

13. Upon abandonment, termination, revocation or cancellation of any site, facility structures or parts thereof authorized under this permit, the holder shall remove within a reasonable time, all structures and improvements and shall restore the site unless otherwise agreed in writing or in this permit. If the holder fails to remove all such structures or improvements within a reasonable period, the United States Navy, Department of Defense, will be responsible, subject to the availability of appropriated funds, for reimbursement to the United States Forest Service, Department of Agriculture for removal of all facilities and improvements and restoration of the site.

14. This permit is not transferable.

15. The holder may sublease the temporary use and occupancy of the premises and improvements covered under this permit and the operation of facilities authorized; provided the express written permission of the Forest Supervisor has been secured. The holder shall continue to be responsible for compliance with all conditions of this permit by persons to whom such premises may be sublet.

16. Nothing in this permit shall be construed to imply authority or permission to place any restrictions on National Forest lands other than those lands designated in this permit. The Forest Service reserves the authority to permit or limit uses of all lands on Back Island not included in this permit.

17. This authorization shall expire and become void on January 1, 2018, but a new special use authorization to occupy and use the same National Forest system land will be granted not to exceed 20 years provided the holder will comply with the then-existing laws and regulations governing the occupancy and use of National Forest lands. It is understood and agreed that the purpose of this permit is to enable the holder to develop, manage and maintain an acoustic range and measurement facility.

18. The holder shall dispose of refuse resulting from this use, including waste materials, garbage and rubbish of all kinds, in the following manner: on a site off the National Forest approved by local municipal goverment. (B-34)

19. No waste or byproduct shall be discharged into water if it contains any substance in concentrations which will result in harm to fish and wildlife or to human water supplies.

Storage facilities for materials capable of causing water pollution, if accidentally discharged, shall be located so as to prevent any spillage into waters or channels leading into water, that would result in harm to fish and wildlife or to human water supplies. (D-2)

20. The holder shall protect the scenic esthetic values of the area under this permit, and the adjacent land, as far as possible with the authorized use, during construction, operation and maintenance of the improvements. (D-3).

21. All butane, propane or other liquified petroleum gas equipment shall be installed and operated in accordance with applicable laws and regulations.

22. Nothing in this permit is construed to imply permission to build or maintain any structure not specifically named on the face of this permit, or approved by the authorized officer in the form of a new permit or permit amendment. (X-3)

23. If, during excavation or other ground disturbing activities, historic, prehistoric or paleontological objects or sites are discovered, the holder must cease such activities in the area of the discovery. The holder must then notify the Forest Service, and must not resume excavation or other ground disturbing activities there until written approval is given.

The holder is responsible for the protection of any discovered resources, and the alteration of project plans to avoid further disturbance of the discovered resource, as the Forest Service determines is necessary after consultation with the holder. The holder may perform the salvage of the discovered resource if, and in the manner, approved by the Forest Service.

Items of historic, prehistoric, or paleontological value are protected under various Federal laws, including the Antiquities Act of 1906 (16 USC 433), the Archaeological Resources Protection Act of 1979 (16 USC 470ee), and Federal regulations. Failure to comply with this clause may result in criminal prosecutiion for violation of a Federal law or regulation. (X-17)

24. This permit authorizes only the area and improvements located above the line of mean high tide.

25. The holder must designate in writing to the Forest Supervisor, the name and title of the person who is authorized to act in all matters connected with privileges authorized by this permit. In the event the designated representative is to be changed for any reason, the Forest Supervisor must be notified of the replacement as soon as possible. (X-97)

26. Holder shall reimburse the United States Forest Service, Department of Agriculture for any costs incurred by the United States Forest Service, Department of Agriculture as a result of claims, demands, losses or judgment caused by Holder's use, occupancy or issuance of this permit.

27. Nothing in this special use permit shall be construed as obligating the United States Navy for payments in excess of appropriations authorized by law.

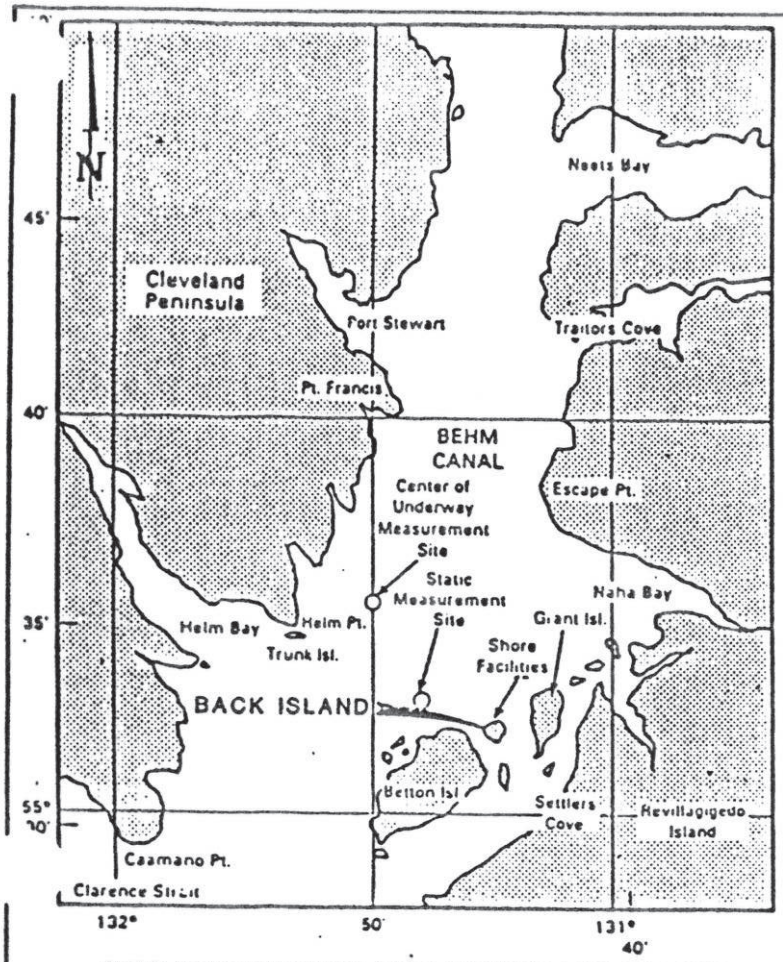
28. Nothing contained herein should be construed as a waiver by the Secretary of the Navy of any right to request a determination that the lands covered by this authorization are not "public lands" as that is defined in Section 3(e) of the Alaska Native Claims Settlement Act, Public Law 92-203.

29. The Forest Service agrees not to waive its administration of this SUP or transfer administration of it to a selecting Alaskan Native or Native Corporation.

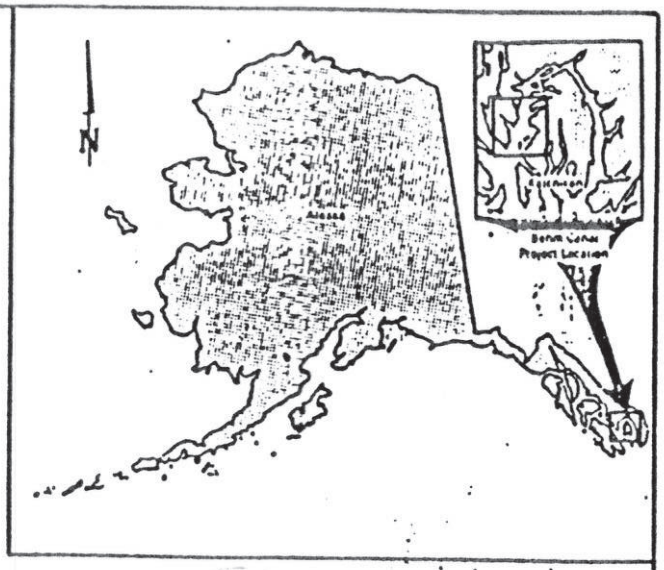
30. The Secretary of Agriculture agrees to the extent legally authorized, to not concur in the withdrawal of the SUP area for benefit of any Alaskan Native or Native Corporation under applicable law.

031689 01645 krd 2720 bs

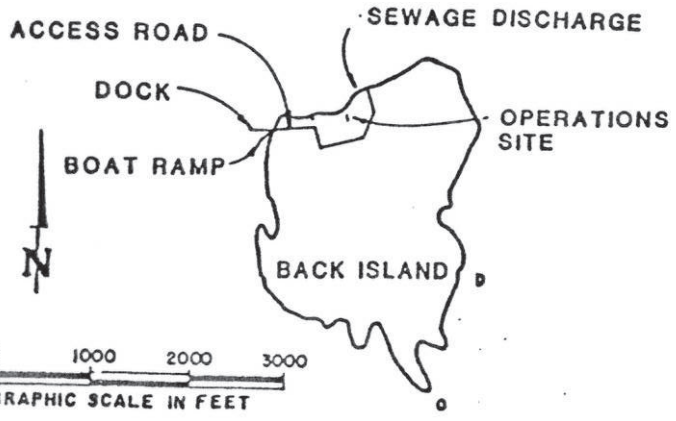
EXHIBIT A



SITE LOCATION OF THE SOUTHEAST ALASKA ACOUSTIC MEASUREMENT FACILITY



LOCATION / VICINITY MAP



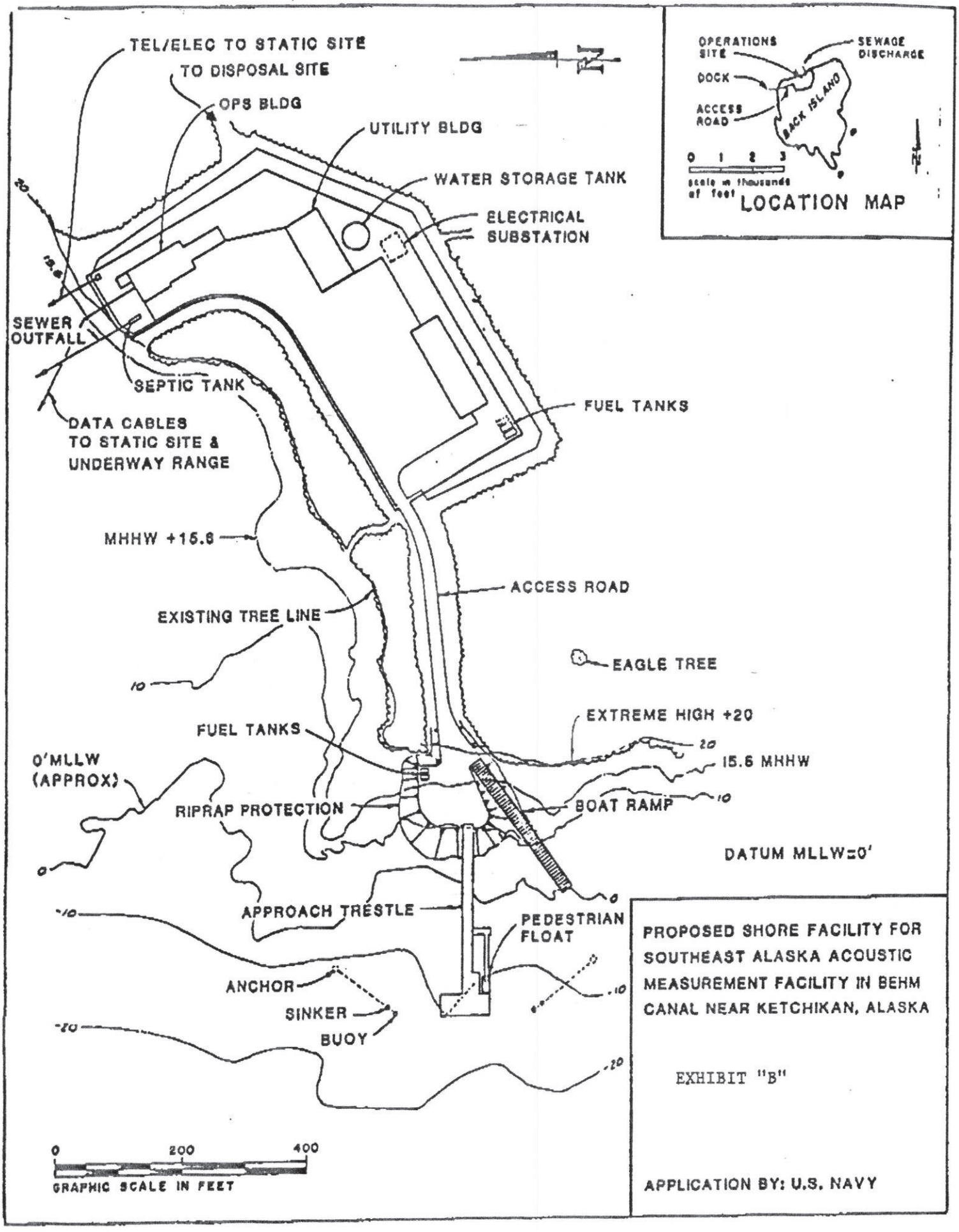
PROJECT LOCATION

PROPOSED LOCATION OF SOUTHEAST ALASKA ACOUSTIC MEASUREMENT FACILITY INCLUDING UNDERWAY AND STATIC MEASUREMENT SITES AND SHORE FACILITIES: IN BEHM CANAL NEAR KETCHIKAN, ALASKA

Exhibit A

1988

APPLICATION BY: U.S. NAVY


TEL/ELEC TO STATIC SITE
TO DISPOSAL SITE
OPS BLDG
UTILITY BLDG
WATER STORAGE TANK
ELECTRICAL SUBSTATION
SEWER OUTFALL
SEPTIC TANK
DATA CABLES TO STATIC SITE & UNDERWAY RANGE
FUEL TANKS
MHHW +15.6
ACCESS ROAD
EXISTING TREE LINE
EAGLE TREE
EXTREME HIGH +20
FUEL TANKS
0'MLLW (APPROX)
15.6 MHHW
RIPRAP PROTECTION
BOAT RAMP
DATUM MLLW=0'
APPROACH TRESTLE
PEDESTRIAN FLOAT
ANCHOR
SINKER
BUOY
0
200
400
GRAPHIC SCALE IN FEET
OPERATIONS SITE
SEWAGE DISCHARGE
DOCK
ACCESS ROAD
BACK ISLAND
0 1 2 3
scale in thousands of feet
LOCATION MAP
PROPOSED SHORE FACILITY FOR SOUTHEAST ALASKA ACOUSTIC MEASUREMENT FACILITY IN BEHM CANAL NEAR KETCHIKAN, ALASKA
EXHIBIT "B"
APPLICATION BY: U.S. NAVY

U.S. Fish & Wildlife Service

Search ECOS

ECOS Environmental Conservation Online System

Conserving the Nature of America

Species By County Report

The following report contains Species that are known to or are believed to occur in this county. Species with range unrefined past the state level are now excluded from this report. If you are looking for the Section 7 range (for Section 7 Consultations), please visit the IPaC application.

County: North Slope, Alaska

CSV

Need to contact a FWS field office about a species? Follow this link to find your local FWS Office.

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	Recovery Plan Stage
Birds	Eskimo curlew (*Numenius borealis*)	Wherever found	Endangered	Fairbanks Fish and Wildlife Conservation Office			
Birds	Spectacled eider (*Somateria fischeri*)	Wherever found	Threatened	Fairbanks Fish and Wildlife Conservation Office	Spectacled Eider	Implementation Progress	Final
Birds	Steller's Eider (*Polysticta stelleri*)	AK breeding pop.	Threatened	Fairbanks Fish and Wildlife Conservation Office	Recovery Plan for the Alaska-Breeding Population of the Steller's Eider	Implementation Progress	Final
Mammals	Wood Bison (*Bison bison athabascae*)	Wherever found	Threatened	Anchorage Fish and Wildlife Conservation Office			
Mammals	Polar bear (*Ursus maritimus*)	Wherever found	Threatened	Marine Mammals Management	Polar Bear Conservation Management	Recovery efforts in progress, but	Final

				Office	Plan	no implementation information yet to display.	

Species By County Report

The following report contains Species that are known to or are believed to occur in this county. Species with range unrefined past the state level are now excluded from this report. If you are looking for the Section 7 range (for Section 7 Consultations), please visit the IPaC application.

County: Ketchikan Gateway, Alaska

CSV

Need to contact a FWS field office about a species? Follow this link to find your local FWS Office.

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	Recovery Plan Stage
Birds	Short-tailed albatross (*Phoebastria (=Diomedea) albatrus*)	Wherever found	Endangered	Anchorage Fish and Wildlife Conservation Office	Short-Tailed Albatross (Phoebastria albatrus) Final Recovery Plan	Implementation Progress	Final

Overview of Environmental and Hydrogeologic Conditions at Barrow, Alaska

By Kathleen A. McCarthy

U.S. GEOLOGICAL SURVEY

Open-File Report 94-322

Prepared in cooperation with the

FEDERAL AVIATION ADMINISTRATION



Anchorage, Alaska
1994

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Gordon P. Eaton, Director

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
millimeter (mm)	0.03937	inch
centimeter (cm)	0.3937	inch
meter (m)	0.3048	foot
kilometer (km)	0.6214	mile
hectare (ha)	2.471	acre
square kilometer (km^2)	0.3861	square mile
liter (L)	0.2642	gallon
liter per day (L/d)	0.2642	gallon per day
cubic meter per second (m^3/s)	35.31	cubic foot per second
degree Celsius (°C)	°F = 1.8 x °C + 32	degree Fahrenheit (°F)

Sea level:

In this report "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Overview of Environmental and Hydrogeologic Conditions at Barrow, Alaska

By Kathleen A. McCarthy

Abstract

To assist the Federal Aviation Administration (FAA) in evaluating the potential effects of environmental contamination at their facility in Barrow, Alaska, a general assessment was made of the hydrologic system in the vicinity of the installation. The City of Barrow is located approximately 16 kilometers southwest of Point Barrow, the northernmost point in Alaska, and therefore lies within the region of continuous permafrost. Migration of surface or shallow-subsurface chemical releases in this environment would be largely restricted by near-surface permafrost to surface water and the upper, suprapermafrost zone of the subsurface. In the arctic climate and tundra terrain of the Barrow area, this shallow environment has a limited capacity to attenuate the effects of either physical disturbances or chemical contamination and is therefore highly susceptible to degradation.

Esatkuat Lagoon, the present drinking water supply for the City of Barrow, is located approximately 2 kilometers from the FAA facility. This lagoon is the only practical source of drinking water available to the City of Barrow because alternative sources of water in the area are (1) frozen throughout most of the year, (2) insufficient in volume, (3) of poor quality, or (4) too costly to develop and distribute.

INTRODUCTION

The Federal Aviation Administration (FAA) operates airway support and navigational facilities throughout Alaska, and is currently conducting investigations at many of these sites to evaluate suspected releases to the environment of potentially harmful substances. Once released, the effects of such substances on the environment are often influenced strongly by transport in either surface water or ground water. Therefore, in order to accurately assess the effects of such releases and select the most appropriate remediation measures when such action becomes necessary, an understanding of the geohydrology in the vicinity of each site is critical. This report, the product of compilation, review, and summary of existing hydrogeologic data by the U.S. Geological Survey in cooperation with the FAA, provides an understanding of the geohydrologic system in the vicinity of the Barrow FAA facility.

The City of Barrow has a population of approximately 3,700 (Christy Miller, Alaska Department of Community and Regional Affairs, written commun., 1993), and is the largest community in the North Slope Borough. Air travel is the only year-round means of transportation to or from the city. In 1963, the Wiley Post-Will Rogers Memorial Airport, located immediately south of the

city, was constructed. Since that time, the FAA has operated an attended flight service station at the airport. The FAA station consists of approximately 38 ha of noncontiguous land leased from the Alaska Department of Transportation and the Ukpeagvik Inupiat Corporation (Ecology and Environment, Inc., 1992). A recent environmental compliance investigation was done for the Barrow FAA station by Ecology and Environment, Inc. (1992), and a detailed description of the facility and suspected sources of potential contamination can be found in their report.

PHYSICAL SETTING

Barrow (fig. 1) is located at latitude 71°18' N, longitude 156°47' W, approximately 530 km north of the Arctic Circle and within the region of continuous permafrost. The Chukchi Sea of the Arctic Ocean borders the city to the northwest, and Point Barrow, the northernmost point in Alaska, is 16 km to the northeast.

Climate

The climate of the Barrow area is characterized by long cold winters, short cool summers, and persistent wind. The effects of the nearby Arctic Ocean cause summers to be generally cooler, more breezy, and more moist than at more inland locations. Average monthly temperatures range from approximately 4° C in July to -28° C in February and typically climb above freezing only during the months of June, July, and August (table 1).

The average annual precipitation at the National Weather Service station in Barrow is reported to be 119 mm (table 1). However, numerous observations indicate that actual precipitation on the Arctic Coastal Plain exceeds that recorded by standard National Weather Service gages. Accurate measurement of summer precipitation is difficult, due to the large proportion that occurs as fog and trace amounts of rainfall. Brown and others (1968) suggest that thaw-season precipitation recorded by standard gages averages approximately 90 percent of actual precipitation, but that the discrepancy between actual and measured rainfall varies considerably from year to year. During the winter, gage undercatch of snow is attributed primarily to persistent high winds. Actual snowfall in the Barrow area has been estimated to be from two to four times that recorded by standard gages (Black, 1954; Dingman and others, 1980; Benson, 1982). Benson's data (1982) also indicate that gage efficiency tends to be inversely related to the amount of precipitation with the smallest errors occurring during years of high precipitation.

More than 50 percent of the annual precipitation typically falls during the months of July, August, and September (table 1). Although most precipitation in July and August occurs as rain or fog, snow can occur during any month and is the predominant form of precipitation from September through June.

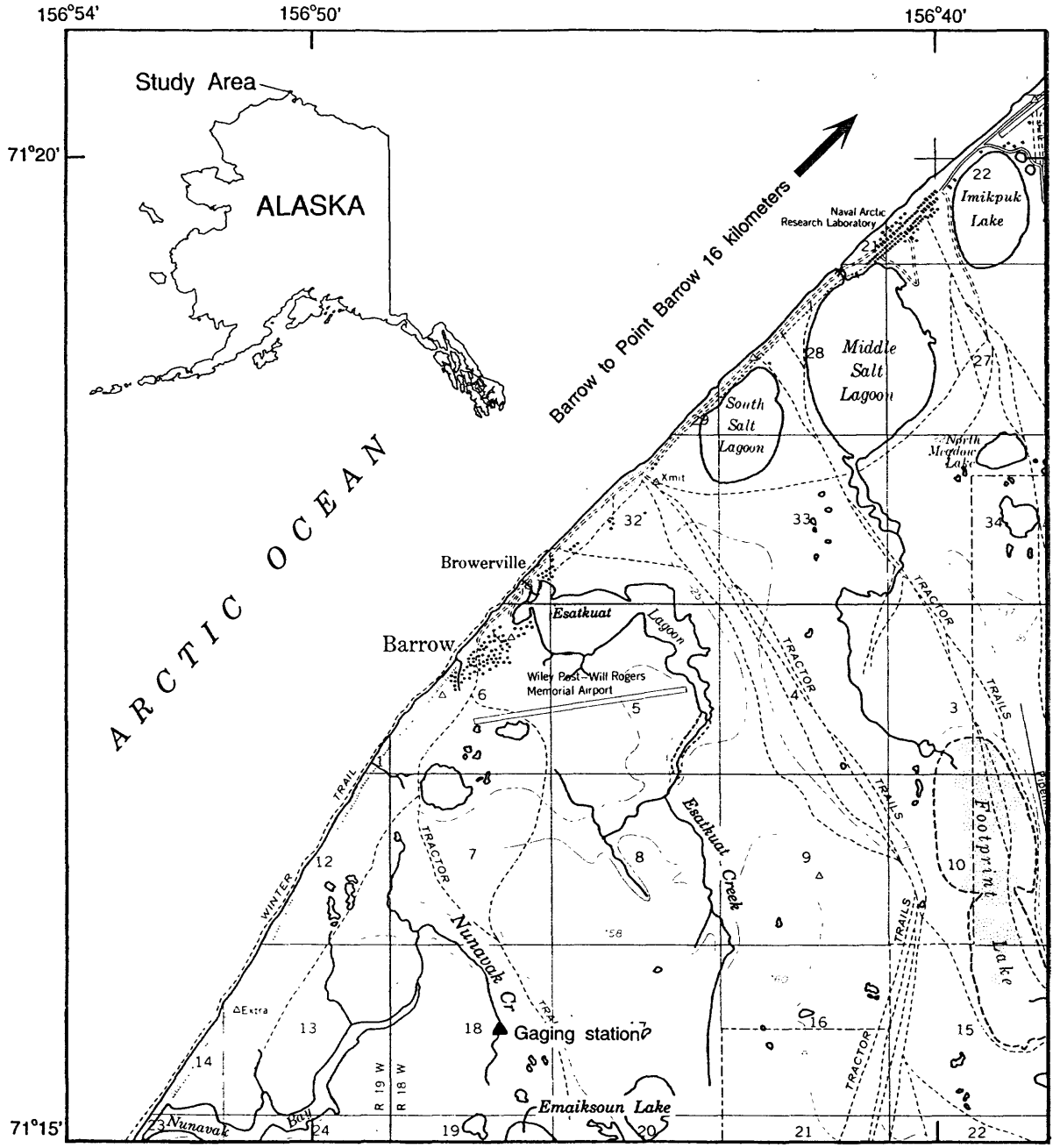


Figure 1. Location of Barrow.

Table 1. Mean monthly temperature, precipitation and snow data for Barrow, Alaska, for the period 1949-87 (Leslie, 1989)

[°C, degree Celsius; mm, millimeter]

Month	Mean temperature (°C)	Mean total precipitation (mm)	Mean total snowfall (mm)
January	-25.4	5.1	58
February	-28.4	4.6	56
March	-26.3	3.8	46
April	-19.0	5.1	61
May	-7.3	4.1	48
June	0.9	9.1	18
July	3.9	22.1	10
August	3.3	24.6	18
September	-0.8	16.3	99
October	-9.7	13.0	160
November	-18.2	6.9	86
December	-24.3	4.3	53
YEAR	**-12.6**	**118.6**	**716**

Surficial Geology

The Barrow peninsula is the northernmost extremity of the Arctic Coastal Plain, which extends from the foothills of the Brooks Range in the south to the Arctic Ocean in the north (Wahrhaftig, 1965). The area is characterized by low relief; numerous lakes, ponds, and drained thaw-lake basins; and areally continuous permafrost. Permafrost is rock or soil that has remained continuously below 0° C for two or more years. In the Barrow area, permafrost extends to depths of up to 300 m (Collins, 1961). The layer above the permafrost that thaws each summer and refreezes each winter is referred to as the "active layer." The maximum depth of the active layer is typically less than 0.5 m in areas where the vegetation and soil of the tundra surface are undisturbed (Brown and others, 1968; Dingman and others, 1980; U.S. Geological Survey, unpub. data). In areas of unvegetated gravels, the seasonal thaw extends to greater depths, but is generally limited to less than 2 m (DOWL Engineers and Crowley Environmental Services, Inc., 1986; Tryck, Nyman, & Hayes and Shannon & Wilson, Inc., 1987; U.S. Geological Survey, unpub. data). Beneath heated

buildings, other artificial structures, and lakes that are more than approximately 2 m in depth, a zone of permanently thawed ground is commonly present. Such zones, referred to as thaw bulbs or thermal taliks, may extend to considerable depths. For example, Brewer (1958) reported measurable warming of the permafrost at a depth of 15 m beneath a 12-by-30 m building near Barrow. Beneath Imikpuk Lake, a small freshwater lake (approximately 750 m in diameter) located 8 km northeast of Barrow, Brewer (1958) found the depth to permafrost to be more than 50 m. Although such aberrations in the permafrost are common, especially in developed areas where the ground surface has been disturbed, they are generally limited in areal extent.

The geology of the Arctic Coastal Plain is relatively well characterized, due in part to the extensive exploration for petroleum that has occurred in the region over the past several decades. Detailed geologic information may be found in reports by Black (1964), Carlson and others (1958), Collins (1961), Dinter and others (1990), Gryc (1988), Wahrhaftig (1965), and Williams and Carter (1984). As discussed in the later section on hydrology, surface water and shallow ground water in the region are generally isolated from deeper ground water by permafrost. Therefore, the discussion here will be limited to the shallow subsurface environment.

Bedrock in the region forms a broad, low-relief surface known as the North Beringian Marine Abrasion Platform (Dinter and others, 1990). The uppermost bedrock unit in the Barrow area, which consists primarily of shale, is not exposed on the surface, but is commonly found in boreholes at depths ranging from 10 to 30 m (Collins, 1961; Black, 1964; M.C. Brewer, U.S. Geological Survey, oral commun., 1994). The bedrock is overlain by unconsolidated marine, eolian, and lacustrine-lagoonal deposits of late Tertiary and Quaternary age. These deposits are a mixture of sand, silt, gravel, and clay, and shallow ground water in the Barrow area generally occurs entirely within the uppermost materials. In coastal areas, deposits include sand dunes and beach gravels. The Barrow airport facility was constructed on one of these dunes (Alaska Transportation Consultants, Inc., 1983).

Soils

Soils in the Barrow area are classified as wet, loamy, histic pergelic cryaquepts (Rieger and others, 1979). These soils are included in the order Inceptisol and are generally characterized by thick accumulations of organic matter at the surface, persistent cold temperatures, shallow permafrost, and very high moisture contents. The considerable organic content of these soils is due largely to the persistent cold temperatures, which restrict biodegradation and thus promote the accumulation of organic material from vegetation. Because organic material has a lower thermal conductivity than mineral soils, it serves to insulate the underlying permafrost. As a result, the permafrost table is typically within 0.5 m of the surface in such soils, provided the surface has not been disturbed.

Physical churning of the soils above the permafrost results from cyclic freezing and thawing. Because of this churning, distinct soil layers are often absent and organic material from plants at the surface is commonly distributed downward. Cyclic freezing of the soils also causes contraction cracks to form. Such cracks may fill with water, which subsequently freezes and cracks. As this

cycle repeats, the fissures grow. Extensive networks of interconnected cracks, referred to as patterned ground or ice-wedge polygons, are common in the Barrow area. A more detailed discussion of the formation of ice-wedge polygons is provided by Carter and others (1987).

The soils throughout the area generally have a very fine-grained texture and are characterized by high porosity and low permeability. However, gravelly soils also occur in the area, particularly near the beach. The permeabilities of soils in the area thus span several orders of magnitude. All soils, however, have a substantially reduced permeability to water once their temperature drops below freezing. As a result, hydraulic conductivities are extremely low for most of the year, and vertical movement of water is restricted year round by the presence of near-surface permafrost.

Vegetation and Wildlife

The diversity of plant and animal species is more limited in the Arctic than in more temperate regions. As a result of the cooling influence of the Arctic Ocean on the summer climate, the number of plant species in coastal areas, such as Barrow, is further reduced relative to the interior of the Arctic Coastal Plain.

Brown and others (1980) report 124 species of vascular plants (sedges, grasses, rushes, and a limited number of low-stature shrubs), 177 species of mosses, and 49 species of hepatics (liverworts) identified in the Barrow area. Lichens are also indigenous to the coastal tundra. All of these plant species are particularly adapted to the arctic climate and tundra terrain of the region and the niches within which many flourish are highly specific. Two factors that control the local distribution of plants are the moisture content and pH characteristics of the soils. These factors, particularly moisture content, can vary considerably over small distances. Gersper and others (1980) described meadows, ice-wedge polygon troughs, rims and basins of low-centered polygons, and centers of high-centered polygons as five microtopographic units of the coastal tundra. Soil-moisture content often differs considerably among these units. As a result, the vegetation patterns in areas of ice-wedge polygons often vary substantially over short distances (Brown and others, 1980).

The terrestrial vertebrate species found in the Barrow area are limited to homoiothermic (warm-blooded) birds and mammals; no reptiles or amphibians are indigenous to the region. Brown and others (1980) report 28 species of birds and 10 species of terrestrial mammals in the area. The considerable bird population includes loons, ducks, geese, shorebirds, passerines, owls, ptarmigan, and eagles, and the terrestrial mammals include caribou, arctic and red fox, and collared and brown lemmings. Numerous marine mammal and fish species are also indigenous to the Barrow area. Marine mammals of the area include polar bear, walrus, both toothed and baleen whales, and several species of seals; fish species include whitefish, arctic grayling, burbot, and trout. Many of these species, particularly whales, fish, caribou, and waterfowl, play a critical role in the subsistence lifestyle of local residents.

Environmental Susceptibility

The tundra environment in the Barrow area is much more susceptible to damage by human activity than environments typical of more temperate regions. For example, disturbances resulting from vehicle traffic or construction activities can cause long-term or even permanent changes to the tundra. Such changes are often the result of damage to vegetation, compaction of the surface organic mat and underlying soils, or a combination of these factors. Vegetation and the surface organic mat help to insulate underlying permafrost. If this insulating layer is damaged or destroyed, the thermal regime in the soil will be altered and the depth of seasonal thaw may increase substantially. Thawing of ice-rich permafrost may lead to considerable subsidence of the local land surface. In the flat terrain of the Barrow area, even small changes in land-surface elevation can have large effects on drainage patterns, and the formation of new lakes where surface disturbances have occurred is common. Once a lake has formed, the thermal regime of the underlying permafrost is further disturbed by heat from the water. Thawing of permafrost beneath the lake may thus occur, resulting in further subsidence of the lake bed and gradual expansion of the lake. This process is similar to the natural cycle of lake formation, expansion, and drainage—referred to as the thaw-lake cycle—which occurs commonly on the Arctic Coastal Plain (Billings and Peterson, 1980; Edwards and Brigham-Grette, 1990; Harry and French, 1983; Kidd, 1988).

Lakes in the Barrow area are also highly susceptible to degradation. One reason for this susceptibility is the process of concentration by freezing. As the surface freezes, impurities in the water tend to be excluded from the ice and are thus concentrated in the remaining unfrozen water. Because of this phenomenon, water quality in lakes and lagoons generally decreases throughout the winter and spring as the ice cover grows and the volume of unfrozen water decreases. In lakes and lagoons that remain partially unfrozen year round, water quality is generally poorest just prior to the thaw season, when the volume of unfrozen water is smallest. Water-quality problems in the Arctic are further exacerbated by the limited availability of water. Annual runoff on the Arctic Coastal Plain averages approximately 110 mm (Dingman and other, 1980) and a large part of this limited runoff occurs during the brief snowmelt period, typically no more than 2 weeks in duration. A considerable portion of this snowmelt runoff occurs while lakes and lagoons are still covered with ice. As a result, a portion of the annual inflow to surface-water bodies commonly flows over the ice cover and leaves through the outlet of the lake without mixing with the water beneath the ice. Dilution of the water remaining beneath the ice with fresh snowmelt water is thus reduced.

The arctic environment also has a limited capacity to attenuate contaminants in soil and active-layer water. Low soil temperatures restrict the activity of microorganisms and thus reduce rates of biodegradation. The presence of near-surface permafrost also decreases the ability of the environment to attenuate contamination by restricting the downward flow of water, thereby reducing the dilution of contaminants by dispersion.

The environment in the Barrow area is clearly sensitive to both physical disturbances and chemical contamination resulting from human activity. Potential damage to the environment from such activities is of particular interest to the community because the subsistence lifestyle of many residents makes them highly dependent on the environment for their livelihood.

HYDROLOGY

The proximity of permafrost to the surface and the great depths to which it extends largely control hydrology in the Barrow area. Permafrost is much less permeable than unfrozen ground and thus acts as a hydrologic confining layer, limiting the vertical movement of water. The presence of this shallow confining layer greatly impedes infiltration and, as a result, water remains at the surface or within the shallow subsurface. The permafrost thus isolates the near-surface flow system, including surface water and ground water within the active layer, from the deeper, regional flow system. Beneath the ocean and deep lakes, however, thermal taliks (thaw bulbs) may penetrate the entire thickness of the permafrost. Chemical taliks—subsurface zones that remain unfrozen because of the chemical composition of the water—also occur in the Barrow area as a result of saline ground water. High-salinity ground water is common throughout the region, particularly beneath the active layer. In some cases, therefore, thermal or chemical taliks may form conduits between the active layer and deeper ground water. Flow through such conduits will be negligible, however, because salinity, and therefore density, generally increase with depth. Relatively fresh shallow ground water and deeper saline ground water will thus tend to remain stratified.

In addition to the presence of permafrost, the limited relief of the tundra contributes to the unique hydrology of the Barrow area. This limited relief greatly impedes drainage and, as a result, lakes and ponds are ubiquitous, and few well-developed stream channels exist. The flat terrain also affects the configuration of drainage basins. Because even slight topographic highs often serve as drainage divides in this region, relatively small changes in the surface, such as soil cracks and the formation of ice-wedge polygon troughs, can breach these divides and significantly alter areal drainage patterns. Unmelted snow drifts and plugging of streams, polygon troughs, or culverts by ice can also result in temporary changes in surface drainage patterns. Although such surface-drainage phenomena are more evident, formation of polygon troughs and differential thawing of the active layer may lead to analogous changes in subsurface drainage patterns and, hence, ground-water flow directions. Furthermore, as a result of the limited vertical thickness of the active layer, distinct ground-water flow regimes in this shallow system are likely to exist at scales ranging from centimeters to tens of meters rather than at more extensive, regional scales. For example, the depth of thaw within ice-wedge polygons may not extend below the level of the polygon troughs. In such cases, no areally continuous ground-water flow system will exist and ground water within each polygon will discharge into the adjacent polygon trough.

Sublimation, evaporation, and transpiration are also significant to hydrologic budgets of the Arctic Coastal Plain. Average annual recorded precipitation of less than 120 mm (table 1) qualifies the Barrow area as a desert (Skinner and Porter, 1987). Average annual runoff for the nearby Nunavak Creek basin (fig. 1) is 119 mm (U.S. Geological Survey, 1993). Relative to these values for annual precipitation and runoff[1], estimates of annual evaporation, transpiration, and sublimation, though they vary considerably among sources, are high. Dingman and others (1980) report estimates ranging from 60 mm per thaw season to 210 mm per year, on the basis of data from Brown and others (1968), Weller and Holmgren (1974), and Stewart and Rouse (1976). Evaporation, transpiration, and sublimation are thus substantial components of the annual hydrologic budget in the Barrow area.

[1]The similarity between average annual recorded precipitation and average annual runoff values reflects the fact that precipitation data do not account for the gage inefficiencies discussed in the "Climate" section.

Annual Hydrologic Cycle

Arctic Coastal Plain hydrology is largely controlled by the region's climate and the presence of near-surface permafrost. The annual pattern of mean air temperature in the area (table 1) results in an annual hydrologic cycle that can be described in terms of four periods: winter, snowmelt, summer, and freeze-up. Each period is characterized by distinct hydrologic processes.

Winter

The winter season in the Barrow area typically begins during late September and lasts through early to mid-June. During the winter, streams do not flow, freshwater lakes less than approximately 2 m in depth freeze to the bottom, and the subsurface is frozen from land surface to depths of up to 300 m (Collins, 1961). Nonetheless, three important hydrologic processes occur during this season: the accumulation of snow, sublimation from the snowpack, and redistribution of soil moisture.

Although the snow cover of the Arctic Coastal Plain is generally shallow (less than 0.5 m except in wind drifts), winter snowfall often accounts for more than half of the annual precipitation recorded for the Barrow area. Considerable moisture is lost from the snowpack, however, as a result of sublimation and evaporation. These high loss rates are caused by strong temperature gradients and air convection within the snowpack and shallow soil, which produce a substantial upward flux of water vapor. In addition to depleting the snowpack, the upward movement of moisture desiccates the shallow soil and surface vegetative mat. (This desiccation may result in the formation of salt crystals at the ground surface.)

Snowmelt Period

The snowmelt period, which marks the transition from winter to summer in the Arctic, generally begins during early to mid-June. A considerable part of the snowpack dissipates within the first few days, and except for isolated, sheltered patches, snow is usually completely gone within approximately 2 weeks. Streamflow during this brief period is considerable in arctic basins, and may constitute as much as 90 percent of the annual runoff (Church, 1988). A typical hydrograph for Nunavak Creek (fig. 2A) illustrates this phenomenon. Although runoff is high during this period, a substantial part of the snowpack is lost to the atmosphere through evaporation and sublimation. These processes are complex during the snowmelt period, especially after the snow cover becomes discontinuous. Large variations in surface albedo, and hence temperature, occur between the remaining snow cover and exposed ground surface and these variations result in complex spatial patterns of evaporation and condensation.

Infiltration during the snowmelt period is limited. Although the upper layer of soil is desiccated as a result of the upward migration of soil moisture during the winter, only shallow thawing of the active layer occurs during the snowmelt period. Meltwater penetrating the soil surface thus freezes, which initially limits infiltration. However, cracks in the soil, including ice-wedge polygon troughs, and other local depressions in the land surface can retain substantial quantities of water. Once the snowpack becomes discontinuous, radiative heating of the exposed darker surface promotes thawing of the active layer, allowing available water to infiltrate. After the existing soil-moisture deficit has been satisfied, excess infiltration provides recharge to the active layer groundwater system.

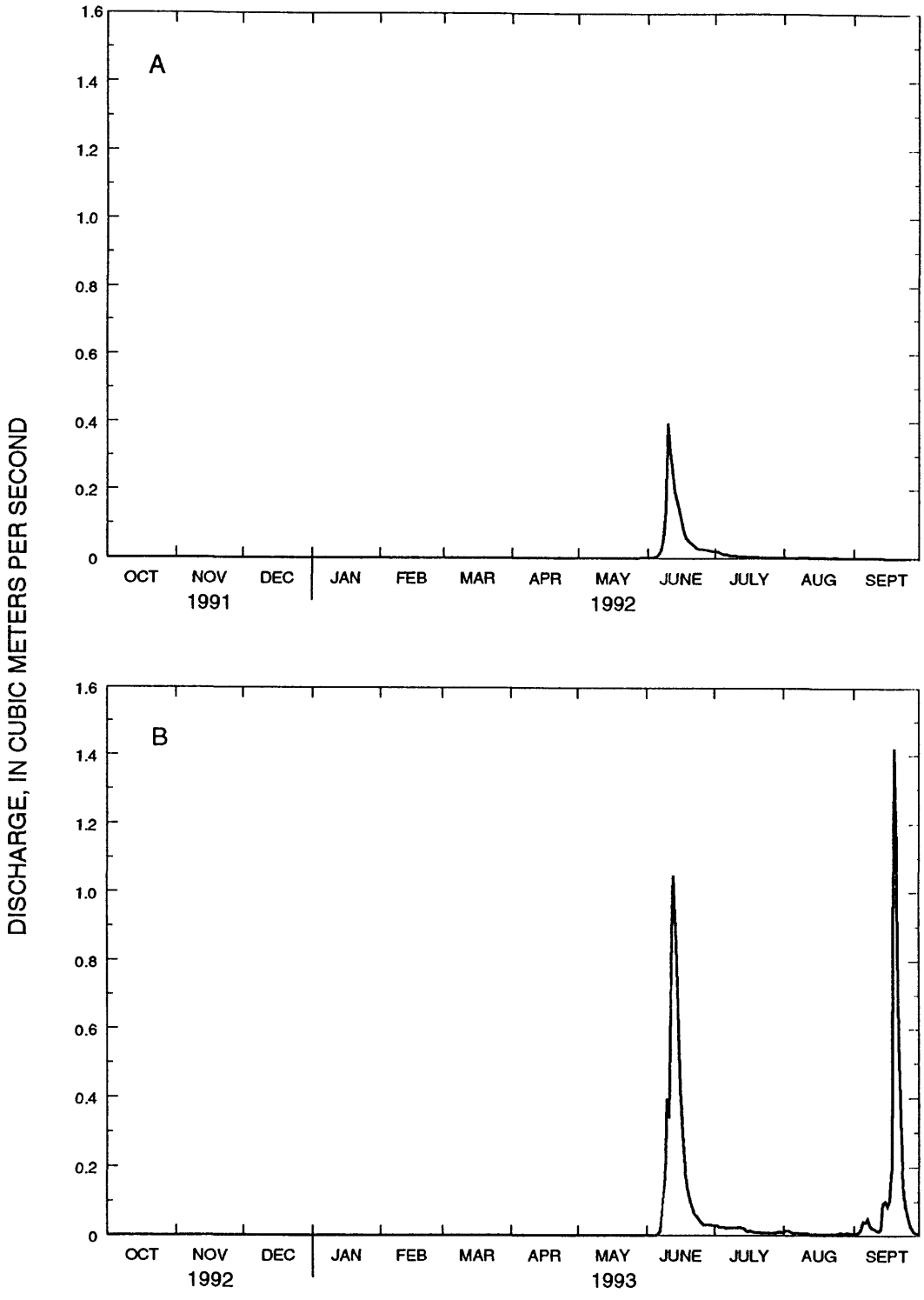


Figure 2. Discharge for Nunavak Creek, water years 1992 and 1993.

In contrast to the snowpack, only part of the ice covering lakes and lagoons melts during this period. During the early part of the snowmelt period, water surfaces remain covered by ice, and snowmelt runoff into lakes and lagoons occurs on top of the ice. Ice is generally thinnest at the shallow edges of surface-water bodies. As thawing progresses, these edges of the ice cover disintegrate most quickly, producing a thawed moat around a frozen interior. When the entire circumference of the frozen surface has thawed, the remaining ice floats free and rises to the surface. This initially massive ice block typically requires several more weeks to melt completely. During this period, winds continually shift the ice, resulting in substantial lake turbulence and shore erosion.

Summer

The short summer season in the Barrow area begins at the end of the snowmelt period (usually during mid- to late June) and typically extends through late August or early September. Important hydrologic processes that occur during the summer season include evapotranspiration; delayed movement of snowmelt water that has been temporarily stored in lakes, small ponds, or the subsurface; and development of the subsurface active layer.

As during the snowmelt period, the rate of water loss to the atmosphere continues to be high throughout the summer, and a number of studies in the Barrow area indicate that evapotranspiration and precipitation are approximately equal during this period (Brown and others, 1968; Dingman and others, 1980; Guymon, 1976; Mather and Thornthwaite, 1958). Consequently, summer precipitation does not usually contribute substantially to annual runoff. This is illustrated for the Nunavak basin in figure 2A, which shows very limited runoff following the snowmelt peak during June. Occasionally, however, this pattern is altered (fig. 2B). A period of unusually high precipitation and warm temperatures during September 1993 resulted in a second runoff peak in Nunavak Creek. This was the first time during the period for which streamflow records are available for Nunavak Creek (1972 to present) that the peak annual flow occurred outside the snowmelt period (U.S. Geological Survey, 1994).

Thawing of the active layer begins during the snowmelt period and continues throughout the summer. While investigating the development of the active layer in a small basin northeast of Barrow, Brown and others (1968) found that thaw penetration usually reached 75 percent of its maximum by early July and maximum penetration was typically reached by mid-August. Flow in the shallow ground-water system of the active layer can occur throughout the thaw season, but studies in areas of undisturbed tundra suggest that the flow is minimal (Dingman and others, 1980). In addition to the low hydraulic conductivity of the soils and the small hydraulic gradients typical in flat terrain, ground-water flux in such areas is limited both by the shallow depth of thaw and the large capacity of the fine-grained tundra soils to hold capillary water.

Freeze-Up

The final phase of the annual hydrologic cycle begins as temperatures drop below freezing, usually during late August or September, and the transition from summer to winter begins. As surface water freezes and precipitation falls as snow, streamflow decreases and generally ceases altogether during late September. The ground surface cools and freezes, and the freezing front progresses downward through the active layer. Although some freezing occurs upward from the

top of the permafrost that marks the bottom of the active layer, freezing from land surface downward is generally much faster. During this period, accumulation of snow and desiccation of the active layer begin. Soil desiccation during this period results from downward migration of the upper freezing front. As soil moisture in the surface layer freezes, pore pressure within the soil matrix is reduced and moisture from underlying soil migrates upward in response to this pressure gradient. Kane and Chacho (1990) provide a discussion of the complex processes of moisture migration in freezing soils.

Flooding and Storm Surges

Flooding of streams resulting from high runoff volumes is generally not a serious problem in the Barrow area, although some flooding of low-lying areas does occur as a result of rapid snowmelt in the late spring and early summer. Conversely, inundation of coastal areas by storm surges, also referred to as storm tides, has had catastrophic effects. The astronomical tide at Barrow, with a total amplitude of less than 30 cm, is relatively insignificant. However, rises in sea level resulting from atmospheric low-pressure systems coupled with onshore winds can be substantial. In the Barrow area, the presence of ocean ice has a damping effect on both waves and storm surges. Even when the ice moves offshore in the summer, it is usually near enough to have some mitigating effects. Occasionally, however, ice moves far enough offshore to allow substantial storm tides to develop. The largest storm surge on record for the Barrow area occurred in October 1963 and had an estimated maximum tide of approximately 3.7 m (Hume and Schalk, 1967). Because the natives of Barrow had no recollections of storms equal to or greater in magnitude than the 1963 storm, Hume and Schalk (1967) considered the event to approximately represent a storm with a 200-year recurrence interval.

One of the potentially devastating effects of storm surges such as the one that occurred in 1963 is the inundation of coastal freshwater lakes by saltwater. For example, Imikpuk Lake, located approximately 7 km northeast of Barrow (fig. 1), was inundated with saltwater during the 1963 storm surge. The lake serves as the potable water supply for the Ukpeagvik Inupiat Corporation National Arctic Research Laboratory (formerly, the Naval Arctic Research Laboratory), and had to be annually pumped dry and allowed to refill with freshwater for three consecutive years following the storm surge (M.C. Brewer, U.S. Geological Survey, oral commun., 1994).

Transport of Contaminants by Surface and Ground Water

Because both streams and the active layer ground-water system in the Barrow area remain frozen for most of the year, transport of contaminants by flowing water would be restricted to the brief thaw season. Directions of surface transport could be highly variable as a result of changes in drainage patterns resulting from soil cracks, snow drifts, or the plugging of streams, polygon troughs, or culverts by ice. Directions of ground-water transport could also vary considerably as a result of ice-wedge polygon formation, differential thawing as the active layer develops throughout the summer, and the small scales at which distinct flow regimes exist in the shallow active layer flow system. These changes in directions of surface- and ground-water flow are likely to occur over the course of individual thaw seasons, as well as from year to year.

The large volume of runoff that occurs during the snowmelt period—up to 90 percent of the annual total—has important implications for environmental contamination. Because flowing water is a primary mechanism of contaminant transport, most of the annual migration of surface contaminants may occur during this brief period.

Storm surges may also transport contaminants. It is possible that a storm surge, within a period of hours, could transport contaminants over distances that would take several years, or even decades, under more typical conditions. Furthermore, storm-surge transport may occur in directions contrary to prevailing flow paths.

DRINKING WATER

Water supply poses a unique challenge in the Arctic. One of the primary difficulties in developing reliable, year-round water supplies is the short open-water season. Most freshwater lakes in the Barrow area are less than 2 m in depth and thus freeze completely during the winter. Esatkuat Creek and Nunavak Creek are the only substantial streams in the area. Esatkuat Creek drains an area of approximately 3.7 km^2 to the southeast of the FAA facility and discharges into Esatkuat Lagoon, which is located approximately 2 km to the north and east of the station (fig. 1). Nunavak Creek drains an area of approximately 7.2 km^2, including Emaiksoun Lake, approximately 4 km south of Barrow, and discharges to Nunavak Bay, approximately 5 km southwest of the city (fig. 1). Flow in both of these streams, however, is limited to the short thaw season (fig. 2).

Another important consideration in developing water supplies in the Arctic is the construction and maintenance of storage, treatment, and distribution systems. The extreme climate and the presence of permafrost make construction of these systems challenging and expensive, particularly if water must be distributed a considerable distance from its source.

Present Drinking Water Supply

Esatkuat Lagoon, which lies approximately 2 km to the north and east of the FAA facility (fig. 1), remains partially unfrozen year round. The lagoon is separated into sections by artificial berms and the upper lagoon serves as the primary source of drinking water for the City of Barrow. Water drawn from the lagoon is treated by filtration and distributed through a utilidor system to multiple watering points throughout the city. Approximately 97 percent of the housing units in Barrow are served by this distribution system (Alaska Department of Community and Regional Affairs, 1991). Water use averages less than 200,000 L/d. However, demand peaks in winter, and monthly usage during this period can exceed 850 million liters (Alaska Consultants, Inc., 1983).

Alternative Drinking-Water Sources

Few alternative sources of drinking water are available in the Barrow area because, as discussed previously, streamflow ceases entirely during the winter, and only a small number of lakes, including Emaiksoun and Imikpuk Lakes (fig. 1), remain partially unfrozen year round. Even these lakes, however, are not well suited as alternative drinking water sources for the city because of their limited volumes and relatively distant locations.

Development of ground water as an alternative source of drinking water has proven to be impractical in the Barrow area and currently no water wells are in use (Alaska Department of Community and Regional Affairs, 1991). Shallow ground water within the active layer is not suitable as a source of drinking water for two reasons. First, this water remains frozen for most of the year and second, even during the period of maximum thaw, the volume of water available in this shallow system is not adequate to meet the needs of even a small part of the City of Barrow. Some attempts have been made to explore the availability of deeper, subpermafrost ground water, but in many places the permafrost is too extensive to allow economical development of this water. Furthermore, subpermafrost ground water is generally too saline to serve as a source of drinking water. In a few places, such as beneath Esatkuat Lagoon, unfrozen ground water has been found at shallower depths (J.B. O'Sullivan and R.W. Faas, consulting geologists, written commun., 1962). However, this water is unfrozen as a result of its high salinity, which is approximately twice that of sea water, and is thus unsuitable as a source drinking water.

Melted snow and ice have been used as sources of water in many areas (Grainge, 1969; Ryan, 1990; Williams, 1974). However, such sources are seldom satisfactory for large, long-term settlements. One of the primary drawbacks of utilizing melted snow and ice as long-term sources of water is the large amount of fuel required for the melting process. The expense of fuel tends to make this an economically prohibitive source of water for most communities.

Desalinization of deep ground water or seawater could theoretically provide an alternative source of drinking water for the community of Barrow. However, similar to other alternatives, construction, operation, and maintenance of a desalinization facility in the extreme Barrow climate would be expensive.

SUMMARY

The Barrow area is characterized by an arctic climate, which is reflected in the landscape features, vegetation, wildlife, and annual hydrologic cycle of the area. Because of its remote location and the extreme climate, air travel is the only year-round means of transportation that is available for either passengers or freight. This isolation is one reason that many residents continue to adhere to the traditional subsistence lifestyle followed by previous generations. The community is thus heavily dependent on the natural arctic environment, which is particularly susceptible to damage by human activity. Disturbance of the land surface, for example, may result in changes in the thermal regime of the underlying permafrost and lead to long-term changes in the landscape. Contamination of surface water, ground water, or soil can also be especially damaging in the arctic. The short open-water season, limited recharge, low rates of biodegradation, and restricted vertical movement of ground water all reduce the environment's capacity to attenuate contamination.

The most important factors governing hydrological processes in the Barrow area are the short open-water season, presence of near-surface permafrost, and limited variations in land-surface elevation over large distances. Because of the short open-water season, both surface and shallow ground-water flow are limited to the brief thaw season each year. The thaw season typically extends from early or mid-June through late September, but a substantial percentage of the annual runoff—up to 90 percent—occurs within the first 2 weeks. However, the subsurface is still largely frozen during this period, and ground-water flow in the active layer is negligible.

The subsurface flow system thaws gradually over the summer, typically reaching its maximum depth by mid-August. The presence of near-surface permafrost limits the vertical extent of this shallow flow system and restricts vertical ground-water flow, thereby impeding drainage. As a result, surface water and shallow ground water tend to be isolated from the deeper, regional ground-water flow system.

As a result of the limited relief of the tundra surface, few well-developed stream channels exist, and a substantial part of surface-water flow occurs in ice-wedge polygon troughs and other small channels. As a result of the limited relief and limited depth of thaw, distinct flow regimes in the shallow ground-water system often occur over distances ranging from centimeters to tens of meters. The local scale of both the surface-water and ground-water flow systems can result in considerable variations in the magnitude and direction of flow over relatively small distances.

In the Barrow area, transport of contaminants by either surface or ground water would be limited to the brief thaw season each year. Transport by both surface and ground water would likely be complex, however, due to changes in these flow systems that occur over the course of individual thaw seasons, as well as from year to year. The majority of the annual migration of surface contaminants would probably take place during the snowmelt period, when most of the annual runoff occurs. However, even during this brief period, directions of surface transport could vary considerably as a result of soil crack formation, snow drifts, or the plugging of flow channels by ice or snow. Transport by active-layer ground water would occur more gradually over the course of the thaw season, but directions of subsurface transport could also vary considerably as a result of ice-wedge polygon formation, differential thawing as the active layer develops throughout the summer, and the small scales at which distinct flow regimes exist in this shallow flow system. In addition to the usual annual migration of contaminants via surface or ground water, storm surges could result in the transport of contaminants over distances that would typically take several years.

Esatkuat Lagoon, located approximately 2 km to the north and east of the FAA facility, is the present drinking-water supply for the City of Barrow. Lakes, streams, ground water, snow, ice, and seawater are also available in the area, but are not suitable as alternative sources of drinking water because of limited volume, poor quality, high development costs, or because they are thawed for only a short period each year.

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BARROW POST ROGERS AP, ALASKA (500546)

Period of Record Monthly Climate Summary

Period of Record : 09/01/1901 to 06/09/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	-7.4	-10.6	-7.9	7.0	24.7	38.9	45.8	43.3	34.9	20.7	5.8	-4.4	15.9
Average Min. Temperature (F)	-19.9	-22.7	-20.6	-6.8	15.3	30.1	34.1	34.0	28.2	11.6	-5.4	-16.2	5.1
Average Total Precipitation (in.)	0.18	0.17	0.13	0.18	0.17	0.34	0.91	1.02	0.68	0.49	0.25	0.17	4.67
Average Total SnowFall (in.)	2.4	2.7	2.0	2.8	2.3	0.6	0.3	0.7	4.0	7.7	4.3	2.8	32.5
Average Snow Depth (in.)	9	10	11	11	7	1	0	0	1	4	7	8	6

Percent of possible observations for period of record.
Max. Temp.: 99.9% Min. Temp.: 99.8% Precipitation: 99.9% Snowfall: 99.7% Snow Depth: 99.7%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

KETCHIKAN INTL AP, ALASKA (504590)

Period of Record Monthly Climate Summary

Period of Record : 09/01/1910 to 06/09/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	38.9	41.8	44.0	50.0	56.4	61.5	64.9	65.2	59.9	51.8	44.5	40.5	51.6
Average Min. Temperature (F)	28.6	31.1	32.1	36.0	41.4	47.3	51.2	51.6	47.3	40.8	34.5	31.1	39.4
Average Total Precipitation (in.)	14.05	12.67	11.25	11.05	9.44	7.33	7.53	10.83	14.47	22.20	17.28	15.63	153.73
Average Total SnowFall (in.)	13.3	8.9	3.4	0.3	0.1	0.0	0.0	0.0	0.0	0.1	2.3	8.6	36.9
Average Snow Depth (in.)	3	3	1	0	0	0	0	0	0	0	0	1	1

Percent of possible observations for period of record.
Max. Temp.: 87.3% Min. Temp.: 87.3% Precipitation: 87.6% Snowfall: 66.9% Snow Depth: 61.8%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

KUPARUK, ALASKA (505136)

Period of Record Monthly Climate Summary

Period of Record : 02/01/1983 to 06/09/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	-11.3	-10.9	-8.4	8.7	28.1	47.4	56.0	50.8	39.2	21.5	4.0	-4.7	18.4
Average Min. Temperature (F)	-23.9	-24.0	-22.6	-6.3	17.0	33.0	39.0	36.9	28.9	10.9	-8.9	-17.8	5.2
Average Total Precipitation (in.)	0.13	0.17	0.08	0.14	0.07	0.32	0.87	1.06	0.48	0.35	0.16	0.13	3.96
Average Total SnowFall (in.)	2.6	2.5	2.2	2.8	1.7	0.5	0.0	0.3	3.0	8.4	4.6	3.5	32.0
Average Snow Depth (in.)	9	9	9	10	5	0	0	0	0	3	6	7	5

Percent of possible observations for period of record.
Max. Temp.: 94.1% Min. Temp.: 94.1% Precipitation: 94.3% Snowfall: 94.2% Snow Depth: 94.2%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

WAINWRIGHT, ALASKA (509729)

Period of Record Monthly Climate Summary

Period of Record : 09/20/1935 to 01/31/1969

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	-6.4	-12.9	-8.3	7.9	26.9	41.6	50.0	47.3	36.7	23.0	8.0	-5.5	17.4
Average Min. Temperature (F)	-21.2	-26.9	-22.4	-6.8	15.2	30.3	36.3	36.1	28.1	12.2	-4.7	-18.6	4.8
Average Total Precipitation (in.)	0.15	0.10	0.15	0.30	0.20	0.26	1.57	2.06	0.56	0.77	0.17	0.08	6.35
Average Total SnowFall (in.)	0.9	1.1	0.2	-99.0	0.2	0.0	0.0	0.0	1.2	0.0	0.0	0.8	-99.0
Average Snow Depth (in.)	6	7	8	9	9	4	0	0	0	2	4	5	4

Percent of possible observations for period of record.
Max. Temp.: 87% Min. Temp.: 87% Precipitation: 93.3% Snowfall: 17.7% Snow Depth: 94.2%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Appendix C
Interview Record



Preliminary Assessment for Per- and Polyfluoroalkyl Substances at Former Naval Arctic Research Laboratory Barrow and Associated Special Areas Utqiaġvik, Alaska

NOTIFICATION: THIS APPENDIX CONTAINS SENSITIVE BUT UNCLASSIFIED INFORMATION WHICH IS PROTECTED BY THE FREEDOM OF INFORMATION ACT

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