UNITED STATES AIR FORCE

Eielson Air Force Base, Alaska

Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply

FINAL

JUNE 2019

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

%	percent
°F	degrees Fahrenheit
µg/L	micrograms per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AFFF	aqueous film-forming foam
ARARs	applicable or relevant and appropriate requirements
bgs	Below ground surface
CCL	Contaminant Candidate List
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWMA	Critical Water Management Area
DoD	Department of Defense
EAFB	Eielson Air Force Base
EPA	U.S. Environmental Protection Agency
GAC	granular activated carbon
HA	health advisory
IC	Institutional Controls
IFS	Interim Feasibility Study
IPP	Interim Proposed Plan
I-ROD	Interim Record of Decision
IRP	Installation Restoration Program
LUC	land use control
NCP	National Contingency Plan
NPL	National Priorities List
NPV	net present value
PFAS	per- and polyfluoroalkyl substances
PFC	perfluorinated compound
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PHA	provisional health advisory
PTW	principal threat waste
RAO	remedial action objective
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SEMS	Superfund Enterprise Management System
TBC	To Be Considered
TCRA	time-critical removal action
UECA	Uniform Environmental Covenants Act
USAF	U.S. Air Force
USC	United States Code

UU/UE	Unrestricted Use and Unlimited Exposure
WTP	Water Treatment Plant

PART 1 DECLARATION

1.1 SITE NAME AND LOCATION

The community of Moose Creek, Alaska, is located approximately 120 miles south of the Arctic Circle, 21 miles southeast of Fairbanks, and 7 miles southeast of the City of North Pole, as illustrated on **Figure 1-1**. The Moose Creek community is situated adjacent to the northern boundary of Eielson Air Force Base (EAFB), which is included in the Superfund Enterprise Management System (SEMS) under U.S. Environmental Protection Agency (EPA) Identification Number AK1570028646. Contaminants originating from sources within EAFB have migrated off-base and are impacting the groundwater that the community of Moose Creek uses as its domestic water source.

1.2 STATEMENT OF BASIS AND PURPOSE

This Interim Record of Decision (I-ROD) presents the selected interim remedy for the community of Moose Creek, Alaska. This interim action is limited in scope and addresses only provision of an alternative drinking water supply to the community of Moose Creek. Remediation of the contaminated groundwater will also be addressed in a Final Record of Decision (ROD). The selected interim action is required to protect human health in the short-term while a final remedial solution is being developed. This I-ROD will be followed by a Final ROD.

The interim remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record file for the community of Moose Creek and EAFB, and the references cited in this I-ROD are listed in **Appendix A**. The State of Alaska concurs that, when properly implemented, the interim remedy will comply with State Law.

1.3 ASSESSMENT OF THE SITE

The per- and polyfluoroalkyl substances (PFAS), perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) have migrated from contaminant sources on EAFB to the community of Moose Creek's groundwater, which is used to supply the community's drinking water. Detected concentrations of PFOS and PFOA in the Moose Creek community's groundwater exceed the EPA's 2016 lifetime drinking water health advisory (HA) for PFOS (USEPA, 2016a) and for combined PFOS+PFOA (USEPA, 2016a, 2016b). PFOS and PFOA are not CERCLA-listed hazardous substances, but in some circumstances could be responded to as CERCLA pollutants or contaminants; therefore, the U.S. Air Force (USAF) is following the CERCLA process to address potential risks from exposure to these PFASs (USAF, 2016). The interim response action selected in this I-ROD is necessary to protect public health or welfare from actual or threatened releases of pollutants or contaminants from EAFB which may present an imminent and substantial endangerment to public health or welfare of the community of Moose Creek.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The selected interim remedy is limited in scope and addresses only the provision of an alternative domestic water supply to the community of Moose Creek. The selected interim action is designed to protect human health in the short-term while a comprehensive final remedial solution, which will be documented in a Final ROD, is being developed.

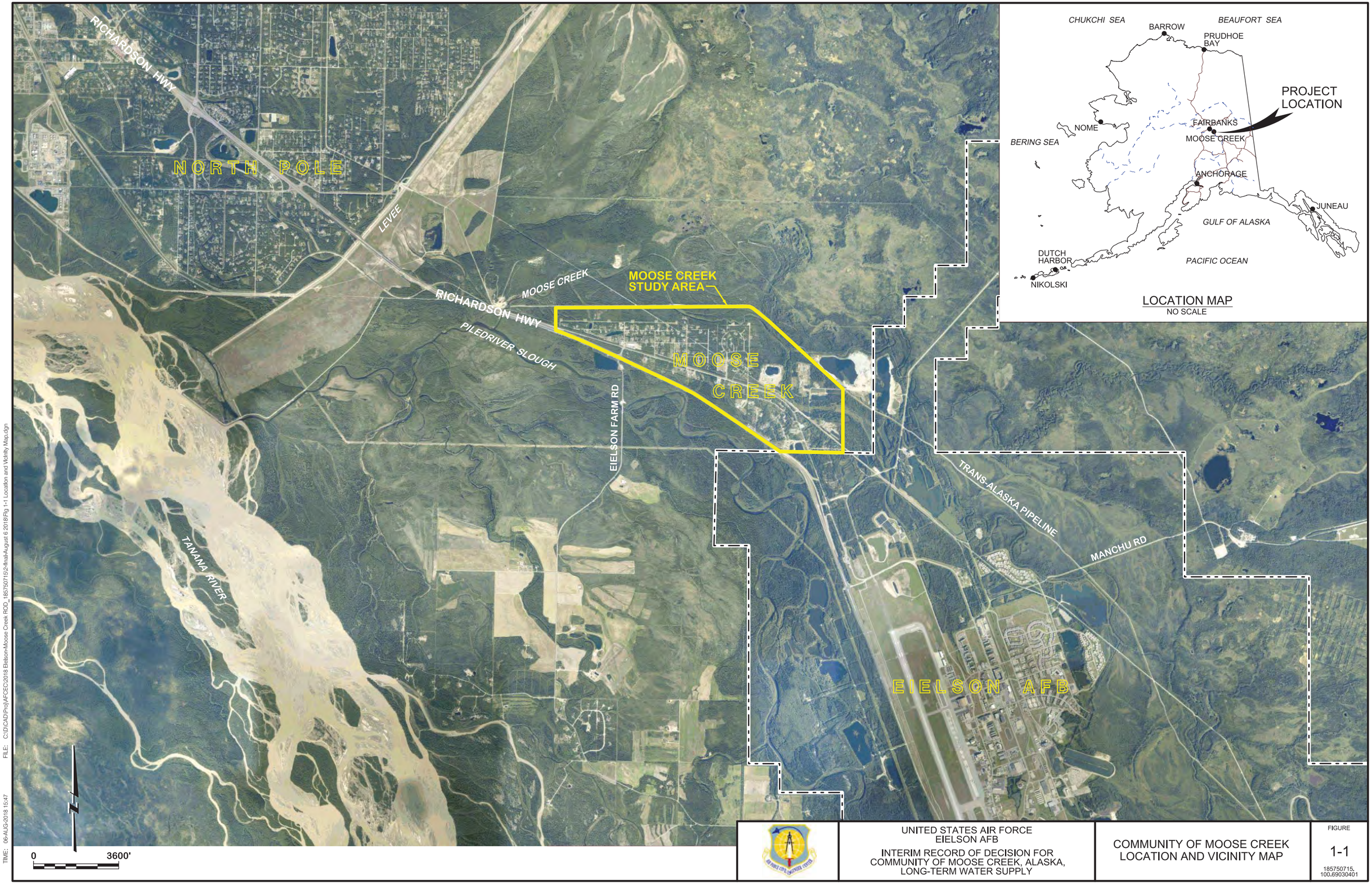
The selected interim remedy is to provide potable water supplied by the City of North Pole Water Treatment Plant (WTP) to the community of Moose Creek. This interim remedy does not address principal threat waste (PTW). Identification of PTW and approaches to address any identified PTW will be addressed in the Final ROD. A PTW is normally defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to ground water.

Following are the major components of the selected remedy:

- A new water main will be installed to connect the City of North Pole WTP to the community of Moose Creek. A local distribution system, holding tank, and circulation pumping station will be constructed to serve the community, and local connections will be made to affected properties in the community of Moose Creek.
- The new system will be maintained and operated by the North Pole Municipality, which will collect water use charges from property owners, and operate and maintain the system for the residents of Moose Creek.
- Land use controls (LUCs) will be required to prohibit the use of contaminated groundwater. The LUCs will include a Critical Water Management Area (CWMA), which will be established to prevent the use of contaminated groundwater and prohibit the installation of new water wells within the CWMA.
- The Alaska Uniform Environmental Covenants Act (UECA) will require the recording of environmental covenants on all impacted real properties in accordance with Alaska statutory law. The USAF will negotiate agreements with impacted landowners to: 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit future well installation/ contaminated-groundwater use.
- In addition, the previously installed water tanks and granular activated carbon (GAC) systems will be removed, and tanker and bottled water delivery would stop.

1.5 STATUTORY DETERMINATIONS

This interim action is: protective of human health and the environment for the exposure pathway addressed by this action and is intended to provide adequate protection until a Final ROD is signed; complies with those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action; and is cost-effective. This action is an interim solution only and is not intended to utilize alternative treatment or resource recovery technologies to the maximum extent practicable for the community of Moose Creek.



LOCATION MAP
NO SCALE

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR
COMMUNITY OF MOOSE CREEK, ALASKA,
LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK
LOCATION AND VICINITY MAP

FIGURE
1-1
185750715,
100.69030401

FILE: C:\DICADProj\AFCEC\2018 Eielson-Moose Creek ROD_185750715\2-final-August 6 2018\Fig 1-1 Location and Vicinity Map.dgn
TIME: 06-AUG-2018 15:47

(This page intentionally left blank.)

Because this action does not constitute the final remedy for the community of Moose Creek, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action.

Subsequent actions are planned to address fully the threats posed to human health and the environment by conditions at the community of Moose Creek, but it is anticipated that this interim action will remain to be incorporated into the final action. Because this remedy will result in contaminants remaining on-site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health within 5 years after commencement of the remedial action and be conducted every 5 years thereafter. Because this is an I-ROD, review of this site and remedy will be ongoing as the USAF continues to develop remedial alternatives for the community of Moose Creek.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in Part 2, the Decision Summary section of this I-ROD, starting on Page 2-1:

- Chemicals of concern and their respective concentrations – Section 2.7.1.1 (Page 2-6).
- Baseline risk represented by the chemicals of concern – Section 2.7 (Page 2-6).
- Action levels established for chemicals of concern and the basis for these levels – Section 2.8, Table 2-1 (Page 2-14).
- How source materials constituting principal threats are addressed – Section 2.11 (Page 2-37).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and I-ROD – Section 2.6 (Page 2-6).
- Potential land and ground water use controls that will be required as a result of the selected remedy – Section 2.12.2 (Page 2-37).
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected – Section 2.12.3 (Page 2-43).
- Key factors that led to selecting the remedy – Section 2.12.1 (Page 2-37).

Additional information can be found in the Administrative Record file for the community of Moose Creek and EAFB.

(This page intentionally left blank.)

1.7 AUTHORIZING SIGNATURES

Lead Agency Selection

This signature documents the U.S. Air Force's selection of the remedy contained in the Interim Record of Decision for the community of Moose Creek, Alaska, Long Term Water Supply.

ROBERT J. BACKLUND, P.E., GS-14, DAF

6/5/19
Date

Deputy Director, Environmental Management Directorate

(This page intentionally left blank.)

U.S. EPA Concurrence Page

This signature sheet documents the U.S. Environmental Protection Agency's concurrence of the remedy contained in the Interim Record of Decision for the community of Moose Creek, Alaska, Long Term Water Supply.

Sheryl Bilbrey — 6/10/19

SHERYL BILBREY — Date

Director
Superfund Emergency Management Division, Region 10
U. S. Environmental Protection Agency,

(This page intentionally left blank.)

ADEC Concurrence Page

The State of Alaska Department of Environmental Conservation agrees that, if properly implemented, the selected remedies for the Community of Moose Creek, Alaska Long Term Water Supply will comply with State law. This decision will be reviewed and may be modified in the future if information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health.

JOHN HALVERSON — 6/6/2019 Date

Environmental Program Manager,
Alaska Department of Environmental Conservation

(This page intentionally left blank.)

PART 2 DECISION SUMMARY

The Decision Summary (Part 2) of the I-ROD provides an overview of the site characteristics, alternatives evaluated, and the analysis of those options. This part of the I-ROD also identifies the selected interim remedy and explains how the remedy fulfills statutory and regulatory requirements.

2.1 SITE NAME, LOCATION, AND DESCRIPTION

The community of Moose Creek, Alaska, is located approximately 120 miles south of the Arctic Circle, 21 miles southeast of Fairbanks, and 7 miles southeast of the City of North Pole, as illustrated on Figure 1-1. Moose Creek is located within the Fairbanks North Star Borough of central Alaska. The Moose Creek community is situated adjacent to the northern boundary of EAFB, which is included in SEMS under Identification Number AK1570028646. Contaminants originating from sources within EAFB have migrated off-base and are impacting the groundwater that the community of Moose Creek uses as its drinking water source (USAF, 2017b). The Moose Creek community is the only populated area outside of EAFB currently affected by PFOS/PFOA contamination from the base.

The community of Moose Creek stretches from approximately 1 to 3 miles downgradient of EAFB. Approximately 750 people live in the community of Moose Creek, and land use includes residential and industrial activities (USAF, 2017b). There are over 170 water wells identified within the community of Moose Creek.

EAFB is an active military installation that has been used for military operations since its establishment in 1944. The base is in the Tanana River Valley along the northern bank of the river on a low, relatively flat, floodplain terrace approximately 2 miles from the active river channel. EAFB participates in the Installation Restoration Program (IRP), a program established in 1978 under which the U.S. Department of Defense (DoD) seeks to identify, investigate, and clean up contamination from hazardous materials and pollutants or contaminants. A wide variety of source areas have been identified at EAFB, including: closed and active unlined landfills, drum storage area(s), fuel spill areas, fire training areas, and other disposal or spill areas (USAF, 2017a). EAFB was listed on the National Priorities List (NPL) in 1989 (54 Federal Register [FR] 48184) by the EPA due to historical contamination at the base. The listing designated the facility as a federal Superfund site subject to the remedial response requirements of CERCLA, as amended by SARA (USAF, 2017b). The USAF is the lead agency, the EPA is the lead regulatory agency, and the Alaska Department of Environmental Conservation (ADEC) is the support regulatory agency.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

There have been no enforcement activities related to the PFOS and PFOA contamination of the community of Moose Creek's drinking water supply.

The community of Moose Creek is located adjacent to EAFB, which has used aqueous film-forming foam (AFFF) firefighting agents containing PFAS, which are also known as perfluorinated compounds (PFCs), in both training exercises and to extinguish petroleum fires on the base. AFFF formulations may contain PFOS, as well as some PFAS-based AFFF constituents

that may further degrade into PFOA. Releases of AFFF to the environment have occurred during fire training, equipment maintenance, and storage at EAFB (USAF, 2018).

PFOS and PFOA were first included on the EPA's Drinking Water Contaminant Candidate List (CCL) in 2009 and remains on the final version of the CCL (CCL 4), which was released in November 2016 (USEPA, 2016c). The CCL is a list of contaminants, referred to as "emerging contaminants", that are: currently not subject to any proposed or promulgated national primary drinking water regulations, are known or anticipated to occur in public water systems, and may require regulation under the Safe Drinking Water Act (SDWA). The EPA selects candidates for the CCL based on the best available information and data on health effects and the occurrence of unregulated contaminants. Inclusion of PFOS and PFOA on the CCL indicates EPA's concern that these compounds have the potential to present health risks through drinking water exposure.

In 2014, the USAF conducted screening level site investigations at EAFB to determine the presence of PFOS and PFOA and their relative concentrations. The site investigation report associated with that work was finalized in February 2015 (USACE, 2015a) and documented both PFOA and PFOS at concentrations in groundwater above their respective EPA provisional health advisory (PHA) levels that were in place at that time (USEPA, 2009).

In January 2015, the EPA Region 10 requested that EAFB test the drinking water wells on base to determine if PFOS or PFOA were present. PFOS and PFOA are not identified under CERCLA as hazardous substances, but are determined to be pollutants or contaminants; therefore, the USAF conducted site inspections into these emerging contaminants following the CERCLA process. Sampling by the USAF confirmed both chemicals in EAFB drinking water wells, with PFOS exceeding the PHA level that was in place at the time (USAF, 2018). Since PFOS and PFOA are water soluble, an additional site inspection was conducted to determine whether contaminants had migrated in groundwater towards the northern base boundary and to the nearby community of Moose Creek. In April 2015, the USAF tested the groundwater at the northern base boundary, which abuts the community of Moose Creek, and identified PFOS levels exceeding the PHA near the base boundary (USACE, 2015a).

As a result of the identification of elevated PFOS concentrations in groundwater near the northern EAFB boundary, the USAF coordinated with the community of Moose Creek to test private drinking water wells, starting in May 2015 (USACE, 2015b). This testing has shown that the majority of private drinking water wells in the community of Moose Creek have water that exceeds the current EPA HA for PFOS (USEPA, 2016a), issued in May 2016, which is more stringent than the prior PHA for PFOS and PFOA (USEPA, 2009).

The USAF conducted an emergency removal action to provide bottled drinking water to the community of Moose Creek. The emergency action was followed by a time-critical removal action (TCRA) to mitigate the health threat posed by the PFOS and PFOA in the drinking water (AFCEC, 2015). This TCRA included the delivery of bottled water and installation of potable water tanks or GAC filter systems at the affected private properties. As of April 2018, the USAF is monitoring 174 properties in the Community of Moose Creek, of which 170 have well water above the EPA HA. The USAF has installed 164 systems at properties in the Moose Creek community: 98 storage tanks, 64 GAC filter systems and two 5-gallon carboys. A further six properties are having bottled water delivered.

The USAF continues to perform periodic resampling of wells in the community of Moose Creek. The periodic resampling is designed to establish a baseline and evaluate concentration trends, to ensure that all drinking water well locations with PFOS and PFOA above the current drinking water HA levels are identified (USAF, 2017b).

2.3 COMMUNITY PARTICIPATION

The Interim Feasibility Study (IFS) for the community of Moose Creek drinking water supply was presented to the community during a 19 July 2017 public meeting. At the meeting, comment cards were distributed to the attendees and written comments were provided to the USAF.

The Interim Proposed Plan (IPP) for the community of Moose Creek drinking water supply was released for public comment in April 2018, with the public comment period extending from 15 April 2018 to 15 May 2018. A notice was placed in the Fairbanks Daily News-Miner inviting public comment on the IPP and announcing a public meeting (**Appendix B**). The public meeting to discuss the IPP was held on 23 April 2018. Written comments were received regarding the IPP, and comments were recorded during the April 2018 public meeting. The USAF's responses to comments received on the IFS and IPP are included in the Responsiveness Summary, which is Part 3 of this I-ROD. The IFS and IPP can be found in the Administrative Record file for EAFB.

Since the discovery of PFOS and PFOA in the community of Moose Creek's groundwater, the USAF has held public meetings to update the residents on the status and progress of their response action. Meetings were held on the following dates: 15 June 2015; 22 July 2015; 26 August 2015; 26 October 2015; 14 December 2015; 25 January 2016; 18 April 2016; 1 December 2016; 19 July 2017; and 23 April 2018. In addition, the following public outreach actions were conducted:

- A letter and fact sheet were mailed to the potentially affected property owners in May 2015, along with a survey form to determine the number of private wells that could be affected by the PFOS and PFOA contamination.
- A website was developed (http://www.eielson.af.mil/Info/Environmental/).
- The following electronic document repositories were developed:
  - http://alaskacollection.library.uaf.edu/eafbsc/cd0/Moose%20Creek%20PFCs%20Contamination%20Information%20Repository/.
  - http://afcec.publicadmin-record.us.af.mil/
- The following Physical document repository was developed:

  Elmer E. Rasmuson Library,
  University of Alaska Fairbanks,
  310 Tanana Drive,
  Fairbanks,
  Alaska 99775

2.4 SCOPE AND ROLE OF THE RESPONSE ACTION

The USAF initiated an emergency action and TCRA response to minimize exposure to PFOS and PFOA contaminated water within the community of Moose Creek in 2015. The USAF issued a

policy memorandum on 11 August 2016 stating that any PFOA/PFOS releases that pose unacceptable risk, including migration off-base, would be addressed in accordance with CERCLA and the NCP (USAF, 2016). Where drinking water samples indicate unacceptable risk to human health, as defined by exceeding the EPA's HA for PFOS and PFOA, the USAF will take appropriate mitigation action for all public and private water sources reasonably believed to be contaminated by USAF actions (USAF, 2016).

This response action is designed to identify an alternative potable water supply for the community of Moose Creek following EPA Guidance (USEPA, 1988), while comprehensive PFAS source investigations and remedial actions are undertaken at EAFB. The selected remedy is part of the USAF response to the presence of PFOS/PFOA in the groundwater domestic water source resulting from its past use at EAFB. The USAF will be conducting a further Remedial Investigation (RI) that will sample groundwater to determine the full nature and extent of PFOS and PFOA contamination. The findings of that investigation and resulting decisions will be discussed with the public in a separate Feasibility Study, Proposed Plan, and ROD. The remedy selected in this I-ROD will allow a solution to be developed and implemented before the RI is complete. A final remedy will be selected using the CERCLA process upon completion of the RI. The interim action selected in this I-ROD will neither be inconsistent with nor preclude implementation of the final remedy.

2.5 SITE CHARACTERISTICS

The following subsections provide an overview of the Moose Creek community, including the current understanding of the nature and extent of contamination. An RI is being conducted at EAFB to provide a basis for determining which EAFB PFOS and PFOA contaminant releases are migrating to the community of Moose Creek (USAF, 2017b).

2.5.1 Environmental Setting

The community of Moose Creek is in the Tanana River Valley along the river's northern bank on a low, relatively flat, floodplain terrace approximately 2 miles from the active river channel. The climate is typical of interior Alaska and is characterized by large diurnal and annual temperature variations, low precipitation, and low humidity. Moist maritime air masses are blocked in the south by the Alaska Range and in the north by the Brooks Range, creating a semiarid climate. Large annual variations in temperature and solar radiation occur because of the high latitude. Average temperatures range between 44 and 61 degrees Fahrenheit (°F) during the summer season and between -15°F and -10°F during the winter season. Extreme temperatures recorded between 1944 and 1984 at EAFB were 93°F for July and -63°F for January. Annual precipitation in this area averages 14 inches, which includes 72 inches of snow. Average monthly precipitation ranges from 0.5 to 2.5 inches, with rainfall generally highest in July and August. The evaporation rate is approximately 14 inches per year, which equals the mean annual precipitation.

2.5.2 Site Hydrogeology

The community of Moose Creek is located within an area regionally characterized by discontinuous permafrost; therefore, permafrost may be present in the subsurface. Data regarding the distribution of permafrost within the community is limited and what is available is biased to

the shallow subsurface, between 40 and 100 feet below ground level. Residential well logs on file at the Alaska Department of Natural Resources (ADNR) do not document the presence of permafrost in the community. Two deeper boring wells installed during a USAF environmental investigation did not encounter permafrost (USAF, 2018).

PFOS and PFOA have been identified in groundwater within the community of Moose Creek, which is adjacent to the northern EAFB boundary. Groundwater flow at EAFB has been identified in previous studies (USAF, 2017a) and approximately follows the Piledriver Slough flow direction from southeast to northwest (**Figure 2-1**). The delineation results of the Moose Creek community water well sampling program have identified a contaminant distribution pattern that is consistent with the groundwater flow direction, indicating that PFOS/PFOA releases occurred at EAFB and migrated off-base (USAF, 2017b). Drinking water in the community has historically been supplied by shallow wells located on the individual properties (USAF, 2018).

2.5.3 Nature and Extent of Contamination

The complete extent of the contamination resulting from the use of AFFF at EAFB has not yet been fully characterized. However, the USAF sampled all community of Moose Creek domestic water wells for PFOS and PFOA in 2016 to identify the extent of well contamination by PFOS or PFOA, that had migrated off-base (USAF, 2018). The 2016 survey dataset is the latest full dataset for all the wells showing PFAS contamination in the community of Moose Creek (Appendix C). Once the groundwater at a property has been identified as exceeding the LHA, arrangements are made to install a drinking water treatment system. The current sampling program is for post treatment drinking water compliance and not groundwater characterization. Therefore, a more recent groundwater dataset is not available that covers the whole area. The sampling program confirmed that most private domestic wells in the community of Moose Creek have water that exceeds the HA for PFOS+PFOA of 0.070 micrograms per liter (µg/L) (USEPA, 2016a, 2016b), as graphically shown on **Figure 2-2**. **Figure 2-3** depicts the PFOS levels graphically in the private domestic water wells in the Moose Creek community. The PFOA levels are not shown on Figure 2-3.

The data available in June 2016 (EA, 2016) identified maximum PFOS and PFOA concentrations of 1.5 µg/L and 0.14 µg/L, respectively, in groundwater samples collected from community of Moose Creek domestic water wells prior to treatment. There were 170 properties inspected that had groundwater data reported above the EPA HA level of 0.070 µg/L for either PFOA or PFOS or the cumulative PFOA and PFOS (EA, 2016). There were four properties that had wells with groundwater below the EPA HA.

The private wells in the community of Moose Creek are typically 50 feet deep. A deep well was drilled and found that PFOS/PFOA contaminated groundwater was present to a depth of approximately 180 feet below ground surface (bgs). The groundwater below this depth, and down to 274 feet bgs was found to be below the EPA HA.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

2.6.1 Land Use

Approximately 750 people live in the community of Moose Creek, and land use includes residential and industrial activities. The community is adjacent to EAFB, an active military installation, and was originally settled because of the growth of EAFB and the nearby City of North Pole. The community of Moose Creek is a primarily residential community and future land use is expected to remain primarily residential in nature (USAF, 2017b).

2.6.2 Ground and Surface Water Beneficial Uses

Groundwater in Moose Creek is primarily used for drinking and irrigation but there are other industrial and commercial uses of groundwater in the vicinity. Surface water uses in the study area will be covered in the Full ROD.

2.7 SUMMARY OF SITE RISKS

2.7.1 Human Health Risk Assessment

PFAS are a class of emerging contaminants, which means they have been identified as being a potential environmental or public health risk. Neither PFOS nor PFOA are listed CERCLA hazardous substances (40 Code of Federal Regulations [CFR] Part 302, Table 302.4). Both the USAF and regulators have determined that PFOS and PFOA are 'pollutants or contaminants' as defined by CERCLA (42 United States Code [USC] § 9601(33). As an emerging contaminant the human and ecological effects from PFOS and PFOA continue to be studied (USAF, 2018). The EPA and Agency for Toxic Substances and Disease Registry (ATSDR) have reviewed the large toxicity databases for both PFOS and PFOA and have summarized the adverse effects to animals and humans following exposure. The EPA Office of Water concluded there is ample evidence of adverse effects, particularly in animals.

2.7.1.1 Identification of Chemicals of Concern

The chemicals of concern are PFOS and PFOA migrating offsite from EAFB in groundwater, due to historical use of PFAS-containing materials at Eielson AFB. The EPA has established a 0.070 µg/L drinking water HA for PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b). For this I-ROD, the USAF has defined the exceedance of the EPA's HA for PFOS or for PFOS and PFOA in drinking water as presenting an unacceptable level of risk to human health.

The data available in June 2016 identified maximum PFOS and PFOA concentrations of 1.5 µg/L and 0.14 µg/L, respectively, in groundwater samples collected from Moose Creek community drinking water wells, prior to treatment (EA, 2016). Currently, 170 properties had groundwater data reported above the EPA HA level.

NORTH POLE

LEVEE

MOOSE CREEK

TRANS-ALASKA PIPELINE

RICHARDSON HWY

PILEDRIVER SLOUGH

EIELSON FARM RD

MOOSE CREEK

TANANA RIVER

EIELSON AFB

LEGEND:

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

BOUNDARY OF MOOSE CREEK STUDY AREA

N

0 3600'

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR COMMUNITY OF MOOSE CREEK, ALASKA, LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK VICINITY GROUNDWATER FLOW

FIGURE
2-1
185750715.
100.06010403

TIME: 28-MAR-2019 15:53 FILE: C:\DJCAD\Proj\Stantec Cardno Baker JV\2018-2019 Eielson_Moose Creek ROD_185750715\3-final\March 2019\Fig 2-1 Moose Creek Vicinity Groundwater Flow.dgn

(This page intentionally left blank.)

Note:
Concentrations above 0.07 ug/L exceed the EPA Lifetime Health Advisory (LHA) level (EPA 2016).

Data Sources:
Jacobs 2015; EA 2016; Imagery: Alaska Mapped, Geographic Information Network of Alaska 2007

Legend

- Sample Location
- Sampling Grid

PFOA + PFOS Concentrations (ug/L)

- < 0.07
- 0.07-0.2
- 0.2-0.4
- 0.4-0.6
- 0.6-0.8
- 0.8-1.0
- 1.0-1.2
- 1.2-1.4
- 1.4-1.6
- 1.6-1.8
- 1.8-2.0
- > 2.0

A1 A2 A3 A4

BELOW
2016 EPA LHA LEVEL

ABOVE
2016 EPA LHA LEVEL

B1 B2 B3 B4 B5 B6

Moose Creek

Richardson Hwy

C3 C4 C5 C6 C7

Piledriver Slough

D6 D7 D8

E7 E8 E9

Moose Creek

Eielson AFB

N

Miles
0 1 2

Source:
EA Engineering Science, and Technology, Inc., PBC
2nd Quarter Report (2016) on Moose Creek Area Inspections,
Sampling & Analysis, Treatment, and Construction
Moose Creek Area,
Figure 4- Moose Creek Cumulative PFOA+PFOS Results through 30 June 2016

N

0 900'

	UNITED STATES AIR FORCE EIELSON AFB INTERIM RECORD OF DECISION FOR COMMUNITY OF MOOSE CREEK, ALASKA, LONG-TERM WATER SUPPLY	COMMUNITY OF MOOSE CREEK PFOA AND PFOS RESULTS UP TO 30 JUNE 2016	FIGURE 2-2 185750715. 100.06010403

FILE: C:\D\CAD\Proj\AFCEC\2018 Eielson-Moose Creek ROD_185750715\2-final-August 6 2018\Fig 2-2 Moose Creek_PFOA-PFOS results.dgn
TIME: 06-AUG-2018 15:20

(This page intentionally left blank.)

Note:
Concentrations above 0.4 ug/L exceed the groundwater cleanup level (ADEC).

Data Sources:
Jacobs 2015; EA 2016; Imagery: Alaska Mapped, Geographic Information Network of Alaska 2007

Legend

- Sample Location
- Sampling Grid

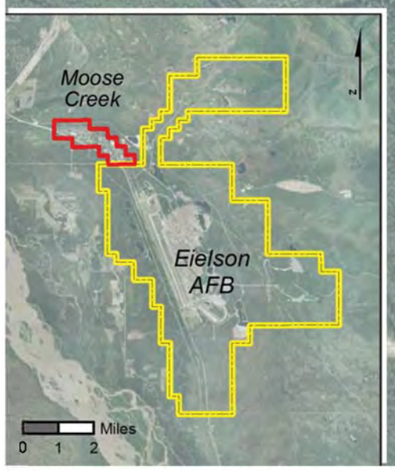
PFOS Concentrations (ug/L)

- < 0.07
- 0.07-0.2
- 0.2-0.4
- 0.4-0.6
- 0.6-0.8
- 0.8-1.0
- 1.0-1.2
- 1.2-1.4
- 1.4-1.6
- 1.6-1.8
- 1.8-2.0
- > 2.0

A1 A2 A3 A4
B1 B2 B3 B4 B5 B6
C3 C4 C5 C6 C7
D6 D7 D8
E7 E8 E9

Moose Creek
Richardson Hwy
Piledriver Slough

BELOW ADEC CLEANUP LEVEL
ABOVE ADEC CLEANUP LEVEL



Source:
EA Engineering Science, and Technology, Inc., PBC
2nd Quarter Report (2016) on Moose Creek Area Inspections, Sampling & Analysis, Treatment, and Construction
Moose Creek Area,
Figure 3- Moose Creek PFOS Results through 30 June 2016

N
0 900'

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR COMMUNITY OF MOOSE CREEK, ALASKA, LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK
PFOS RESULTS
UP TO 30 JUNE 2016

FIGURE
2-3
185750715.
100.06010403

FILE: C:\DI\CAD\Proj\AF\CEC\2016 Eielson-Moose Creek ROD_185750715\2-final-August 6 2018\Fig 2-3 Moose Creek_PFOS results.dgn
TIME: 06-AUG-2018 15:22

(This page intentionally left blank.)

Neither PFOS nor PFOA is a listed CERCLA hazardous substance (Title 40 CFR Part 302, Table 302.4). Both the USAF and regulators have determined that PFOS and PFOA are "pollutants or contaminants", as defined by CERCLA (42 USC § 9601(33)).

2.7.1.2 Exposure Assessment

Based on the current sampling data and the limited scope of this I-ROD, the route of exposure in the community of Moose Creek is the ingestion of groundwater. Potentially exposed populations are Moose Creek community residents or businesses that use groundwater as a drinking water source. However, the USAF undertook emergency and TCRA responses in the community, providing bottled water and then installing GAC filter systems and a tanked water delivery system to mitigate human health risks (USAF, 2018). Exposure pathways for dermal contact and ingestion of plants irrigated with contaminated water will be discussed in the Final ROD.

ADEC regulations prohibit the discharge of contaminated groundwater to the environment (ADEC, 2018). This limits the use of groundwater within the Moose Creek community, because the PFOS and PFOA contaminated water cannot be used for activities such as watering a garden or washing a car (USAF, 2018).

2.7.1.3 Toxicity Assessment

The health effects associated with exposures to PFOS and PFOA include: developmental effects to fetuses during pregnancy or to breastfed infants (low birth weight, accelerated puberty, skeletal variations); kidney toxicity; immune effects (reduced antibody production in response to vaccination); thyroid disease; and increased cholesterol (USEPA, 2016d). There is limited evidence of an association between exposure to PFOA and an increased risk of kidney and testicular cancer, but under EPA's Guidelines for Carcinogen Risk Assessment, both PFOA and PFOS are considered as having "Suggestive Evidence of Carcinogenic Potential" (USEPA, 2016a, 2016b).

2.7.2 Summary of Ecological Risk Assessment

The ecological risk profile of PFOS and PFOAs is not yet known, and there is insufficient impact data available currently to perform a quantitative ecological risk assessment.

2.7.3 Basis for Action

The response action selected in this I-ROD is necessary to protect public health or welfare from actual or threatened releases of pollutants, or contaminants that may present an imminent and substantial endangerment to public health or welfare. Both the USAF and regulators have determined that PFOS and PFOA are "pollutants or contaminants", as defined by CERCLA (42 USC § 9601(33)). Detected concentrations of PFOS and PFOA in the Moose Creek community's groundwater exceed the EPA's 2016 lifetime drinking water health advisory (HA) for PFOS (USEPA, 2016a) and for combined PFOS+PFOA (USEPA, 2016a, 2016b) making the ground water unsafe for potable use.

2.8 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) provide a general description of what the response action will accomplish and serve as the design basis for the remedial alternatives evaluated in this I-ROD (USEPA, 1999). RAOs are media-specific or site-specific goals for protecting human health and the environment that are established based on the nature and extent of the contamination, the resources that are currently and potentially threatened, and the potential for human and environmental exposure.

PFOS and PFOA are present in the Moose Creek community's groundwater at concentrations that exceed the 2016 EPA HA values developed by the EPA. In the absence of promulgated standards for PFOS and PFOA in drinking water, interim RAOs established in this I-ROD to protect human health are based on the 2016 EPA HA values issued by the EPA. Final RAOs and cleanup goals will be established in the Final ROD for the community of Moose Creek.

The interim RAO for the Moose Creek community is to protect human health by preventing human ingestion of PFAS-contaminated groundwater that exceeds the 2016 EPA HA value of 0.070 µg/L. Because of the limited scope of this I-ROD, no ecological RAOs were developed. The action levels are summarized in **Table 2-1**.

Table 2-1 Drinking Water Action Levels

Media	Parameter	Action Level	Basis
Drinking Water	PFOS	0.070 µg/L	EPA HA
	PFOA	0.070 µg/L	EPA HA
	PFOS+PFOA	0.070 µg/L	EPA HA

Key:
µg/L – micrograms per liter
EPA – U.S. Environmental Protection Agency
EPA HA – EPA Drinking water lifetime health advisory (USEPA, 2016b or 2016c).
PFOA – perfluorooctanoic acid
PFOS – perfluorooctane sulfonate

2.9 DESCRIPTION OF ALTERNATIVES

In the IFS, seven alternatives were developed to meet the interim RAOs (USAF, 2017b). The remedial alternatives are listed in **Table 2-2** and are described in Section 2.9.1. All identified alternatives, except the baseline (no action) alternative, include the implementation of LUCs to prohibit future well installation and use of untreated contaminated groundwater (USAF, 2018).

Table 2-2 Summary of Remedial Alternatives

Alternative	Name	Description
Baseline	No Action	No further action will be taken.
1	North Pole Water Line	Water supply from the North Pole WTP and local distribution system within Moose Creek.
2	EAFB Water Line	Water supply from the EAFB WTP and local distribution system within Moose Creek.
3	Individual Water Tanks	Install water tanks at each of the properties in the community of Moose Creek, and potable water delivery by road tanker.
4	Individual Deep Wells	Install new 250-foot deep wells at each property.
5	Community Deep Well	Water supply from a new deep well in Moose Creek and local distribution system within Moose Creek.
6	Individual GAC Systems	Install GAC water treatment at each of the properties in the community of Moose Creek to treat water from existing shallow wells.
7	Status Quo	Retain the solution implemented as part of the TCRA, which is a composite implementation of Alternatives 3 and 6.

Key:
EAFB – Eielson Air Force Base
GAC – granular activated carbon
TCRA – time critical removal action
WTP – water treatment plant

2.9.1 Description of Remedy Components

All the Remedial Alternatives developed for evaluation must meet the key Applicable or Relevant and Appropriate Requirements (ARARs) which are substantive provisions of any promulgated Federal or more stringent State environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements for a CERCLA site. The full list of ARARs were defined in the IFS and those that apply to the proposed alternative are discussed in Section 2.10.2; however, the following are identified as the key ARARs that apply to all Alternatives:

- Drinking water protection – No federal promulgated standards exist for PFAS; however; the EPA has established drinking water HA levels in EPA-822-R-16-004 (USEPA 2016a) and EPA-822-R-16-005 (USEPA 2016b) for PFOS and PFOA, respectively., also SDWA (40 CFR 141).
- Groundwater human health protection – ADEC 18 AAC 75.345(b) Table C. This prevents the discharge of water above stated concentrations without treatment into the environment, this would be for non-potable uses at the properties and their septic tank leach fields.

2.9.1.1 Baseline – No Action

The baseline alternative is included, as required by the CERCLA process. For this alternative, it is assumed no further work will be conducted to maintain the water treatment systems installed as part of the TCRA. This will mean:

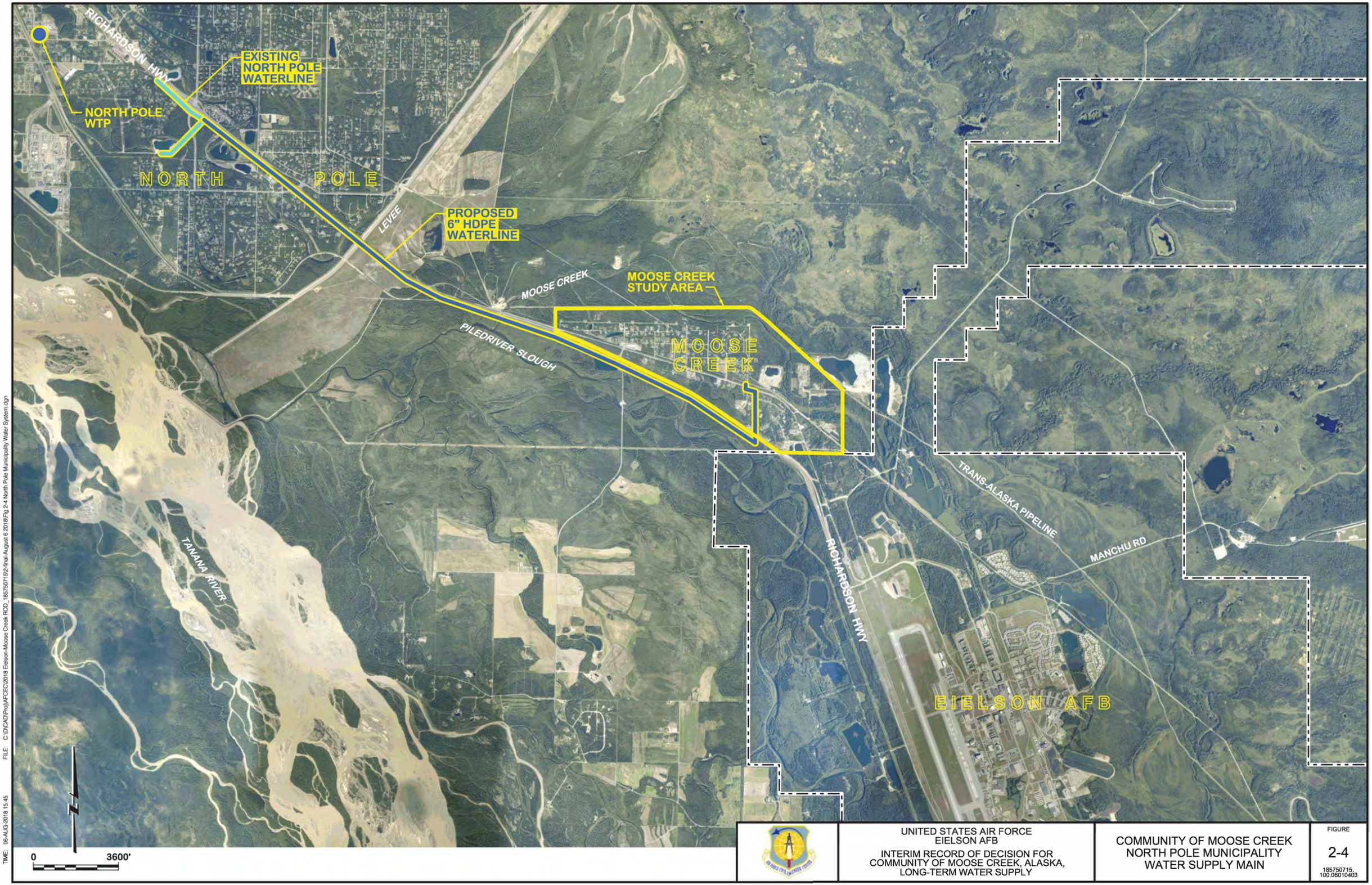
- The currently installed GAC systems would eventually fail to operate and water tanks and 5-gallon carboys at properties will no longer be filled.
- Residents would be required to find alternative drinking water sources or, potentially, this would mean that no safe water was available at the properties for either potable or outdoor use.

This does not meet protection of human health or either of the key ARAR requirements. It is the only remedial alternative included in the evaluation that does not meet the key ARAR requirements.

2.9.1.2 Alternative 1 – North Pole Water Line

Under Alternative 1 (North Pole Water Line), potable water would be supplied to the Moose Creek community by the North Pole WTP. Components included in this alternative are as follows:

- A new water main would carry water from the North Pole WTP to the community, as illustrated on **Figure 2-4**. The North Pole water supply is located approximately 5 miles downgradient of Moose Creek and has been shown to be free of PFOS and PFOA at concentrations above the HA (USAF, 2018). Routine sampling indicates that the North Pole water supply meets all Federal and State requirements. In addition, sulfolane has not been detected in the North Pole water supply (City of North Pole, 2016).
- A local distribution system would be constructed. **Figure 2-5** shows the proposed local distribution system, holding tank, and circulation pumping station. The new holding tank would allow balancing of local demands on the existing North Pole WTP. The local distribution system would need to be pressurized and circulated with heat input to prevent freezing during winter. Local connections would be made to properties in the community of Moose Creek.
- The new system would be maintained and operated by the North Pole Municipality, which would collect water use charges from property owners and operate and maintain the system for the residents of Moose Creek.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require existing wells in the community of Moose Creek to be decommissioned by the USAF to prohibit the continued use of groundwater within the CWMA. In addition, the previously installed water tanks, GAC systems, and 5-gallon carboys would be removed, and tanker and bottled water delivery would stop.



FILE: C:\DICAD\Proj\AFCEC\2018 Eielson-Moose Creek ROD_185750715\2-final-August 6 2018\Fig 2-4 North Pole Municipality Water System.dgn

TIME: 06-AUG-2018 15:45

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR
COMMUNITY OF MOOSE CREEK, ALASKA,
LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK
NORTH POLE MUNICIPALITY
WATER SUPPLY MAIN

FIGURE
2-4
185750715.
100.06010403

(This page left intentionally left blank.)

MOOSE CREEK STUDY AREA

TRANS-ALASKA PIPELINE

MOOSE CREEK

MOOSE CREEK

PROPOSED 4" AND 6" DIP WATERLINES

BAKER RD

OLD RICHARDSON HWY

OGAWA ST

RESERVOIR PUMP STATION CHLORINATION

PILEDRIVER SLOUGH

RICHARDSON HWY

EIELSON FARM RD

EIELSON AFB

0 800'

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR
COMMUNITY OF MOOSE CREEK, ALASKA,
LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK
LOCAL DISTRIBUTION
SYSTEM CONCEPT

FIGURE
2-5

185750715.
100.06010403

TIME: 06-AUG-2018 15:26 FILE: C:\D\CAD\Proj\AFCEC\2018 Eielson-Moose Creek ROD_185750715\2-final-August 6 2018\Fig 2-5 Moose Creek Local Distribution System Concept.dgn

(This page left intentionally left blank.)

It is estimated that this alternative would take 2 to 3 years to implement, with a total lifetime net present value (NPV) of $39,604,000. The 30-year operating costs, used to compare alternatives, is based on the design standard of 90 gallons per person per day. Current household use is estimated to be less than this amount (ADEC, 2017), resulting in an estimated cost of between $40 to $85 per month per household.

2.9.1.3 Alternative 2 – EAFB Water Line

Under Alternative 2 (EAFB Water Line), potable water would be supplied to the Moose Creek community by the USAF from the EAFB WTP. Components included in this alternative are as follows:

- A new water main would carry water from the EAFB WTP to the Moose Creek community, as illustrated on **Figure 2-6**, where it would be distributed via a local distribution system.
- As with Alternative 1, a local distribution system would be constructed. Figure 2-5 shows the proposed local distribution system, holding tank, and circulation pumping station. The new holding tank would allow balancing of local demands on the existing EAFB WTP. The local distribution system would need to be pressurized and circulated with heat input to prevent freezing during winter. Local connections would be made to properties in the community of Moose Creek.
- A new operating authority would collect water charges from property owners and operate and maintain the system for the residents of Moose Creek.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require existing wells in the community of Moose Creek to be decommissioned by the USAF to prohibit the continued use of groundwater within the CWMA. In addition, the previously installed water tanks, GAC systems, and 5-gallon carboys would be removed, and tanker and bottled water delivery would stop.

It is estimated that this alternative would take 2 to 3 years to implement, with a total lifetime NPV of $36,119,000. The 30-year operating costs, used to compare alternatives, is based on the design standard of 90 gallons per person per day. Current household use is estimated to be less than this amount (ADEC, 2017), resulting in an estimated cost of between $40 to $85 per month per household.

2.9.1.4 Alternative 3 – Individual Water Tanks

Under Alternative 3 (Individual Water Tanks), water tanks would be installed within the community of Moose Creek. Currently, 98 properties have water tanks and installed. Components included in this alternative are as follows:

- The 64 GAC water filters and two 5-gallon carboys currently in place would be removed and water tanks would be installed at those residences, an additional 36 properties have been allowed for residences without one of these systems and future population growth.

- Because ADEC regulations prohibit the discharge of contaminated groundwater to the environment, the existing 98 water tanks at each property would be required to have sufficient capacity and ability to supply both potable and non-potable water to its respective property.
- The USAF would continue to monitor and maintain the tanks and supply water to the community of Moose Creek. Water deliveries would be by road tanker when the water tank level dropped sufficiently to allow a delivery.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require existing wells in the community of Moose Creek to be decommissioned by the USAF to prohibit the continued use of groundwater within the CWMA. In addition, the previously installed GAC systems and 5-gallon carboys will be removed, and tanker and bottled water delivery would stop.

It is estimated that this alternative would take 1 to 2 years to implement, with a total lifetime NPV of $41,760,000.

2.9.1.5 Alternative 4 – Individual Deep Wells

Under Alternative 4 (Individual Deep Wells), a deep well would be installed at each property to replace the existing shallow well. Currently, all residences in the community of Moose Creek have wells that are approximately 50 feet deep. A test well has shown that groundwater below 200 feet is uncontaminated with PFOS or PFOA. Components included in this alternative are as follows:

- The USAF would install a 250-foot deep well at each affected property. A new pump would be required, but all other piping could be reused to supply potable and non-potable uses. Iron and manganese removal is not included for wells serving individual properties.
- The property owners would be responsible for monitoring and maintaining the new wells and associated pumps and systems once installation is complete.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require existing shallow wells in the community of Moose Creek to be decommissioned by the USAF to prevent continued use of shallow groundwater within the CWMA. In addition, the previously installed water tanks, GAC systems, and 5-gallon carboys would be removed, and tanker and bottled water delivery would stop.

It is estimated that this alternative would take 1 to 2 years to implement, with a total lifetime NPV of $32,626,000.

LEVEE

MOOSE CREEK

MOOSE CREEK STUDY AREA

PILEDRIVER SLOUGH

MOOSE CREEK

TRANS-ALASKA PIPELINE

MANCHU RD

PROPOSED 6" HDPE WATERLINE

RICHARDSON HWY

EIELSON AFB

TAMANA RIVER

N

0 3600'

TIME: 06-AUG-2018 15:29 FILE: C:\D\CAD\Proj\AFCEC\2018 Eielson-Moose Creek ROD_185750715\2-final-August 6 2018\Fig 2-6 Eielson AFB Water Supply Main.dgn

	UNITED STATES AIR FORCE EIELSON AFB INTERIM RECORD OF DECISION FOR COMMUNITY OF MOOSE CREEK, ALASKA, LONG-TERM WATER SUPPLY	COMMUNITY OF MOOSE CREEK EIELSON AFB WATER SUPPLY MAIN	FIGURE 2-6 185750715, 100.06010403

(This page left intentionally left blank.)

2.9.1.6 Alternative 5 – Community Deep Well

Under Alternative 5 (Community Deep Well), a deep well would be provided to supply water from below the PFOS and PFOA plume to the community of Moose Creek. A test well has shown that groundwater below 200 feet is uncontaminated with PFOS and PFOAs. Components included in this alternative are as follows:

- The USAF would install a 250-foot deep well, as shown on **Figure 2-7**. The water from the new well would be treated to remove manganese and iron and discharged into a local supply reservoir.
- As with Alternatives 1 and 2, a local distribution system would be constructed. The local distribution system would need to be pressurized and circulated with heat input to prevent freezing during winter. Local connections would be made to properties in the community of Moose Creek.
- A new operating authority would collect water use charges from property owners and operate and maintain the system for the residents of Moose Creek.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require existing shallow wells in the community of Moose Creek would be decommissioned by the USAF to prohibit the continued use of contaminated groundwater within the area. In addition, the previously installed water tanks, GAC systems, and 5-gallon carboys would be removed, and tanker and bottled water delivery would stop.

It is estimated that this alternative would take 2 to 3 years to implement, with a total lifetime NPV of $37,905,000. The 30-year operating costs, used to compare alternatives, is based on the design standard of 90 gallons per person per day. Current household use is estimated to be less than this amount (ADEC, 2017), resulting in an estimated cost of between $45 to $95 per month per household.

2.9.1.7 Alternative 6 – Individual GAC Systems

Under Alternative 6 (Individual GAC Systems), GAC water filters would be installed within the community of Moose Creek. Currently, 64 properties have GAC water filters installed. Components included in this alternative are as follows:

- The 98 previously installed water tanks and two 5-gallon carboys would be removed and GAC water filters would be installed at those residences. An additional 36 properties have been allowed for residences without one of these systems and future population growth, and tanker and bottled water delivery would stop.
- Because ADEC regulations prohibit the discharge of contaminated groundwater to the environment, the water distribution system at each property would require modification to ensure both potable and non-potable water is treated.

- The USAF would continue to monitor and sample water and be responsible for maintenance of installed systems.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require any existing wells in the community of Moose Creek without installed GAC filters to be decommissioned by the USAF to prevent continued use of untreated water within the CWMA.

It is estimated that this alternative would take 1 to 2 years to implement, with a total lifetime NPV of $67,423,000.

2.9.1.8 Alternative 7 – Status Quo

Under Alternative 7 (Status Quo), there would be no change to the solution implemented at each residence as part of the TCRA. Currently, 64 properties have GAC water filters installed, 98 have water tanks, two have 5-gallon carboys, and six receive bottled water deliveries. Components included in this alternative are as follows:

- The 98 water tanks currently in place and the 64 installed GAC water filters would remain. An additional 36 properties have been allowed for residences without one of the systems and for future population growth.
- Because ADEC regulations prohibit the discharge of contaminated groundwater to the environment, the existing systems would require modification to ensure that only delivered water or GAC-treated water would be used for both potable and non-potable uses.
- The USAF would continue to monitor and sample water and be responsible for maintenance of installed systems.
- LUCs would be required to prohibit the use of contaminated groundwater. The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.
- The CWMA would require any existing wells at residences without GAC treatment in the community of Moose Creek to be decommissioned by the USAF to prevent the continued use of contaminated groundwater within the CWMA.
- It is estimated that this alternative would take 1 year to implement, with a total lifetime NPV of $49,638,000.

2.9.2 Common Elements and Distinguishing Features of Each Alternative

There are several common elements among the identified alternatives. The following elements are included in all identified alternatives except the baseline (no action) alternative:

- Implementation of LUCs in the form of a CWMA and compliance with UECA to prohibit the use of untreated, contaminated groundwater.

MOOSE CREEK STUDY AREA

TRANS-ALASKA PIPELINE

MOOSE CREEK

GLENDALE ST

BAKER RD

MOOSE CREEK

OLD RICHARDSON HWY

OSAGE ST

RICHARDSON HWY

PILEDRIVER SLOUGH

WELLHOUSE

RESERVOIR
PUMP STATION
CHLORINATION

EIELSON FARM RD

EIELSON AFB

0 800'

FILE: C:\DICADD\Proj\AFCEC\2018 Eielson Moose Creek ROD_185750715\2-final-August 6 2018\Fig 2-7 Moose Creek Community Deep Well (Concept).dgn

TIME: 06-AUG-2018 15:33

	UNITED STATES AIR FORCE EIELSON AFB INTERIM RECORD OF DECISION FOR COMMUNITY OF MOOSE CREEK, ALASKA, LONG-TERM WATER SUPPLY	COMMUNITY OF MOOSE CREEK COMMUNITY DEEP WELL CONCEPT	FIGURE 2-7 185750715. 100.06010403

(This page left intentionally left blank.)

- Elimination of the human health threat posed by PFOS and PFOA in domestic water.

In addition, all alternatives except the baseline (no action) alternative would comply with Federal and State requirements that are applicable or relevant and appropriate. The identified alternatives also have the following distinguishing features:

- Alternatives 1 and 2 use existing, known water sources that comply with all drinking water requirements.
- Alternatives 1, 2, and 5 require construction of a distribution system to transport water to individual residences.
- Alternatives 3 and 7 require frequent water deliveries by a road tanker, whereas all other alternatives rely on distribution systems or wells to provide potable and non-potable water.
- Alternatives 4 and 5 require the installation of new, deep wells.
- Alternatives 6 and 7 require frequent maintenance and water testing.

2.9.3 Expected Outcomes of Each Alternative

The expected outcome of all alternatives except the baseline (no action) alternative would be a potable water supply for the community of Moose Creek. The Final ROD will evaluate additional outcomes and determine a timeframe to achieve cleanup levels.

2.10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the I-ROD summarizes the comparative analysis of alternatives that was presented in the detailed analysis section of the IFS (USAF, 2017b). The seven alternatives were evaluated individually and against each other based on nine criteria identified in CERCLA Section 121(b) and the NCP Section 300.430(f)(5)(i). These criteria provide grounds for comparison of the relative performance of the alternatives and identify their advantages and disadvantages. Evaluating against the nine criteria provides sufficient information to adequately compare the alternatives and to eventually select the most appropriate approach for a site.

The nine criteria are divided into three groups: threshold criteria, balancing criteria, and modifying criteria. *Threshold* criteria must be achieved by an alternative for it to be eligible for further consideration and analyses. *Balancing* and *modifying* criteria are then used to establish the rationale for choosing the most appropriate alternative. The results of this evaluation are used to identify a selected remedy. The relative performance of each alternative, when compared to the nine criteria, and how it compares to the other alternatives under consideration are discussed in the following subsections and summarized in **Table 2-3**. Because the baseline (no action) alternative fails to meet both threshold criteria, this alternative was eliminated from evaluation under the primary balancing and modifying criteria.

Table 2-3 Potable Water Supply Alternatives Comparative Evaluation

Criteria	Alternative							
	Baseline	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	No Action	**North Pole Water Line**	**EAFB Water Line**	**Individual Water Tanks**	**Individual Deep Wells**	**Community Deep Well**	**Individual GAC Systems**	**Status Quo**
Threshold Criteria								
Protection of Human Health & Environment	Fail	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**
Compliance with ARARs/TBCs	Fail	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**
Primary Balancing Criteria								
Long-term Effectiveness & Permanence	Low	**High**	**High**	Medium	Medium	Medium	Medium	Medium
Reduction in Toxicity, Mobility, or Volume through Treatment	None	None	Low	None	None	None	Low	Low
Short-term Effectiveness	Low	Medium	Medium	**High**	Medium	Medium	**High**	**High**
Implementability	**High**	Medium	Medium	**High**	Medium	**High**	Medium	**High**
Estimated Costs								
Capital Costs	$0	$25,168,000	$21,683,000	$2,146,000	$26,905,000	$22,025,000	$1,753,000	$904,000
NPV of Recurring Cost of 0.7%	$0	$14,436,000	$14,436,000	$39,614,000	$5,721,000	$15,880,000	$65,670,000	$48,734,000
Total NPV at 0.7%	$0	$39,604,000	$36,119,000	$41,760,000	$32,626,000	$37,905,000	$67,423,000	$49,638,000

Key:
% – percent
ARARs – applicable or relevant and appropriate requirements
EAFB – Eielson Air Force Base
GAC – granulated activated carbon
NPV – net present value
TBCs – to be considered

2.10.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment is the first threshold criterion. However, this interim action is limited in scope and addresses only contaminated groundwater that serves as the Moose Creek community's domestic water source. The selected interim action is required to protect human health and the environmental impacts from the use of domestic water in the short-term, while a final remedial solution is being developed. Protection of the environment will be addressed in the Final ROD.

This criterion addresses whether each alternative provides adequate protection of human health and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls (ICs).

All the alternatives, except for the baseline (no action) alternative, would provide adequate protection of human health by eliminating, reducing, or controlling risk through provision of water, treatment and/or LUCs. Alternatives 1, 2, 3, 4, 5, and elements of Alternative 7 eliminate risk of exposure to PFOS and PFOA by providing water from uncontaminated water supplies and implementing LUCs. Alternative 6 and elements of Alternative 7 control risk through treatment of PFOS and PFOA contaminated groundwater and LUCs. Therefore, Alternatives 1 through 7 **pass** this criterion.

2.10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations, which are collectively referred to as "applicable or relevant and appropriate requirements (ARARs)," unless such ARARs are waived under CERCLA section 121(d)(4). Criteria to be considered (TBC) are non-promulgated advisories or guidance issued by Federal or State government that are not legally binding and do not have the status of potential ARARs. However, in many circumstances, TBCs are considered along with ARARs.

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

ARARs fall into three categories: chemical-specific, location-specific, and action-specific. *Chemical-specific* ARARs are health-based or risk-management-based numbers that provide concentration limits for the occurrence of a chemical in the environment at agreed-upon points of compliance. *Location-specific* ARARs restrict activities in certain sensitive environments. *Action-specific* ARARs are activity or technology-based controls or restrictions for particular treatment and disposal activities related to the management of hazardous wastes.

Table 2-4 summarizes the ARARs for the selected remedy at the community of Moose Creek, as defined in the IFS, and describes how the selected remedy addresses each one at agreed-upon points of compliance.

Compliance with ARARs addresses whether an alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site. Compliance with ARARs is the second threshold criterion. This criterion identifies whether a remedy will meet all the ARARs or provide the basis for invoking a waiver.

All alternatives, except for the baseline (no action) alternative, meet the Federal and State ARARs. Therefore, Alternatives 1 through 7 **Pass** this criterion.

2.10.3 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence criterion is one of the primary balancing criteria. This criterion refers to the expected residual risk and evaluates the ability of a remedy to maintain reliable protection of human health over time, once cleanup levels have been met. This criterion also includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Alternatives 1 and 2 use existing, known water sources that comply with all drinking water requirements, and the water would be distributed to the residents by a permanent, piped system. As a result, these alternatives are rated **High**.

Alternative 3 requires a high level of frequent water deliveries. Frequent water tank deliveries will cause additional wear and tear on roads. If further residential construction occurs in the Moose Creek community, these issues will increase. As a result, this alternative is rated **Medium**.

Alternatives 4 and 5 require new deep wells. There is concern that PFOS and PFOA could be drawn down to the lower aquifer, resulting in similar contamination issues as experienced by the current shallow wells. Alternative 5 would also result in an isolated residential water supply system, close to an existing system, which is unlikely to present as reliable a water supply option as Alternatives 1 and 2. As a result, these alternatives are rated **Medium**.

Alternatives 6 and 7 require high levels of frequent maintenance and testing. ADEC regulations prohibit the discharge of contaminated groundwater to the environment, so existing systems would require modification to ensure that only delivered water or GAC-treated water is used for both potable and non-potable uses. Preventing discharges would be difficult with the numerous separate systems in the individual properties in Moose Creek. As a result, these alternatives are rated **Medium**.

Table 2-4 Description of ARARs for the Selected Remedy

Source	Standard, Requirement, Criterion, Limitation	Description of Standard	Status	Selected Remedy[1] Points of Compliance
Chemical-Specific ARAR				
EPA Drinking Water Health Advisory for PFOS	EPA-822-F-16-004. May 2016.	Establishes lifetime HA levels for PFOS in drinking water at 70 ppt.	TBC	The selected remedy will supply potable drinking water in compliance with HAs for PFOS
EPA Drinking Water Health Advisory for PFOA	EPA-822-F-16-005. May 2016.	Establishes lifetime HA levels for PFOS in drinking water at 70 ppt.	TBC	The selected remedy will supply potable drinking water in compliance with HAs for PFOA
ADEC, Oil and Other Hazardous Substances Pollution Control	18 AAC 75 .345(b) Table C	Provides for the reporting, investigation, and cleanup of PFOS and PFOA in groundwater at 0.4 µg/L	Applicable	The selected remedy will prevent discharge of contaminated groundwater.
Location-Specific ARAR				
None				
Action-Specific ARAR				
Safe Drinking Water Act (42 USC 3), National Primary Drinking Water Standards,	40 CFR 141 ..1 to .861	Establishes drinking water standards for public water systems. However, no numeric value for PFOS or PFOA cleanup level have been established.	Relevant & Appropriate	The selected remedy will supply potable drinking water in compliance with public water systems.
National Oil and Hazardous Substances Pollution Contingency Plan, Remedial investigation/feasibility study and selection of remedy	40 CFR 300 .430(e)(2)(i)(B) & (C)	Establishes non-zero MCLGs quality goals. However, no value has been established for PFOS and PFOA.	Relevant & Appropriate	(1) If the MCLGs are above zero, then the MCLGs are ARAR; (2) If the MCLGs are zero, then use the MCLs for those contaminants.
Alaska Drinking Water Standards	18 AAC 80 .200 -235	Public Water System Review and Approval Requirements	Applicable	Extending the existing public water distribution system will require ADEC review and approval.

Table 2-4 (Cont.) Description of ARARs for the Selected Remedy

Key:

1 – The selected interim remedy is to supply potable water from North Pole municipality water treatment plant via new water main. At the community of Moose Creek, a water reservoir and pumping station will supply water to a local distribution system supplying water to each property. North Pole Municipality will operate the new water supply system for the community.

µg/L – micrograms per liter
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
ARAR – Applicable or Relevant and Appropriate Requirements
CFR – Code of Federal Regulations
EPA – U.S. Environmental Protection Agency
HA – EPA drinking water lifetime health advisory
MCL – Maximum Contaminant Level
MCLG – Maximum Contaminant Level Goal
mg/kg – milligrams per kilogram
PFOA – perfluorooctanoic acid
PFOS – perfluorooctane sulfonic
ppt – part per thousand
TBC – To Be Considered
USC – United States Code

Reviews at least every 5 years, as required, would be necessary to evaluate the effectiveness of any of these alternatives, because contaminants would remain in groundwater at concentrations above human health risk-based levels.

2.10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

The reduction of toxicity, mobility, or volume of contaminants through treatment criterion is one of the primary balancing criteria. This criterion refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

This action is an interim solution only and is not intended to reduce the toxicity, mobility, or volume of contaminated groundwater through treatment. The statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element will be addressed by the final response action. However, Alternatives 2, 6, and 7 are rated **Low** because there will be some pumping and treatment of the groundwater through the use of GAC systems. Alternatives 1, 3, 4, and 5 do not provide treatment and are rated **None**.

2.10.5 Short-Term Effectiveness

The short-term effectiveness criterion is one of the primary balancing criteria. This criterion addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternatives 3, 6, and 7 have already demonstrated that, where they can be implemented, they can be done in a short time with no risk to residents, workers, or the environment. As a result, these alternatives are rated **High**.

Alternatives 1, 2, 4, and 5 require design and interaction with authorities for permits before they can be implemented. Implementation is anticipated to take up to 2 years once it commences. As a result, these alternatives are rated **Medium**.

2.10.6 Implementability

The implementability criterion is one of the primary balancing criteria. This criterion addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternative 3 has already been partially implemented and Alternative 7 is fully implemented, except for the LUCs. Therefore, these alternatives are rated **High**.

Alternative 5 will require a location for the deep well and storage tank to be identified. However, this should be able to be accomplished within the community boundary. As a result, this alternative is rated **High**.

Alternative 1 will require a water supply from the City of North Pole, which will have to cross the Chena Flood protection area and, therefore, requires additional engineering. Alternative 2 will

require a water supply from EAFB, which will require the USAF to take on responsibilities outside its core mission. As a result, these alternatives are rated **Medium**.

Alternatives 4 and 6 will require additional design and investigation. During the implementation of the TCRA, the GAC systems could not be easily installed at all locations. Installing deep wells at all residences could be problematic, because very little data is available on the aquifer and it may not be accessible in every location. As a result, these alternatives are rated **Medium**.

2.10.7 Cost

The cost criterion is one of the primary balancing criteria. This criterion includes an evaluation of estimated capital and annual operations and maintenance costs, as well as NPV. NPV is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent (%). To compare the Alternatives over their operating life, NPV will be used to include anticipated operating cost over a 30-year period, as recommended. The rate of return recommended for these projects is 5%. For Federally-funded projects, it is recommended that the current Real Treasury Interest Rates published in Circular A-94 (Appendix C), which is 0.7% (for 2017, 30-Year), is used.

The estimated total NPV for the alternatives ranges from $32.6 million for Alternative 4 to $67.4 million for Alternative 6. Alternatives 1, 2, 3, and 5 are all within a 10% range of $40 million, the median 30-year NPV. Alternative 4 is less expensive, and Alternatives 6 and 7 are more expensive.

2.10.8 State/Support Agency Acceptance

The EPA and ADEC supplied a letter (USEPA, 2018) stating their concurrence with the Preferred Alternative identified in the IPP, of Alternative 1.

2.10.9 Community Acceptance

During the public comment period, the community of Moose Creek residents did not express strong support for any of the alternatives presented in the IPP. Several residents were interested in the USAF buying all the affected properties. Of the alternatives presented in the IPP, the highest level of support within the community appeared to be for Alternative 7 (Status Quo).

The community voiced concerns regarding the financial impact of the water utility rates associated with Alternatives 1, 2, and 5. However, a large number of people wished to discuss the details of how Alternative 1 was to be implemented, including ensuring that connections to properties were included in capital project and making good use of Borough-owned land within the community for the reservoir and pumping station. The City of North Pole passed a resolution on 17 July 2017 in support of expanding the North Pole WTP to service the community of Moose Creek (City of North Pole, 2017). In addition, the Fairbanks North Star Borough submitted a letter of support from the Mayor voicing the Borough's strong support for Alternative 1. The mayor stated that Alternative 1 provides a long-term solution of providing a clean, reliable source of water to the residents of Moose Creek, despite high estimated capital costs and the 2- to 3-year timeframe for implementation (FNSB, 2018).

2.11 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a site. A PTW is normally defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to ground water. This interim remedy does not address PTW. Identification of PTW and approaches to address any identified PTW will be addressed in the final ROD.

2.12 SELECTED REMEDY

The selected remedy is Alternative 1 (North Pole Water Line), which includes upgrades to the City of North Pole WTP, the installation of a new water main from the WTP to the community of Moose Creek, and a water distribution system within the community that will serve each property. Additionally, LUC's will be put in place to prohibit current and future use of contaminated groundwater.

2.12.1 Summary of the Rationale for the Selected Remedy

Alternative 1 (North Pole Water Line) was selected over the other alternatives because it was assessed as having the highest rating for long-term effectiveness and permanence for the provision of safe drinking water. In addition, this alternative eliminates the human health risk posed by the identified contaminants in the drinking water.

Based on currently available information, the USAF believes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. However, this is only an interim solution specifically for the Moose Creek drinking water supply.

2.12.2 Description of the Selected Remedy

The selected remedy is to provide potable water supplied by the City of North Pole WTP to the community of Moose Creek. The major components of the selected remedy are discussed below.

New Water Supply to Community:

- The City of North Pole WTP will be upgraded to increase its capacity to allow it to supply the community of Moose Creek that is located approximately 5 miles downgradient. This water source is free of PFOS and PFOA at concentrations above their EPA HA's (USAF, 2018). Routine sampling indicates that the North Pole water supply meets all Federal and State requirements for safe drinking water.
- A new water main will be installed to connect the WTP to the community of Moose Creek as illustrated on Figure 2-4. The estimated length of the new water main is 17,210 linear feet.

- A 230,000-gallon holding tank and circulation pumping station with water heating by a boiler and heating oil will be installed. A local distribution system will be constructed to serve the whole community.
- Connections will be made to affected properties from the local distribution system in the community of Moose Creek; however, the local distribution system will be designed to serve all properties with wells, including those that do not currently exceed the EPA HA. The estimated length of the distribution lines is 47,640 linear feet.
- The new system will be maintained and operated by the North Pole Municipality, which will collect water use charges from property owners and operate and maintain the system for the residents of Moose Creek.
- A CWMA will be implemented. The existing water supply wells will be decommissioned by the USAF to prevent continued use of groundwater within the area pursuant to Alaska regulation 18 AAC 80.015. The water tanks, GAC systems, and 5-gallon water carboys previously installed by the USAF will also be removed.
- The UECA will require the recording of environmental covenants on all impacted real properties in accordance with Alaska statutory law. The USAF will negotiate these agreements with impacted landowners to 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit future well installation/contaminated-groundwater use.

Land Use Controls:

LUCs will be established for the community of Moose Creek to prohibit the use of contaminated water above the EPA HA. The Air Force LUC for the Community of Moose Creek are stated below:

i. Resource Uses and Risk Exposure Assumptions.
The Community of Moose Creek is both a residential and industrial community. Groundwater in the aquifer under the area is used for both potable and other household uses, including gardening, as well as some process use at industrial sites.

ii. Risks Necessitating the LUCs.
The groundwater is not safe for drinking because it has become contaminated with PFOS and PFOA at levels that exceed the EPA HAs. Additionally, the groundwater is also above the ADEC groundwater clean-up levels for PFOS and PFOA. Accordingly, the base must impose LUCs to ensure the groundwater is not used for domestic water purposes until it is returned to EPA HA levels.

iii. Performance Objectives of LUCs.
Prevent access to or use of the groundwater, until EPA HA's are met, and groundwater quality is demonstrated to be suitable for unrestricted use and unlimited exposure (UU/UE).

iv. Location of LUCs.
The LUC will be applicable to the area indicated on **Figure 2-8.** The CWMA boundary will be established following further assessment and in accordance with 11 AAC 93.500.

MOOSE CREEK

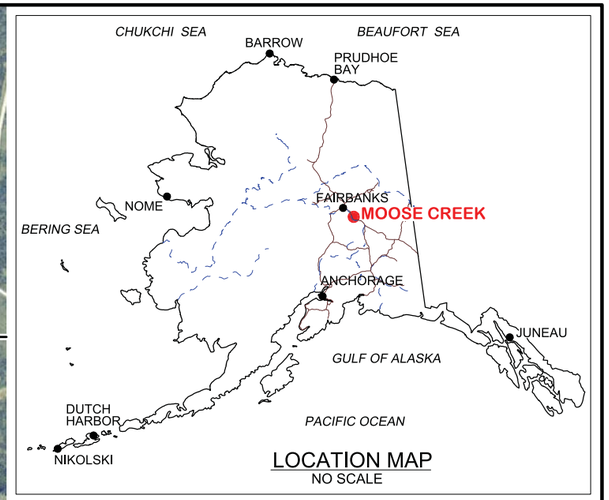
RICHARDSON HWY

PILEDRIVER SLOUGH

MOOSE CREEK

EIELSON AFB

TRANS-ALASKA PIPELINE



LOCATION MAP
NO SCALE

LAND USE CONTROL RESTRICTION

INSTALLATION BOUNDARY

NOTES (NOT ALL NOTES APPLY TO ALL PAGES)
1. AFB = AIR FORCE BASE
2. LUC = LAND USE CONTROL. LUC BOUNDARIER DEPICTED ON THIS FIGURE ARE PRELIMINARY PENDING FINAL ANALYSIS OF SURVEY INFORMATION. LUC BOUNDARIES WILL BE UPDATED ONCE THIS INFORMATION IS AVAILABLE.

N

0 1800'

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR COMMUNITY OF MOOSE CREEK, ALASKA, LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK
LAND USE CONTROL

FIGURE
2-8
185750715.
100.06010403

TIME: 04-SEP-2018 12:46
FILE: C:\D\CAD\Proj\AFCEC\2018 Eielson-Moose Creek ROD_185750715\2-final\August 6 2018\Fig 2-8 Moose Creek Community Land Use Controls.dgn

(This page left intentionally left blank.)

v. Duration of LUCs.
The LUCs will be maintained in place on groundwater use until EPA HA's for PFOS and PFOA are achieved.

vi. Description of LUC
The LUCs implemented at Moose Creek will prohibit the use of the contaminated groundwater.

- USAF will petition the State DNR to create a CWMA. The CWMA will be established to legally restrict the use of groundwater and prevent installation of new water wells within the CWMA designated zone. The USAF will monitor compliance with the requirements of the CWMA, and submit an annual report to ADNR and DEC. The USAF will refer instances of non-compliance to ADNR for enforcement actions pursuant to state law.
- In accordance with the UECA (AS 46 .04 et seq) the USAF shall inform affected property owners of the requirements of this act and assist them in establishing an environmental covenant on the real property. The USAF will negotiate these agreements with impacted landowners to 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit future well installation/contaminated-groundwater use.

vii. General Performance Responsibility.
The USAF, EPA, ADNR, and ADEC will be responsible for enforcing the CWMA and UECA.

The USAF will be responsible for implementing, maintaining, monitoring, and reporting of LUCs as specified in the Moose Creek Land Use Control Implementation Plan and Land Use Control Management Plan. The Implementation Plan will be developed by the USAF with input from and approval by ADEC and the EPA.

viii. Specific Performance Responsibility to Bind Contractors and Tenants.
The USAF shall inform, monitor, enforce, and bind, where appropriate, real property owners, authorized lessees, tenants, contractors, and other authorized occupants of the site regarding the LUCs affecting the site.

ix. Specific Performance Responsibility for Transferring Sites.
Not Applicable to these LUCs, no land covered is owned by the USAF.

x. Corrective Measures Requirement.
Any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs will be addressed by the USAF as soon as practicable, but in no case will the process be initiated later than 10 days after the USAF becomes aware of the breach.

xi. Notification Requirement.
The USAF will notify the EPA, ADEC and ADNR as soon as practicable, but no longer than 10 days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs. The USAF will notify the EPA and ADEC regarding the actions the USAF took or may

take to address the breach within 10 days of sending the EPA and ADEC notification of the breach.

xii. Notification to EPA and the State Regarding Land Use Changes

In conformance with the Alaska UECA, an environmental covenant entered into in accordance with AS 46.04.300 – 46.04.390 shall require notification of the USAF 45 days in advance of any proposed land use changes that are inconsistent with LUC objectives or the selected remedy.

xiii. Notification of Transfers.

The USAF must provide notice to the EPA, ADNR, and ADEC at least 30 days prior to any transfer or sale of covered land so that EPA, ADNR, and ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective ICs. If it is not possible for the facility to notify EPA, ADNR, and ADEC at least 30 days prior to any transfer or sale, then the facility will notify EPA, ADNR, and ADEC as soon as possible but no later than 60 days prior to the transfer or sale of any covered land.

xiv. Concurrence Language.

EAFB shall not modify or terminate LUCs, implementation actions, or land use that are associated with the selected remedy without the approval of the EPA and the opportunity for concurrence by ADEC. EAFB shall seek prior concurrence of the EPA and the State before any anticipated action that may disrupt the effectiveness of the LUCs, or any action that may alter or negate the need for LUCs.

xv. Monitoring and Reporting Language.

Monitoring of the environmental use restrictions and controls will be conducted annually by the USAF. The monitoring results will be included in a separate report or as a section of another environmental report, if appropriate, and provided to the EPA and ADEC. The annual monitoring reports will be used in preparation of the Five-Year Review to evaluate the effectiveness of the remedy.

The annual monitoring report, submitted to the regulatory agencies by the USAF, will evaluate the status of the LUCs and how any LUC deficiencies or inconsistent uses have been addressed. The annual evaluation will address whether the use restrictions and controls referenced above were communicated in the deed(s), whether the owners and state and local agencies were notified of the use restrictions and controls affecting the property, and whether use of the property has conformed to such restrictions and controls.

xvi. Mechanism for Achieving LUC Performance Objectives

The internal procedures that EAFB will use to implement the LUCs include, but are not limited to, the following:

- Develop and document a Moose Creek Land Use Control Implementation Plan.
- Develop and document a Moose Creek Land Use Control Management Plan.

The USAF will notify the EPA and ADEC in advance of any changes to internal procedures associated with the selected remedy that might affect the LUCs.

Monitoring of Remedy Implementation

Because the selected remedy will result in contaminants remaining on-site above human health risk-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health within 5 years after commencement of the interim remedial action and every 5 years thereafter until the site can support unlimited use and unrestricted exposures (UU/UE).

2.12.3 Summary of the Estimated Remedy Costs

The estimated remedy costs are detailed in the IFS and summarized in **Table 2-5**. This cost is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

2.12.4 Expected Outcomes of the Selected Remedy

The selected remedy will eliminate human exposure to PFOS and PFOA by providing an alternative drinking water source to the Moose Creek community and decommissioning existing wells, thereby eliminating access to contaminated groundwater. In addition, LUC's will be established to prohibit future groundwater exposures. The selected remedy will, therefore, achieve the interim RAOs identified in this I-ROD for the community of Moose Creek. The Final ROD will evaluate additional outcomes and determine a timeframe to achieve cleanup levels.

Table 2-5 Cost Estimate Summary for the Selected Remedy

Potable Water Supply Component	Unit Cost	Units	Quantity	Cost
Capital Costs				
Upgrade City of North Pole WTP	$280,000	lump sum	1	$280,000
New Water Transmission Main	$100	per linear foot	17,210	$1,721,000
New Water Transmission Main (Directionally Drilled Section)	$141	per linear foot	12,800	$1,808,640
New Local Distribution Mains	$160	per linear foot	47,640	$7,622,400
New Local Service Connections	$3,200	per property	200	$640,000
New Local Storage Tank	$1,020,000	lump sum	1	$1,020,000
New Distribution Pump Station	$880,000	lump sum	1	$880,000
Abandon/ Dispose: GAC/ Tank/ Well	$4,100	per property	200	$820,000
Land Use Controls	$100,000	lump sum	1	$100,000
CAPITAL SUBTOTAL				**$14,892,040**
Engineering / Permitting / Survey / ROW	20%			$2,978,408
Construction Administration	10%			$1,489,204
Contingency	30%			$5,807,896
CAPITAL TOTAL				**$25,167,548**
Operation and Maintenance				
Cost of Water (North Pole)	$0.01955	per gallon	27,375	$535,181
Net Present Value				
NPV of Recurring Costs (30-year)	0.7%			$14,436,325
Summary				
Capital	Total			**$25,168,000**
NPV of Recurring Costs (30-year)	0.7% *			**$14,436,000**
NPV (30-year)	0.7% *			**$39,604,000**

Key:
% – percent
GAC – granular activated carbon
NPV – net present value
ROW – right of way
WTP – water treatment plant
* - Real Interest Rate, 30 year (OMB Circular A-94 Appendix C, revised November 2016)

2.13 STATUTORY DETERMINATIONS

This interim action is: protective of human health and the environment for the exposure pathway addressed by this action and is intended to provide adequate protection until a Final ROD is signed; complies with those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action; and is cost-effective. This action is an interim solution only and is not intended to utilize alternative treatment or resource recovery technologies to the maximum extent practicable for the community of Moose Creek. Because this action does not constitute the final remedy for the community of Moose Creek, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed to human health and the environment by conditions at the community of Moose Creek and will address the preference for treatment in the Final ROD, but it is anticipated that this interim action will remain to be incorporated into the final action. This is an I-ROD, so review of this site and the remedy will be ongoing as the USAF continues to develop remedial alternatives for the community of Moose Creek.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

There were no significant changes from the Proposed Plan (USAF, 2018).

(This page left intentionally left blank.)

PART 3 RESPONSIVENESS SUMMARY

This section provides a summary of the public participation activities and comments received following the publication of the IFS and IPP for the Long-Term Water Supply to the community of Moose Creek, Alaska, and the USAF response to comments received.

3.1 BACKGROUND AND COMMUNITY INVOLVEMENT

The USAF conducted several public meetings with the community of Moose Creek since the discovery of PFOS and PFOA in the groundwater that supplies the community's drinking water wells. These have been held on the following dates: 15 June 2015; 22 July 2015; 26 August 2015; 26 October 2015; 14 December 2015; 25 January 2016; 18 April 2016; 1 December 2016; 19 July 2017; and 23 April 2018. These meetings were used to inform the community of the discovery of contaminated groundwater and then update the residents on progress of the temporary solution being implemented under the TCRA.

There were two public comment periods during the development of the alternatives for Long-Term Water Supply to the community of Moose Creek, Alaska. The first was in July 2017 for the Draft IFS and the second was in April and May 2018 for the IPP, to allow public comment on the options identified in these documents.

At the time of the first public comment period, on the Draft IFS, the USAF had not identified a preferred alternative for supply of the long-term drinking water to the community of Moose Creek. The alternatives being investigated were presented at a public meeting on 19 July 2017. Comments were invited either by email or by mail using comment cards sent to Moose Creek residents. A second public comment period was held between 15 April and 15 May 2018 on the IPP. A public meeting was held on 23 April 2018 and, at this meeting, the USAF presented the preferred option for discussion. Questions raised at that meeting were recorded and further comments were received by email or mail. The questions and concerns raised are detailed in the following subsections.

3.2 SUMMARY OF PUBLIC COMMENTS RECEIVED DURING PUBLIC COMMENT PERIODS AND AGENCY RESPONSES

The first part of this section addresses those community concerns and comments that are non-technical in nature. Responses to specific legal and technical questions are provided in the second part. Comments in each part are categorized by relevant topics.

3.2.1 Summary and Response to Local Community Concerns

<u>Interim Feasibility Study – Public Comments Received</u>

A consultation period was held following publication of the IFS:

1. Some residents responded to the IFS by stating that the USAF created the situation where the groundwater was no longer fit to be drunk; therefore, why do the residents have to bear the cost for buying water that was previously free from their own wells? Their

preferred option would be purchase of their properties, which would be an additional Alternative 8.

USAF Response: The USAF may provide alternate water supplies as an interim remedy until the existing water supply is cleaned up or as a final remedy to permanently replace the existing water supply. At Moose Creek the alternate water supply is considered a final remedy with regard to the drinking and household water pathway, even though further remedial action may be needed as to the aquifer. Per Department of Defense policy, the USAF's responsibility for the alternate water supply ends upon completion of construction of the water system. The USAF does not have the authority to use the Environmental Restoration Account to fund water systems unless the operation of an aquifer treatment system is also selected in the decision document as a component of a response action to restore the groundwater. Only FEMA has the authority to "buy out" affected property owners, the Air Force can only purchase property on the open market in order to affect a remedy, so it was not possible to include this as an alternative.

2. Some residents responded to the IFS by stating that of the options presented they preferred to keep their existing system, either the water tank or GAC treatment of well water, so would prefer the Status Quo alternative.

   USAF Response: Residents opinions would be considered in the community acceptance section of the alternative's evaluation, and any residents preferences would be considered at this time.

3. Some residents responded to the IFS by raising the issue of how and when the groundwater became contaminated, and if there were any health impacts, they had been a resident of Moose Creek for 30 years.

   USAF Response: The USAF is currently identifying the sources of contamination and by testing the groundwater establishing its extent. If residents have any concerns due to the groundwater contamination, they can contact USAF at EAFB.

Interim Proposed Plan – Public Meeting and Written Comments Received

Remedial Alternative Selection Process

Information on Implementation of Preferred Alternative:

1. A resident asked if the USAF could confirm that the cost of removing the existing temporary water tanks and GAC filters would be borne by the USAF. If the resident requested, could they be left installed?

   USAF Response: The temporary equipment (water tanks and GAC filters) are the property of the USAF and would be removed once no longer required. It would not be possible to leave them after the permanent solution was implemented.

2. A number of residents asked if the connection from the local distribution system to the property was included in the USAF costs, or if this was to be borne by the residents. This cost could be substantial and should be included in USAF costs. Also, does this apply to currently vacant lots?

USAF Response: The cost of the connection is included in the project costs to be covered by the USAF and will not be borne by the residents. Connections will be supplied to current properties or properties under construction.

3. For the alternatives that require a water storage tank and pump station, Fairbanks North Star Borough owns land within Moose Creek that is currently available (an old school and near the Fire Station). Have you looked at using this land for this equipment?

   USAF Response: Although land for the equipment has been located, no specific site has been identified at this stage of the study. These options are very good and will be looked at in the further design stages.

4. After the project to supply drinking water has been implemented, can I still use my existing well to water the garden?

   USAF Response: No, the State of Alaska has restrictions on releases of contaminated water. As a result, the USAF is considering only options that would provide an adequate supply of water to Moose Creek community residents for drinking water, as well as household uses (car washing, gardening, etc.).

5. There is a separate project to supply natural gas to the community of Moose Creek. This will involve laying gas pipes down many of the same roads that will require water pipes. Have you coordinated with gas supply company this would benefit the residents by coordinating the construction?

   USAF Response: The USAF is aware of the project but has not yet looked into coordinating construction activities, as the selected alternative is unknown at this time.

6. When the water supplies are installed to each property will each apartment have their own water meter?

   USAF Response: Usually water meters are installed at a convenient location agreed between the property owner and the water supplier. Each property will require to be inspected to determine where the water meter would be installed. Where multiple apartments are connected to a single water meter, the apartment owner will normally include the water cost in the fees.

7. A resident stated he had been told that the water aquifer that supplied North Pole was contaminated and a new water main was being built from Fairbanks to supply North Pole with water from there. This would mean water was being pumped from Fairbanks to supply Moose Creek which would affect the selected option.

   USAF Response: We have spoken to North Pole utilities and this is not the case. They have no plans to get water supplied from Fairbanks to pump to Moose Creek, and routine sampling indicates that the North Pole water supply meets all Federal and State requirements.

Public Participation Process:

1. At the public meeting for the IPP, it was stated that the same questions are being asked that were asked at the meeting to discuss the IFS. What happened to those comments and the comments returned in writing as required by the USAF, have they been ignored?

USAF Response: All comments received from the public have been collected and will be included in the I-ROD at the end of this study. For the IFS, approximately 12 comments were received about the alternatives, from the 170 properties who received comment cards.

2. It was asked why hold a public consultation, if the USAF had already made up its mind and selected their preferred alternative.

   USAF Response: The preferred alternative is only that. Following public consultations of this option, it is possible that a different alternative may be selected.

3. A resident stated that, in 2017, North Pole passed a motion supporting Alternative 1. How did they know this was going to be the selected option when the residents of Moose Creek did not?

   USAF Response: The motion passed by North Pole was to confirm that, if requested, they would be willing to supply water to Moose Creek, which is currently outside their supply boundary. This motion was necessary to demonstrate that this alternative would be viable if selected.

3.2.2 Comprehensive Response to Specific Legal and Technical Questions

Remedial Alternative Selection Process:

1. A number of residents expressed interest in the option of having their current shallow wells replaced with deep wells. However, there was also concern that this may simply result in the contaminated water being pulled down to the deeper level after a period of time.

   USAF Response: The USAF agreed that pursuing this alternative had risks due to limited data being available about the deeper aquifer. Only one well had been installed during the study period and it was also not certain deep wells could be installed at all properties. These risks had been included in the alternatives section process.

2. A resident asked when will the groundwater contamination be cleaned up. It states in the IFS an assumption of 30 years for the operating cost, would cleaning up the groundwater affect the selected alternative?

   USAF Response: The USAF is currently identifying the sources of contamination and by testing the groundwater establishing its extent. Once that has been done, a feasibility study for cleaning up the contamination will be conducted and then a Final ROD, which includes an estimated timeframe to achieve cleanup goals, will be prepared. At this point, it is not possible to say when the groundwater will be cleaned up.

3. Has the alternative of drilling a slightly deeper well and then putting GAC on the water been investigated?

   USAF Response: The water would still require treatment with GAC, so this option is the same as Alternative 6.

4. Has the alternative of tankering water to the proposed Moose Creek reservoir but still building the local water distribution system been investigated. This would save the cost of building the new main across the Chena Flood area.

   USAF Response: This alternative would result in a capital cost similar to that for Alternative 2 (EAFB water supply) but with the additional high operating cost of water

tankering in Alternative 3. It would have the benefit of reducing the road wear around the community of Moose Creek. The Total NPV for this alternative would, however, be high.

Cost to be Borne by Residents:

1. A number of residents stated that since the USAF created the situation where the groundwater was no longer fit to be drunk why do the residents have to bear the cost for buying water that was previously free from their own wells? This should apply to all eight alternatives evaluated.

   USAF Response: The USAF may provide alternate water supplies as an interim remedy until the existing water supply is cleaned up or as a final remedy to permanently replace the existing water supply. At Moose Creek the alternate water supply is considered a final remedy with regard to the drinking and household water pathway, even though further remedial action may be needed as to the aquifer. Per Department of Defense policy**,** the USAF's responsibility for the alternate water supply ends upon completion of construction of the water system. The USAF does not have the authority to use the Environmental Restoration Account to fund water systems unless the operation of an aquifer treatment system is also selected in the decision document as a component of a response action to restore the groundwater. In this IROD, a public water supply system will provide potable water to the Community, and no remedy to restore the aquifer is selected in the decision document as a component of the response action. In the comparisons of costs, the wells previously operated by residents had costs associated with them for periodic maintenance (or replacement) for: pumps, tanks, piping, and other equipment; and electricity costs that should be acknowledged. Responsibility for operation and maintenance of the system transfers to the operator of the water supply system, in this instance the City of North Pole, which can charge for use of the water. Once the Final ROD is available, if any of the costs associate with water treatment are for removal of PFAS these conclusions will be revised.

2. A number of residents stated that they had been impacted by groundwater contamination. This affected both property values and personnel health and would they be able to claim compensation.

   USAF Response: Any residents could contact the USAF at EAFB and EAFB personnel would go through the process of what steps you would need to file a claim(s).

3. In the cost table to compare the alternatives, for Alternative 1 there is $14M operating cost for 30 years. Who is paying this cost?

   USAF Response: That cost is the operating cost for the water supply. It is effectively what the water customers are paying over 30 years.

Information on Implementation of Preferred Alternative

1. North Pole currently has communities within their boundaries that are not supplied by their existing WTP. Also, due to contamination from Flint Hills, another large community is being put onto their water system.

   USAF Response: The USAF can't comment on the water supply requirement for the whole of North Pole. The City was approached about being able to supply water to the community of Moose Creek and confirmed that there was sufficient water available; however,

treatment (to remove iron and manganese) and pumping would be required to be supplied by the USAF under this project.

2. The design for the preferred alternative shows chlorination of the water. When I contacted North Pole they said they did not chlorinate their water so why is it needed for Moose Creek? The addition of chlorine will affect the performance of the septic tanks since none of the properties are connected to sewers

   USAF Response: Chlorination is not required for the community of Moose Creek water supply; however, in discussions it was stated it may be required under some circumstances. It is now understood that, for the design proposed, chlorination is not required. The option to add chlorine was left in the design but is unlikely to be implemented. It should be added that chlorinated water being discharged into a septic tank is not an unusual situation and does not affect their performance.

3. It was asked why the design water consumption of 90 gallons/ person/ day is higher than the water usage used to calculate the average water bill of $40-85/ month.

   USAF Response: The design value is based on a possible future requirement and allows for an increase in water consumption per head of population. The existing value was based on typical water usage for existing North Pole customers and is, therefore, lower.

3.3 REMAINING CONCERNS

Issues and concerns that the USAF was unable to address during the planning activities include the following:

- **How will the LUC be implemented?** The USAF is unable to fully identify how the LUC will be implemented in the community of Moose Creek. Discussions are still on-going with regulatory and state agencies about the process.
- **How long will the groundwater be affected?** The USAF is still conducting investigations on the PFOS and PFOA groundwater contamination and identifying source areas. It is not possible at this early stage of the process to establish how long it will take until groundwater concentrations of PFOS and PFOA are below EPA HA levels.

APPENDIX A

References

REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2017. Public Water vs. Private Well Water, A Comparison (North Pole, Alaska). December.

ADEC, 2018. 18 AAC 75 Oil and Other Hazardous Substances Pollution Control. October.

Air Force Civil Engineer Center (AFCEC), 2015a. Final Action Memorandum for a Time-Critical Removal Action of PFC-Contaminated Water at Moose Creek, Alaska. 18 November.

City of North Pole, 2016. Drinking Water Quality Report, North Pole Utilities, PWSID 310675. Available at: http://www.northpolealaska.com/sites/default/files/fileattachments/utilities/page/3701/2016_water_quality_report.pdf.

City of North Pole, 2017. Resolution 17-15, A Resolution Stating Positions in Regards to the Moose Creek Feasibility Study dated June 2017, Sponsored by Mayor Bryce Ward. Introduced and Adopted 17 July.

EA Engineering, Science, and Technology, Inc. (EA), 2016. 2nd Quarter Report (2016) on Moose Creek Area Inspections, Sampling & Analysis, Treatment, and Construction. Moose Creek, Alaska. Contract No. W911KB-14-D-0019, Task Order No. 0004. August.

Fairbanks North Star Borough (FNSB), 2018. Fairbanks North Star Borough Comments, Interim Proposed Plan for the Long Term Water Supply, Community of Moose Creek, Alaska. 4 May.

U.S. Army Corps of Engineers (USACE), 2015a. Final Site Investigation Report for Site Investigations of Fire Fighting Foam Usage at Various Air Force Bases in the United States for Eielson Air Force Base. February.

USACE, 2015b. Final Addendum #2 to the Perfluorinated Compounds (PFCs) Investigation Work Plan at Eielson Air Force Base, Alaska. Prepared by EA Engineering. July.

USAF, 2016. Memorandum: SAF/IE Policy on Perfluorinated Compounds (PFCs) of Concern, Department of the Air Force. August.

USAF, 2017a. Final Installation-wide Monitoring Program 2015 Groundwater Monitoring Report, Eielson Air Force Base, Alaska, February.

USAF, 2017b. Eielson Air Force Base Final Interim Feasibility Study for Community of Moose Creek, Alaska, Long-Term Drinking Water Supply. October.

USAF, 2018. Eielson Air Force Base Interim Proposed Plan for Long Term Water Supply, Community of Moose Creek, Alaska. April.

USEPA, 1988. Guidance Document for Providing Alternate Water Supplies. EPA 540/G-87/006. February.

USEPA, 1999. A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, Document EPA-540-R-98-031. July.

USEPA, 2009. Provisional Health Advisory for PFOA and PFOS. January.

USEPA, 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS), Document EPA-822-R-16-004. May.

USEPA, 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA), Document EPA-822-R-16-005. May.

USEPA, 2016c. Contaminant Candidate List 4 – CCL 4. November.

USEPA, 2016d. Fact Sheet: PFOA & PFOS Drinking Water Health Advisories. Document EPA-800-F-16-003. November.

USEPA, 2018. EPA and DEC Approval of the Final Interim Proposed Plan for Long term Water Supply, Community of Moose Creek, Alaska April 2018.

APPENDIX B

Public Notice of Availability

AFFIDAVIT OF PUBLICATION

UNITED STATES OF AMERICA
STATE OF ALASKA } **SS.**
FOURTH DISTRICT

Before me, the undersigned, a notary public, this day personally appeared Jenny Nance **, who, being first duly sworn, according to law, says that he/she is an Advertising Clerk of the Fairbanks Daily News-Miner, a newspaper (i) published in newspaper format, (ii) distributed daily more than 50 weeks per year, (iii) with a total circulation of more than 500 and more than 10% of the population of the Fourth Judicial District, (iv) holding a second class mailing permit from the United States Postal Service, (v) not published primarily to distribute advertising, and (vi) not intended for a particular professional or occupational group. The advertisement which is attached is a true copy of the advertisement published in said paper on the following day(s):**

April 15, 18, 2018

Contracts & Procurement

Ad # 45416

Acct # 8630

and that the rate charged thereon is not excess of the rate charged private individuals, with the usual discounts.

Jenny Nance

Subscribed and sworn to before me on this 18 **day of** April **,** 20 18

M. Burnell

Notary Public in and for the State Alaska.

NOTARY PUBLIC
M. BURNELL
STATE OF ALASKA
My commission Expires December 7, 20____

My commission expires Dec 7, 2021

THE UNITED STATES AIR FORCE
INVITES PUBLIC COMMENT
AND ANNOUNCES A PUBLIC MEETING

For the Interim Proposed Plan for Long Term Water Supply for the Community of Moose Creek, Alaska
Eielson AFB, Alaska

The U.S. Air Force invites public comment on the Interim Proposed Plan (IPP) for the Long Term Water Supply for the Community of Moose Creek, Alaska. Groundwater in the area has become contaminated with perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) as the result of past firefighting and training activities at Eielson AFB.

An open house with a public comment session will be held April 23, 2018, from 6:00 to 8:00 p.m. at the Moose Creek Fire Station, 3481 Old Richardson Hwy, North Pole, AK 99507.

The US Air Force, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation (the Agencies) considered a variety of alternatives including:

- No action,
- Potable water supply from North Pole, with local distribution system,
- Potable water supply Eielson AFB, with local distribution system
- Deep Well to supply community water treatment plant, with local distribution system
- Installation of potable water tanks, at each property
- Installation of deep well, at each property
- Installation of granulated activated carbon, at each property
- Continuation of existing temporary water supply as the long term water Supply

The agencies have identified the preferred alternative, as supply of potable water from North Pole with a local distribution system to each property, as the alternative that will protect human health and the environment and provide long term effective supply of safe potable water to the community of Moose Creek. The preferred alternative is a preliminary determination, other alternatives could be selected based upon public comment, new information, or a reevaluation of existing information. The public is encouraged to comment on all the alternatives described in the Interim Proposed Plan. The Agencies will not select the final action until all public comments obtained during the public comment period have been evaluated.

The public comment period will begin April 15, 2018 and end on May 15, 2018. Written comments about the alternatives presented in the IPP should be sent to the base public affairs officer (address provided below) by May 15, 2018. These will be included in the Interim record of decision that will also be placed in the information repository at completion of the decision process.

The IPP and the documents used to prepare the IPP are located in the information repository at Eielson AFB listed below and can also be found at the internet address: http://alaskacollection.library.uaf.edu/eafbsc/cd0/Moose%20Creek%20PFCs%20Contamination%20Information%20Repository/

Documents can be found at:
2310 Central Avenue
Suite 213
Eielson AFB, 99702
Telephone: (907) 377-1666

For more information, contact:
354th Fighter Wing Public Affairs
354 Broadway Street, Unit 15A
Eielson Air Force Base, Alaska, 99702-1895
Telephone: (907) 377-2116
Email: 354fw.pa.publicaffairs@us.af.mil

E00045416

APPENDIX C

PFOS and PFOA Sample Results for Moose Creek

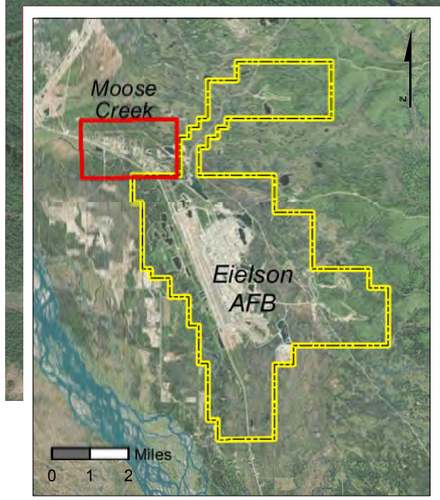
Data Sources
Jacobs 2015; EA 2017; Imagery: Esri, Digital Globe 2010

Legend
- Sampling Grid
- Well Location (Property ID#)

A1 A2 A3 A4
B1 B2 B3 B4 B5 B6
C3 C4 C5 C6 C7
D6 D7 D8
E7 E8 E9

Richardson Hwy

Moose Creek



0 850'

UNITED STATES AIR FORCE
EIELSON AFB

INTERIM RECORD OF DECISION FOR
COMMUNITY OF MOOSE CREEK, ALASKA,
LONG-TERM WATER SUPPLY

COMMUNITY OF MOOSE CREEK
SAMPLE WELL LOCATIONS

FIGURE
C-1
185750715.
100.06010403

FILE: C:\D\CAD\Proj\Stantec Cardno Baker JV\2018-2019 Eielson_Moose Creek ROD_185750715\3-Final\March 2019\Appendix C-1.dgn
TIME: 04-JUN-2019 10:33

Table C-1 – Community of Moose Creek – Wells Sampling Results

Property Number	PFOA (µg/L)	PFOS (µg/L)	Combined PFOS/ PFOA (µg/L)
1	0.130	1.400	1.530
2	0.100	1.270	1.370
3	0.075	0.988	1.063
4	0.113	1.790	1.903
5	0.146	2.090	2.236
6	0.132	2.090	2.222
7	0.020	0.092	0.112
8	0.101	1.390	1.491
9	0.101	1.100	1.201
10	0.094	1.370	1.464
11	0.098	1.700	1.798
13	0.108	1.720	1.828
14	0.015	0.142	0.157
15	0.015	0.098	0.113
16	0.046	0.746	0.792
17	0.022	0.295	0.317
18	0.011	0.200	0.211
19	0.015	0.166	0.181
20	0.027	0.420	0.447
21	0.098	1.380	1.478
22	0.097	0.957	1.054
23	0.050	0.683	0.733
24	0.009	0.080	0.089
25	0.022	0.330	0.352
26	0.076	0.970	1.046
27	0.022	0.354	0.376
28	0.051	0.797	0.848
29	0.016	0.120	0.136
30	0.014	0.093	0.106
31	0.011	0.121	0.132
32	0.020	0.065	0.085
33	0.043	0.526	0.569
34	0.094	1.230	1.324
35	0.073	0.900	0.973
36	0.070	0.929	0.999
37	0.048	0.585	0.633
38	0.053	0.747	0.800
39	0.039	0.428	0.467

Table C-1 – Community of Moose Creek – Wells Sampling Results (Continued)

Property Number	PFOA (µg/L)	PFOS (µg/L)	Combined PFOS/ PFOA (µg/L)
40	0.129	1.790	1.919
41	0.138	1.710	1.848
42	0.138	1.490	1.628
43	0.127	1.430	1.557
44	0.094	1.220	1.314
45	0.043	0.551	0.594
47	0.078	1.280	1.358
48	0.014	0.191	0.205
49	0.124	1.600	1.724
50	0.087	1.210	1.297
51	0.023	0.250	0.273
52	0.045	0.627	0.672
53	0.005	0.065	0.070
54	0.069	1.160	1.229
55	0.143	1.700	1.843
56	0.037	0.411	0.448
56	0.118	1.700	1.818
57	0.051	0.733	0.784
58	0.043	0.454	0.497
59	0.023	0.290	0.313
60	0.093	1.620	1.713
61	0.153	1.270	1.423
62	0.146	1.680	1.826
63	0.065	0.949	1.014
64	0.094	1.510	1.604
65	0.020	0.288	0.308
66	0.283	0.891	1.174
67	0.138	1.660	1.798
68	0.098	1.360	1.458
69	0.023	0.299	0.322
70	0.048	0.851	0.899
71	0.140	3.100	3.240
72	0.036	0.485	0.521
73	0.020	0.214	0.234
74	0.091	1.500	1.591
75	0.037	0.610	0.647
76	0.026	0.364	0.390
77	0.027	0.430	0.457
78	0.108	1.420	1.528

Table C-1 – Community of Moose Creek – Wells Sampling Results (Continued)

Property Number	PFOA (µg/L)	PFOS (µg/L)	Combined PFOS/ PFOA (µg/L)
79	0.159	1.300	1.459
80	0.096	1.320	1.416
81	0.102	1.460	1.562
82	0.034	0.284	0.318
83	0.029	0.285	0.314
84	0.110	1.000	1.110
85	0.045	0.315	0.360
86	0.170	2.000	2.170
87	0.043	0.552	0.595
88	0.046	0.612	0.658
89	0.010	0.218	0.228
90	0.099	1.400	1.499
91	0.086	1.270	1.356
92	0.025	0.366	0.391
93	0.073	0.940	1.013
94	0.059	0.820	0.879
95	0.073	0.958	1.031
96	0.031	0.442	0.473
97	0.031	0.472	0.503
98	0.035	0.572	0.607
99	0.052	0.570	0.622
100	0.038	0.307	0.345
101	0.011	0.042	0.053
102	0.034	0.474	0.508
103	0.014	0.163	0.177
104	0.125	1.790	1.915
105	0.049	0.754	0.803
106	0.079	0.960	1.039
107	0.046	0.611	0.657
108	0.032	0.533	0.565
109	0.038	0.582	0.620
110	0.020	0.276	0.296
111	0.012	0.189	0.201
112	0.140	1.100	1.240
113	0.016	0.248	0.264
114	0.098	1.550	1.648
115	0.067	0.921	0.988
116	0.106	1.320	1.426
117	0.139	1.550	1.689

Table C-1 – Community of Moose Creek – Wells Sampling Results (Continued)

Property Number	PFOA (µg/L)	PFOS (µg/L)	Combined PFOS/ PFOA (µg/L)
118	0.067	0.949	1.016
119	0.070	0.878	0.948
120	0.011	0.093	0.104
121	0.015	0.180	0.195
121	0.090	1.200	1.290
122	0.108	1.390	1.498
123	0.163	1.290	1.453
124	0.048	0.620	0.668
125	0.016	0.140	0.156
126	0.022	0.285	0.307
127	0.088	1.660	1.748
128	0.032	0.453	0.485
129	0.024	0.244	0.268
130	0.096	1.740	1.836
131	0.124	1.860	1.984
132	0.042	0.478	0.520
134	0.009	0.037	0.046
135	0.031	0.440	0.471
136	0.086	1.280	1.366
137	0.112	1.400	1.512
140	0.073	1.400	1.473
141	0.036	0.670	0.706
142	0.029	0.570	0.599
143	0.150	1.300	1.450
144	0.051	1.100	1.151
145	0.069	1.100	1.169
146	0.019	0.110	0.129
148	0.048	0.830	0.878
149	0.046	0.750	0.796
150	0.062	0.990	1.052
151	0.110	1.700	1.810
152	0.130	1.500	1.630
153	0.070	1.400	1.470
154	0.041	0.700	0.741
156	0.013	0.070	0.083
157	0.025	0.450	0.475
158	0.027	0.350	0.377
159	0.017	0.059	0.076
160	0.055	0.860	0.915

Table C-1 – Community of Moose Creek – Wells Sampling Results (Continued)

Property Number	PFOA (µg/L)	PFOS (µg/L)	Combined PFOS/ PFOA (µg/L)
161	0.036	0.620	0.656
162	0.066	0.870	0.936
163	0.019	0.130	0.149
164	0.110	1.900	2.010
165	0.150	1.400	1.550
166	0.095	1.600	1.695
167	0.026	0.550	0.576
168	0.037	0.500	0.537
169	0.009	0.044	0.053
172	0.039	0.400	0.439
173	0.160	1.300	1.460
174	0.062	0.720	0.782
175	0.059	0.730	0.789
176	0.099	0.740	0.839
177	0.120	1.200	1.320
178	0.036	0.690	0.726
185	0.042	0.580	0.622

APPENDIX D

Response to Comments on Community of Moose Creek Interim Record of Decision

EPA Responses

ADEC Responses

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3123

OFFICE OF
ENVIRONMENTAL
CLEANUP

April 30, 2019

Mr. Gary Fink
AFCEC/CZOP
10471 20th St; Suite 327
JBER, AK 99506 – 2201

RE: EPA and DEC Review of the *United States Air Force Eielson Air Force Base Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply, April 2019*

Dear Mr. Fink:

The United States Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (DEC) and have completed review of the *United States Air Force Eielson Air Force Base Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply, April 2019* (Moose Creek Interim ROD). A draft of this document was received on September 7, 2018. EPA and DEC completed our initial reviews and a Draft Final Moose Creek Interim ROD was distributed for our review on January 7, 2019. The EPA was on furlough from December 31, 2018 to January 28, 2019. EPA and DEC reviewed outstanding comments and another Draft Final Moose Creek Interim ROD was distributed on April 1, 2019. A meeting between the EPA, DEC and the United States Air Force was held on April 3, 2019 to discuss and address any remaining outstanding comments on the Moose Creek Interim ROD. A Final Moose Creek Interim ROD was distributed on April 30, 2019. All comments have been resolved and were sufficiently integrated into the document, therefore, the Moose Creek Interim ROD, is approved.

The Moose Creek Interim ROD presents the selected interim remedy for the community of Moose Creek, Alaska. This interim action is limited in scope and addresses only provision of an alternative drinking water supply to the community of Moose Creek. Remediation of the contaminated groundwater and any other affected media will also be addressed in a Final Record of Decision (ROD). The selected interim action is required to protect human health in the short-term while a final remedial solution is being developed. The Moose Creek Interim ROD will be followed by a Final ROD.

Please include this letter with the final document and contact either of us if you have any questions.

Sincerely,

Digitally signed by
Dustan Bott
Date: 2019.04.30
14:54:26 -07'00'

Dustan Bott
Remedial Project Manager

Sincerely,

Digitally signed by
M. Dennis Shepard
Date: 2019.04.30
13:42:01 -08'00'

Dennis Shepard
Environmental Program Specialist

Cc: (via email)
Shawn Blocker, EPA
Melinda Brunner, DEC
Bri Clark, DEC
Kevin Thomas, AFCEC
Carolyn Tallant, AFCEC
Joe Price, AFCEC

Review of the Responses to EPA Comments on the Draft Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply and the Redline Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply, Eielson Air Force Base, Alaska, January 2019

Number	Page	Section	Comment	Response	Evaluation of Response
GENERAL COMMENTS					
1.	-	General Comment	The Draft Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply, Eielson Air Force Base, Alaska, August 2018 (the IROD) does not discuss how land use controls (LUCs) will be implemented for any future newly constructed residences or facilities in Moose Creek. Please revise the IROD to discuss how LUCs will be implemented for any future newly constructed residences or facilities in Moose Creek.	**Agree:** The LUC has been changed to discuss the implementation of a critical water management area (CWMA) and compliance with the Uniform Environmental Covenants Act (UECA) to prohibit use of contaminated groundwater.	The response addresses the comment.
2.	-	General Comment	Sections 1.5 and 2.13 of the IROD state that the "interim action is: protective of human health and the environment in the short-term and is intended to provide adequate protection until a Final ROD is signed;" however, this statement is not consistent with Section 2.10.1, which states, "The selected interim action is required to protect human health in the short-term while a final remedial solution is being developed. Protection of the environment will be addressed in the Final ROD." The IROD should consistently indicate that the interim remedy is not protective of the environment, and protectiveness of the environment will be addressed in the Final ROD. Please revise all references to protectiveness of the environment in the IROD to clarify that the interim remedy is not protective the environment, and protectiveness of the environment will be addressed in the Final ROD.	**Agree:** Wording in 1.5 and 2.13 will be amended to say: 'This interim action is: protective of human health and the environment for the exposure pathway addressed by this action and is intended to provide adequate protection until a Final ROD is signed.'	The response addresses the comment.
3.	-	General Comment	According to Section 1.5, "This action is an interim solution only and is not intended to utilize permanent solutions;" however, the existing private water supply wells will be decommissioned, so it appears this is a permanent solution. In addition, the IROD does not discuss whether the water supply system is expected to be a component of the final remedy that will be selected in the future Final ROD. It is understood that the interim remedy is a partial remedy because it does not address concentrations in groundwater, but the IROD should clearly indicate that the water supply system will be a permanent feature. Please revise the IROD to remove all statements that indicate the interim remedy is not a permanent solution. Please also revise the IROD to discuss whether the water supply system is expected to be a component of the final remedy that will be selected in the future Final ROD.	**Agree:** Wording will be revised 'to utilize ~~permanent solutions and~~ alternative treatment…' same change made in section 2.13. **Agree:** The later sentence will be modified to 'Subsequent actions are planned to address fully the threats posed <u>to human health and the environment</u> by conditions at the community of Moose Creek~~.~~, <u>but it is anticipated that this interim action will remain to be incorporated into the final action</u>.' The same change was also made in section 2.13.	The response addresses the comment.
4.	-	General Comment	The numbers of properties with water tanks and granular activated carbon (GAC) filters referenced in the alternative descriptions is not consistent with earlier text. For example, Section 2.9.1.4 states that "approximately 100 properties have water tanks and 75 have GAC water filters installed;" however, Section 2.2 states that "The USAF [United States Air Force] have installed 164 systems	**Agree:** References to the number of system in place in 2016 will be removed and only 2018 numbers will be quoted.	The response addresses the comment.

Number	Page	Section	Comment	Response	Evaluation of Response
			at properties in the Moose Creek community: 98 storage tanks, 64 GAC filter systems and 2 five-gallon carboys. A further 6 properties remain on bottled water." In addition, the alternative descriptions do not mention stopping supply of bottled water or the five-gallon carboys. Please revise the descriptions in the subsections of Section 2.9.1 to be consistent with the information provided in Section 2.2. Please also revise the alternative descriptions in the subsections of Section 2.9.1 to include stopping supply of bottled water and the five-gallon carboys.	All references within the Alternatives uses these numbers and also specify that water deliveries (bottled and tanker) will stop for the appropriate alternative.	
5.	-	General Comment	The IROD cites the June 2016 data both in the text and on the figures; however, this data is more than two years old and more recent data (from 2017 or 2018) should be used instead, if available. For example, Section 2.5.3 discusses the maximum concentrations of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) based on June 2016 data. Similarly, Figures 2-2 and 2-3 depict the PFOS+PFOA extent up to June 2016, but do not include more recent data. Please revise the IROD to cite more recent groundwater data for Moose Creek, if available.	**Noted:** The 2016 survey dataset is the latest full dataset for all the wells showing contamination in the community of Moose Creek. Ongoing sampling is for drinking water compliance and not at the wellhead so a more recent full dataset is not available covering the whole area.	The response addresses the comment; however, it would be helpful if the information from the response was incorporated into the Redline Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply, Eielson Air Force Base, Alaska, January 2019 (the Redline IROD) to clarify why 2016 data is presented instead of more recent data. Please revise Redline IROD to incorporate the information provided in the response. **Agree:** The following text has been added to the first paragraph in section 2.5.3 "The 2016 survey dataset is the latest full dataset for all the wells showing PFAS contamination in the community of Moose Creek (Appendix C). Once the groundwater at a property has been identified as exceeding the LHA, arrangements are made to install a drinking water treatment system. The current sampling program is for post treatment drinking water compliance and not groundwater characterization. Therefore, a more recent groundwater dataset is not available that covers the whole area." **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
6.	-	General Comment	Figures 2-2 and 2-3 do not include posted PFOS+PFOA results for each monitoring location. Although the color scale denotes the range of concentrations, this is not enough to substantiate the red lines used to denote the extent of concentrations above the EPA Health Advisory (HA) level and the Alaska Department of Environmental Conservation (ADEC) groundwater cleanup level. Please revise Figures 2-2 and 2-3 to include the PFOS+PFOA results for each monitoring location.	**Disagree:** There are 170 sample locations each with PFOS+PFOA sample results. The quantity of data would result in a very congested figure. The graphic color coded presentation of concentrations is easier to understand.	The response partially addresses the comment. While it is understood that Figures 2-2 and 2-3 would be very congested if the sample results are depicted, a figure with the posted PFOS+PFOA results is needed. A figure with posted PFOS+PFOA results was not included in the IFS or in the Redline IROD, so a figure that includes posted PFOS+PFOA results should be provided, either as an attachment or an appendix. Alternatively, a figure with well identifiers could be provided with a corresponding table presenting the PFOS+PFOA results. Please revise the Redline IROD to include a separate figure to present posted PFOS+PFOA results.

Number	Page	Section	Comment	Response	Evaluation of Response
					Agree: The sample data showing PFOS and PFOA concentrations and an additional figure showing well locations will be included, in an Appendix C. **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
SPECIFIC COMMENTS					
7.	1-1	1.1	EPA no longer uses CERCLIS. Replace with "EPA Identification number"	**Agree**: replace 'Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) under Identification Number..' with 'Superfund Enterprise Management System (SEMS) under EPA Identification Number…' Will also change Abbreviations.	The response addresses the comment.
8.	1-1	1.2	It's not clear what the second sentence in the first paragraph is intended to convey. Suggest changing to: "This interim action is limited in scope and addresses only provision of an alternate water supply to the Moose Creek community. Remediation of the contaminated groundwater will be addressed in a Final Record of Decision". The last sentence in this paragraph is redundant and can be deleted.	**Agree:** will replace paragraph with 'This interim action is limited in scope and addresses only the provision of an alternate water supply to the community of Moose Creek. Remediation of the contaminated groundwater will be addressed in a Final Record of Decision'	The response addresses the comment.
9.	1-1	1.3	Change PFC to per- and polyfluoroalkyl substances (PFAS) throughout the document.	**Agree**: Will change PFC to PFAS, except where prior documents are referenced that used the abbreviation PFC.	The response addresses the comment.
10.	1-2	1.4	See previous comment #8. The first sentence in the first paragraph is unclear because the remedy doesn't address contaminated groundwater, it only provides an alternative water supply. See previous suggested edits. Second sentence in second paragraph: This is an interim remedy so the USAF doesn't necessarily have to address principal threat waste (PTW). It should not make any statements about whether there is/is not PTW when the investigation has not been completed. Delete this sentence and replace with a statement that this interim remedy does not address principal threat waste. Identification of PTW and approaches to address any identified PTW will be addressed in the final ROD.	**Agree:** Will replace first paragraph first sentence with 'The selected interim remedy is limited in scope and addresses only the provision of an alternate water supply to the community of Moose Creek.' Will replace second paragraph second sentence with 'This interim remedy does not address principal threat waste (PTW). Identification of PTW and approaches to address any identified PTW will be addressed in the final ROD.'	The response addresses the comment.
11.	1-9	Concurrence Page	The EPA concurrence page indicates "EPA selection of the remedy", EPA is concurring with the remedy. Please revise.	**Agree:** Will replace 'selection' with 'concurrence'	The response addresses the comment.
12.	1-15	Section 2.2 Page 2-2; Section 2.5.3 Page 2-5; and Section 2.7.1.1 Page 2-6	The last paragraph on page 2-2 states that "As of April 2018, the USAF has sampled 174 properties, of which 170 have well water (*sic*) above the EPA HA;" however, Section 2.5.3 states that "There were 167 properties inspected that had groundwater data reported above the EPA HA level" based on the data from 2016. Similarly, Section 2.7.1.1 references 170 properties with concentrations above the EPA HA. The IROD should consistently reference the number of properties that have concentrations above	**Agree:** Section 2.5.3, the number was incorrect and will be changed to '170 properties' with concentrations above the EPA HA.	The response addresses the comment.

Number	Page	Section	Comment	Response	Evaluation of Response
			the EPA HA. Please revise the IROD to consistently reference the number of properties that have concentrations above the EPA HA.		
13.	2-1	2.1	First paragraph: Replace CERCLIS with SEMS or just say this is the EPA ID number	**Agree:** Will replace 'CERLIS' with 'SEMS'	The response addresses the comment.
14.	-	Figure 2-1	Figure 2-1 depicts the direction of groundwater flow, but the IROD does not provide groundwater level data and/or groundwater level contours to substantiate the groundwater flow direction. Please revise the IROD to provide groundwater level data and/or groundwater level contours to substantiate the groundwater flow direction.	**Agree:** A reference for groundwater flow direction added "Installation-wide Monitoring Program 2015 Groundwater Monitoring Report, Eielson Air Force Base, Alaska, Final, (USAF, 2017a). Also updated the text since all wells have now been sampled.	The response does not address the comment. Figure 2-1 does not show the direction of groundwater flow beneath the community of Moose Creek, and it is not clear from the figure that the groundwater flow direction probably turns westward toward Moose Creek. In addition, Figure 2-1 does not appear to match the text in Section 2.5.2 (i.e., if the groundwater flow direction beneath the community of Moose Creek is consistent with the on-base flow, there should not be any contamination in the western half of Moose Creek). Please revise Figure 2-1 to show the direction of groundwater flow beneath the community of Moose Creek and to indicate whether the groundwater flow direction turns westward toward Moose Creek once off-base. In addition, please ensure the text in Section 2.5.2 is consistent with the groundwater flow information depicted on Figure 2-1. **Agree:** The Arrows on Figure 2-1 indicating approximate groundwater flow direction extended over the Community of Moose Creek. Also, text revised "…and ~~is~~ approximately follows the Piledriver Slough flow direction from southeast to northwest (Figure 2-1)." **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
15.	2-3	2.3	Second paragraph, last sentence: State the physical location of the Administrative Record. The NCP requires that the Administrative Record be available at a physical location near the site. See 40 CFR 300.805.	**Agree**: Will add additional bullets "Documents can be found at: Elmer E. Rasmuson Library, University of Alaska Fairbanks, 310 Tanana Drive, Fairbanks, AK 99775." Also USAF admin rec added to the electronic repository http://afcec.publicadmin-record.us.af.mil/	The response addresses the comment.
16.	2-3	2.4	This section should describe the scope and role of this action in the context of all Superfund activities at the EAFB site, and the AF's overall strategy to investigate remediate contamination at the EAFB site. Will this be part of an Operable Unit? What is the OU number? How many OUs are there at the site and what do they address? What is the AF's overall plan to address all contamination at the EAFB site?	**Disagree**: This Interim ROD has a scope limited to supplying drinking water to the community of Moose Creek. Once an RI has been conducted the USAF will be able to determine how it is to be addressed within the overall EAFB strategy and this will be described in the Final ROD.	The response addresses the comment.

Number	Page	Section	Comment	Response	Evaluation of Response
17.	2-5	2.5.3	First paragraph: Clarify that PFOA levels do not exceed the ADEC cleanup levels. Last paragraph: Need to provide a little more context here. What is this facility? Is this part of the EAFB? See earlier comment about putting this IROD in the context of overall activities at EAFB.	**Agree:** Add sentence 'The PFOA levels are not shown on Figure 2-3, but are below the ADEC cleanup levels.' **Disagree:** At this stage it does not form part of an overall EAFB strategy (see comment #16) so is limited to the Community.	The response partially addresses the comment. While it is understood that the IROD is limited to Moose Creek, the last paragraph of Section 2.5.3 references Flint Hills Resources but does not explain how this facility relates to Moose Creek (i.e., the facility is a source of sulfolane, but Moose Creek is upgradient and therefore not impacted). Please revise the Redline IROD to clarify the relation between Flint Hills Resources and Moose Creek. Alternatively, please remove the sentence regarding Flint Hills Resources. **Agree**: The reference to Flint Hills was added to the IPP at the request of USEPA to confirm the proposed North Pole water source was not impacted by Sulfolane. It will be deleted from the IROD **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
18.	2-5	2.6.2	Since the scope of this IROD is just groundwater, suggest deleting surface water from this section.	**Agree:** Changed second sentence to 'Surface water uses in the study area will be covered in the Full ROD'	The response addresses the comment.
19.	2-6	2.7.1	Please revise the beginning of the third paragraph in this section to accurately quote and not paraphrase the reference: "PFCs are a class of emerging contaminants, which means they have been identified as being a potential environmental or public health risk. Neither PFOS nor PFOA are listed CERCLA hazardous substances (40 CFR Part 302, Table 302.4). ADEC has listed both PFOS and PFOA as State of Alaska hazardous substances, each has a groundwater cleanup level of 0.40 µg/L (ADEC, 2017). Both the USAF and regulators have determined that PFOS and PFOA are 'contaminants', as defined by CERCLA (42 United States Code [USC] § 9601(33). As an emerging contaminant, the human and ecological effects from PFOS and PFOA are not yet fully understood and continue to be studied."	**Agree:** First two sentences will be replaced with, two paragraphs as shown in comment column, except reference amended to (ADEC, 2018) Current Version of 18 AAC 75 is dated October 27, 2018.	The response addresses the comment.
20.	2-6	2.7.1.1	Delete the first part of the second sentence in this section: "The human and ecological effects from PFOS and PFOA are not yet fully understood; however"	**Agree:** Part of sentence deleted.	The response addresses the comment.
21.	-	Figure 2-2 and Figure 2-3	Figures 2-2 and 2-3 have the same figure title but show the extent of concentrations above the EPA HA level and the ADEC groundwater cleanup level, respectively. Please consider modifying the figure titles for Figures 2-2 and 2-3 to clarify that they depict different information. In addition, state what the EPA LHA level is in the legend for Figure 2-2 and what the ADEC cleanup level is in the legend for Figure 2-3.	**Disagree:** Titles are different, Figure 2-2 is PFOA +PFOS Figure 2-3 is PFOS only. Since the EPA HA references the combined concentration and the ADEC clean up level the chemicals separately (PFOS is highest concentration) they were shown on different figures. The required cleanup levels are stated at the top of each figure.	The response addresses the comment.
22.	2-15	2.8	Replace RAOs with cleanup levels. See next comment.	**Disagree:** This section explains the Remedial action objectives and explains that the EPA HA values will form the basis of design for the subsequent design	The response addresses the comment.

Number	Page	Section	Comment	Response	Evaluation of Response
23.	2-15	Table 2-1	Replace "Remedial Action Objective" with "cleanup level" in both places in the table. The RAO is the narrative statement. The numeric levels that must be met to meet the RAO are cleanup levels.	**Agree:** Replace 'Remedial Action Objective' with 'Drinking Water Cleanup Levels' in the table title and cleanup Level in Column Title.	The response addresses the comment; however, it does not appear that the revisions have been made to the Redline IROD. The title of Table 2-1 remains "Interim Remedial Action Objectives," and the third column of Table 2-1 is still labeled as "Remedial Action Objective." Please revise the title of Table 2-1, as well as the third column label, to replace "Remedial Action Objectives" with "Cleanup Levels." **Agreed:** Table title and table column heading changed as proposed**.** **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
24.	2-16	2.9	Provide more information on what type of LUCs are anticipated. See comments in Selected Remedy section. LUCs could be proprietary restrictions (i.e. environmental covenants), or government restrictions (i.e. ordinances), or information advisories (i.e. deed notices and physical on-site signs). USAF should describe with more detail the LUCs that USAF believes will solve the groundwater use issue. It would also be good to know the specifics of what the USAF has in mind to anticipate how effective the LUCs will be.	**Agree:** The LUC bullet has had following text added 'The LUCs will include a CWMA. This will be drafted to legally prohibit the use of groundwater and the installation of new water wells within the CWMA designated zone. The UECA will require the recording of environmental covenants on all impacted real properties.' Except for alternatives where it would not apply. The implementation of the CWMA and UECA is expanded in section 2-12-2 (see comment #37 later)	The response partially addresses the comment. As long as the CWMA is successful, then this LUC is ok. If the CWMA fails to materialize, the AF will need to modify the remedy to come up with a different fix. If that doesn't work, the AF will need to document any new approach in a future decision document. **Agree:** No change to text, the CWMA and UECA are identified in this IROD. If the CWMA did not materialize The USAF may consider condemnation action under our CERCLA authority this would require to be recorded in a future ROD. Also, it is incorrect for the AF to state that UECA will require recording of environmental covenants. UECA is a state law which merely sets out the parameters for covenant. AF will need to work with residence owners to see whether the owners are willing to record an environmental covenant which burdens their property. If so, then the AF will need to negotiate the terms of the covenant with the owner and then the owner will need to record the covenant. If any of that doesn't work, then the AF will need to figure out another fix to prevent contaminated water use at the effected residence, and probably reflect that fix in a modification to the IROD with a future decision document. **Agree:** No change to text in this section, but the description of New Water Supply to Community in section 2.12.2, last bullet amended (see also #37) to clarify how these will be implemented. **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**

Number	Page	Section	Comment	Response	Evaluation of Response
25.	2-16	2.9.1	Ok to list only "key ARARs" in this section, but the ROD must list all ARARs specific to the interim action, not just refer to the FS. Refer to ROD Table 2-4 rather than the FS. First bullet: The Safe Drinking Water Act (SDWA) referenced here is an action-specific ARAR for this interim remedy. The alternatives must meet SDWA requirements for all contaminants, not just PFOS/PFOA. Second bullet: While EPA agrees that this is an ARAR, please explain why this is an ARAR - for which alternatives and activities. Does this refer to the statements that the AF must provide sufficient water for potable and non-potable uses because contaminated groundwater can't be used for watering grass, etc.?	**Agree:** Will added text to reference full list of ARAR in later section 2.10.2, where Table 2-4 is located. **Agree**: SDWA is an Action-Specific ARAR, because it is the implementation of the Alternative that means it applies to PFAS in the supply system. However, the existing WTP at North Pole already complies with SDWA so the other sections are not an ARAR as a result of this CERCLA action and does not require to be listed. **Agree:** Added additional explanation to end of sentence: '…into the environment, this would be for non-potable uses at the properties and their septic tank leach field.'	EPA disagrees with the conclusion of the AF – that because the water supply authority currently complies with the SDWA, SDWA requirements are not ARARs. Since the AF will be hooking people up to a water supply system, that system will become part of the remedy. All aspects of the remedy need to comply with ARARs, including the water supply system that the AF is choosing to tap into. As a result, the AF must assure that the system complies with the SDWA at least at the point when the system becomes part of the remedy (is turned on for the new connections) – otherwise that part of the remedy does not comply with CERCLA. **Agree** : Text revised in the drinking water protection ARAR to include SDWA (40 CFR 141). **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
26.	2-17	2.9.1.2	Per EPA's 1999 ROD guidance, provide the estimated capital, annual O&M, and total present worth costs; discount rate: and the number of years over which the remedy cost estimate is projected for each alternative. The text in this section is confusing in that it says "lifetime" in this sentence and 30 years in the next. Which one was used to develop NPV cost estimates? This is also repeated in the next section. Please clarify.	**Disagree:** Although the Total NPV is given with the description, the build up to this value is stated in Table 2-3 for each alternative. **Agree:** Text from the IFS has been added to section 2.10.7 to clarify the basis of NPV comparison. 'To compare the Alternatives over their operating life, NPV will be used to include anticipated operating cost over a 30-year period as recommended. The rate of return recommended for these projects is 5% for Federally funded projects it is recommended that the current Real Treasury Interest Rates published in Circular A-94 (Appendix C), which is 0.7% (for 2017, 30-Year) is used.'	The response addresses the comment.
27.	2-25	2.9.1.4	Regarding the last bullet: Make all Alternative sections consistent - either have a bullet for this sentence, or not.	**Agreed:** Last item will not be bulleted for all Alternatives	The response addresses the comment.
28.	2-29	2.9.2	Third bullet: See previous comment #25, this is an example as to why the USAF needs to say the SDWA requirements for water supplies are ARARs, not just the HA for PFOS/PFOA.	**Agree:** SDWA is an Action-Specific ARAR, since it is only due to the preferred alternative being implemented that it applies, see Comment #25	See our response to comment #25. **Agree :** Text revised in 2.91 (see #25) and Table 2-4 Description of ARARs (see #31 below) **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
29.	2-31	2.10.2	Bottom of page. Suggest deleting the following: "and typically control remedial activities that generate hazardous wastes (such as with those covered under RCRA). Offsite shipment, treatment, and disposal of excavated contaminated soil invoke action-specific ARARs.	**Agree:** Sentence deleted and definition of Action specific ARAR replaced with text below	The response addresses partially the comment. See our response to comment #25. **Agree** : Text revised in 2.91 (see #25) and Table 2-4 Description of ARARs (see #31 below)

Number	Page	Section	Comment	Response	Evaluation of Response
			This is confusing because examples are not relevant to this action. SDWA requirements for water supplies would be a better example of an action-specific ARAR for this action.	**Agree:** The definition modified to 'are activity or technology based controls or restrictions for particular treatment and disposal activities related to the management of hazardous wastes'	**4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
30.	2-32	Table 2-3	For NPV, per costing guidance federal facilities use current published OMB discount rate.	**Agree**: Reference and basis of NPV was added to section 2.10.7. (see #26 above)	The response addresses the comment.
31.	2-35	Table 2-4	See the various comments on this table below. We agree that MCLs and MCLGs are the primary ARARs components here of the SDWA. There are a host of other Federal drinking water regulations at 40 CFR Part 141 that apply to water systems (like monitoring, filtration, disinfection, and reporting requirements). Most of these requirements appear to be consumed by the ADEC regulation at 18 AAC 80.200 to .235 (which is also identified as an ARAR in this section). These requirements also apply to the water supplier, but since the remedy relies on a major contribution from the water supplier, the USAF should make sure that the water supplier is in compliance with these requirements when hooking people up to the system. An option is to include 40 CFR Part 141 as whole. Are there no location-specific ARARs? Is there a possibility of encountering archaeological or historical artifacts during construction? Might construction impact migratory birds or endangered species? ARARs listed in the Remedial Alternatives section should be consistent with this table (unless the ARAR is relevant only to an alternative that was not selected). The Remedial Alternatives section cites ADEC 18 AAC 75(b) Table C. It should be cited here. For the SDWA reference to MCLs: As MCLs are mostly found at 40 CFR Part 141.60 to .66, this citation must be added to this box. For the SDWA reference to MCLGs: Please qualify this by saying "non-zero MCLGs" and use the citation 40 C.F.R. 300.430(e)(2)(i)(B) & (C). To follow the two qualifiers in the NCP: (1) if the MCLGs are above zero, and the MCLGs for contaminants are relevant and appropriate (which they are), then the MCLGs are ARAR; (2) if the MCLGs are zero, then use the MCLs for those contaminants so long as the MCLs are relevant and appropriate (which they are). For the CWA reference of Section 402 NPDES: Explain why this is an ARAR. Does the North Pole water utility have an NPDES permit for discharge? Seems like this would not be an ARAR because this is an off-site facility and not subject to CERCLA.	**Disagree:** "Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or state environmental or facility-siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. For the preferred alternative the water treatment plant is the existing North Pole plant that is located remotely from Moose Creek. **Noted**: None were identified during the investigation stage for the preferred alternative. **Agree:** Soil cleanup standards should not have been listed in table, reference in Table changed to 18 AAC 75.345(b). **Agree: Will add** Additional clauses '& 141.60 to .66' **Agree:** Will change citation to 40 CFR. 300.430(e)(2)(i)(B) & (C) **Agree:** This was included for the onsite treatment alternative, but is not applicable to the preferred alternative, will be deleted.	See our response to comment #25. **Agree:** Action specific ARAR has SDWA (40 CFR 141) .1 to .861 listed **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**

Number	Page	Section	Comment	Response	Evaluation of Response
32.	2-38	2.10.8 and 2.10.9	With respect to modifying criteria, don't rank alternatives. Just state the State and community views.	**Agree:** Ratings will be deleted from 2.10.8 and 2.10.9 and Table 2-3	The response addresses the comment.
33.	2-38	2.10.9	This section indicates buying affected properties was not considered because alternate water sources are available and attributes this choice to a 1988 EPA guidance on alternate water supplies. EPA reviewed this guidance and did not find such a statement. This statement needs to be modified to be accurate as EPA guidance does not reference property buyouts. Note that the referenced Water Supply Guidance was written for EPA's actions at fund-lead sites, not for USAF-lead actions Delete this sentence: "However, in accordance with EPA guidance (USEPA, 1988), this option was not considered because alternate water sources are available."	**Noted –** This sentence was deleted from this paragraph, however document is EPA OSWER Directive 9295.5-02 dated June 14, 1985. This provides a MOU between EPA and FEMA which specifies that the authority granted by EO 12316 to FEMA for relocations re-delegates authority to EPA to determine the need for relocation **Agree:** Sentence deleted	The response addresses the comment.
34.	2-38	2.11	Replace the sentences in quotes below with a statement that this interim action is not intended to identify or address principal threat waste; this will be done in the final ROD. "Contaminated groundwater is not generally considered to be a source material under the NCP (40 CFR 300). Therefore, there are no principal threat wastes associated with the Moose Creek community's contaminated groundwater."	**Agree**: See also Comment #10 above text replaced with 'This interim remedy does not address PTW. Identification of PTW and approaches to address any identified PTW will be addressed in the final ROD.'	The response addresses the comment.
35.	2-39	2.12	See previous comment #24 on the need for more specificity in LUCs.	**Agree:** The implementation of the LUC in the form of a CWMA and UECA is added in Section 2.12.2 later	The response addresses the comment.
36.	2-39	2.12.2	It is unclear if all of the properties in Moose Creek will be connected to the new water supply system (i.e., the four properties with wells that do not currently exceed the EPA HA level). If these four properties will not be connected, then the wells at those four properties should continue to be monitored to evaluate whether PFOS+PFOA concentrations increase above the HA. Future connection to the new water supply system will be necessary if concentrations increase above the EPA HA level. Please revise Section 2.12.2 to clarify whether all of the properties in Moose Creek will be connected to the new water supply system. First bullet in this section: the ROD needs to be specific about what those Federal and State requirements are.	**Agree:** Additional text will be added that states '..however the local distribution system will be designed to serve all properties with wells, including those that do not currently exceed the EPA HA.' **Agree:** Added '…for safe drinking water'	The response addresses the comment.
37.	2-40 and 2-41	2.12.2	This section does not meet the intent of the 2013 LUC guidance (January 4, 2013 "Sample Federal Facility Land Use Controls ROD Checklist with Suggested Language", OSWER Directive 9355.6-12), that says that the ROD should list the specific LUC instrument(s) that will be used (e.g., deed restrictions). Examples include, but not limited to: "viii. Specific Performance Responsibility to Bind Contractors and Tenants". The USAF needs to explain how they will enforce	**Agree:** This section has been rewritten to reference the creation of a CWMA and compliance with UECA as the LUC instrument.	The response partially addresses the comment. However, this section has part of the same problem as in comment 24. The AF fails to adequately explain how the use of UECA and environmental covenants applies to private property owners and the option such owners have of simply not recording covenants on their property. **Agree:** The description of New Water Supply to Community in section 2.12.2, last bullet amended to "The UECA will require the recording of environmental

Number	Page	Section	Comment	Response	Evaluation of Response
			LUC's on privately owned property. If the USAF has the authority to enforce LUC's on private property, they need to describe what that authority is. If they don't have the authority, then they need to explain how they will establish restrictions on privately held property to ensure contaminated groundwater is not used. xvi. Needs more details as to the mechanisms used to achieve LUC performance objectives.		covenants on all impacted real properties in accordance with Alaska statutory law. The USAF will negotiate these agreements with impacted landowners to 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit future well installation/contaminated-groundwater use." (see also #24) **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
38.	2-44	Table 2-5	Provide a reference for the discount rate (e.g., OMB circular #, date).	**Agree**: Reference, reference and basis of NPV was added to section 2.10.7. (see #26 above)	The response does not address the comment. The comment requests a reference for the current OMB discount rate in Table 2-5. Please revise the Table 2-5 to reference the source for the current OMB discount rate. **Agree** – footnote added to table "* - Real Interest Rate, 30 year (OMB Circular A-94 Appendix C, revised November 2016)" **4/3/2019 - EPA accepted changes during the comment resolution meeting.**
39.	2-45	2.13	After "This interim action is: protective of human health and the environment" in the first sentence, add: "for the exposure pathway addressed by this action"	**Agree:** Sentence revised as suggested (see #2 above)	The response addresses the comment.
40.	3-2	3.2.1	The response to the comment in item 6 under the Information on Implementation of Preferred Alternative discussion does not appear to answer the question. The comment asks whether separate meters will be installed for each apartment unit, but the response only addressed the location of meters. Please expand the response to indicate whether properties with more than one unit will have a separate meter for each unit.	**Agree:** Answer only relates to interface between water supply company and apartment building. The sentence will be amended: 'Where multiple apartments are connected to a single water meter the apartment owner will normally include the water cost in the fees.'	The response addresses the comment.
41.	3-3	3.2.1	The response to the comment in item 1 under the Information on Public Participation Process discussion states that "All comments received from the public have been collected and will be included in the I-ROD;" however, the Responsiveness Summary does not identify which comments were made on the Interim Feasibility Study (IFS) versus the Interim Proposed Plan (IPP). Please revise the Responsiveness Summary to identify which comments were made on the IFS versus the IPP to ensure all public comments have been adequately addressed.	**Agree:** Questions asked by the community on the IFS were similar to those on the IPP, a separate section will created, to show the question raised during that stage on the public consultation.	The response addresses the comment; however, the new section summarizing comments on the IFS does not include Air Force responses. While it is understood that many of the concerns and comments are similar to those made on the IPP, the Air Force should still respond to the comments on the IFS to document that comments have been noted and/or addressed. Please revise the new section summarizing comments on the IFS to include Air Force responses. **Agree:** Responses added to the comments noted during the IFS public meeting. **4/3/2019 - Comments were added and shown at comment resolution meeting. EPA accepted the changes.**

Number	Page	Section	Comment	Response	Evaluation of Response
42.	3-4	3.2.2	The response to the comment in item 4 under the Information on Remedial Alternative Selection Process discussion states that Alternative 3 "would reduce road wear around the community of Moose Creek;" however, tankering water would increase the road wear. Please revise the response to clarify whether tankering water to Moose Creek would increase the road wear.	**Disagree:** Road wear on the unpaved roads within the community by water tankers was the concern identified. The construction of the local distribution system will remove that. However, wording will be amended to clarify unpaved roads are the issue of concern	The response addresses the comment.
43.	3-4	3.2.2	The response to the comment in item 1 under the Costs to be Bourne by Residents discussion states that "The EPA, under their alternative water sources guidance (USEPA, 1988), considers the current water tanks and GACs as temporary systems." This is used as justification that the USAF can only fund temporary costs and not costs once a permanent solution has been implemented. EPA reviewed this guidance and did not find such a statement classifying GAC/water tanks as temporary solutions. This statement needs to be deleted or modified to be accurate. Note that the referenced Water Supply Guidance was written for EPA's actions at fund-lead sites, not for USAF-lead actions. In addition, the USAF should provide a better explanation as to why the USAF will not pay for user fees involved in a water system that the USAF will create, to create to fix a problem that the USAF created.	**Agree:** a revised response has been added 'The USAF does not have the authority to use the Environmental Restoration Account to fund water systems unless the operation of an aquifer treatment system is also selected in the decision document as a component of a response action to restore the groundwater. In this IROD, a public water supply system will provide potable water to the Community, and no remedy to restore the aquifer is selected in the decision document as a component of the response action. Responsibility for operation and maintenance of the system transfers to the operator of the water supply system; in this instance, the City of North Pole, which can charge for use of the water.' Background: Among the major categories of alternatives for providing a safe water supply, USEPA guidance identifies the removal of contaminants by treatment. That guidance states; "[d]epending on the contaminants present, a treatment process can be designed to remove contaminants and reduce levels to comply with drinking water standards. Treatment of contaminated water supplies is used to provide drinkable water at the tap and not as a source remediation." (OSWER 9355.5-03, 3-13). That explanation clearly distinguishes treatment systems installed on water supply systems to control the exposure pathway from treatment systems installed to remediate groundwater. Note there may be situations in which the treatment system is also selected in the decision document as a component of a response action also to restore the groundwater. ERA funds may be used to operate the treatment system in those limited cases because the treatment system's operation is for an environmental restoration purpose. However, that is not the remedy selected in this Moose Creek IROD. While EPA does not use ERA funds, its guidance clearly explains when the use of cleanup funds to treat the water supply ends. "EPA's responsibility for the alternate water supply system ends upon completion of construction, when responsibility for operation and maintenance of the	The response partially addresses the comment. The response does not appear to be sensitive to the community concern regarding user fees for the future water system. The artificial line about how the funds can or can't be spent is unclear especially considering that the North Pole Utility is operating an aquifer treatment to supply water for this remedy. Please clarify and provide the AF policy for this approach. The text of the Redline IROD says that this is an interim remedy that is expected to be incorporated into the final remedy, so the same language should be used in this response to clearly convey that this is not the final remedy. In addition, once the final remedy is proposed, the issue of off-setting the cost of user fees should be discussed again. The response states that "The USAF does not have the authority to use the Environmental Restoration Account to fund water systems unless the operation of an aquifer treatment system is also selected," but the future final remedy may eventually have both supply and treatment systems. Therefore, once the final remedy is proposed, the issue of off-setting the cost of user fees should be discussed again if both supply and treatment systems are part of the final remedy. Lastly, the response should acknowledge that well water is not technically free. There are costs associated with periodic pump maintenance and/or replacement; maintenance and/or replacement of tanks, piping, and other equipment; and electricity costs that should be acknowledged. Please revise the response to clarify that this is an interim remedy that will be incorporated into the future final remedy. Please also revise the response to indicate that once the final remedy is proposed, the issue of off-setting the cost of user fees should be discussed again if both supply and treatment systems are part of the final remedy. Lastly, please revise the response to acknowledge the costs associated with well water. **Agree:** Response to first question in Cost to be Borne by Residents revised to clarify costs for operation of final alternative is USAF policy the words added. "Per Department of Defense policy," at start of third sentence.

Number	Page	Section	Comment	Response	Evaluation of Response
				system is transferred to the appropriate utility...EPA will seek transfer of control as soon as construction is complete..." (OSWER 9355.3-03, 5-1). Air Force CERCLA response authority for releases from Air Force facilities is comparable to EPA's CERCLA response authority for other releases. Just as EPA's responsibility for the alternate water supply system ends upon completion of construction, Air Force authority to use ERA funds for that purpose also ends at that point. In both cases, unless the operation of the treatment system is also selected in the decision document as a component of a response action to restore the groundwater, responsibility for operation and maintenance of the system transfers to the operator of the water supply system; in this instance the City of North Pole.	Text for costs associated with wells previously operated by residents added “In the comparisons of costs, the wells previously operated by residents had costs associated with them for periodic maintenance (or replacement) of: pumps, tanks, piping, and other equipment; and electricity costs that should be acknowledged” and reference to Final ROD is available the cost borne by residents “Once the Final ROD is available, if any of the costs associate with water treatment are for removal of PFAS these conclusions will be revised” **4/3/2019 - EPA accepted changes made during the comment resolution meeting.**
MINOR COMMENTS					
44.	2-16	Table 2-2	The description for Alternative 5 states “new dee well,” but should state “new deep well.” Please revise Table 2-2 to correct this typographical error.	**Agree:** change ‘dee’ to ‘deep’	The response addresses the comment.
45.	2-6	2.7.1	3rd paragraph, first sentence. Missing an “A” after PFO	**Agree:** change ‘PFO’ to ‘PFOA’	The response addresses the comment.

DEC Comments on Interim Record of Decision for Community of Moose Creek, Alaska, Long-Term Water Supply, Eielson Air Force Base, Alaska, Draft, August 2018

October 2, 2018

Reviewer: Alaska Department of Conservation

Comment No.	Page	Section	Comment / Recommendation	Response
1.	General		Adjust footers for uniformity throughout document. Page numbers switch sides frequently and slow down document navigation.	**Disagree** – Page numbers as set up for printing double sided, on paper, so the page number appears on the outside. **1/15/2019 DEC Accept**
2.	1-1	1.1	Part 1. Last sentence. Moose Creek uses the groundwater as more than its drinking water source such as watering lawns and gardens or washing vehicles. Please revise to state "Contaminants originating from sources within EAFB have migrated off-base and are impacting the groundwater that the community of Moose Creek uses as its domestic water source."	**Agree** – will change 'drinking water source' to 'domestic water source.' **1/15/2019 DEC Accept**
3.	1-1	1.2	Replace "drinking water source" with "domestic water source."	**Disagree –** In this instance, the purpose of this project is to supply a safe drinking water supply. **1/15/2019 DEC Accept**
4.	1-1	1.2	Change the last sentence of the second paragraph from *The State of Alaska concurs with the selected interim remedy,* to "The State of Alaska concurs that, when properly implemented, the interim remedy will comply with State Law."	**Agree** – Text will be changed as suggested. **1/15/2019 DEC Accept**
5.	1-1	1.3	Globally change PFC to PFAS throughout the document.	**Agree** – Will change PFC to PFAS globally. Also sentence added to section 2.2 explaining that PFAS and PFC are terms for the same chemical group, this is required due to historic use of 'PFC' in other documents. **1/15/2019 DEC Accept**

6.	1-1	1.3	The text *Although PFOS and PFOA are not CERCLA-listed hazardous substances, they are contaminant…* should be changed to, "Although PFOS and PFOA are not CERCLA-listed hazardous substances, they are considered CERCLA pollutants or contaminants."	**Agree** – Wording modified as per EPA document https://www.epa.gov/pfas/pfas-laws-and-regulations 'Although PFAS, including PFOA and PFOS, are not listed as CERCLA hazardous substances, but in some circumstances could be responded to as CERCLA pollutants or contaminants.' **1/15/2019 DEC Accept**
7.	1-2	1.4	Change "drinking water source" to "domestic water source."	**Agree** – will change 'drinking water source' to 'domestic water source' **1/15/2019 DEC Accept**
8.	1-2	1.4	The text states, "There have been no source materials constituting a principal threat waste identified at either Moose Creek or Eielson AFB." This is not an accurate statement. Multiple AFFF spills/releases were known to occur at EAFB with the contamination in soils having not been cleaned up yet. There is high likelihood of further migration to groundwater due to the nature of PFAS compounds. Please revise.	**Agree** – In line with EPA request (RTC #10) IROD will state 'Identification of PTW and approaches to address any identified PTW will be addressed in the Final ROD' **1/15/2019 DEC Accept**
9.	1-2	1.4	Fourth Bullet. The text states that existing wells will be decommissioned. How is this going to occur? Can this be mandated when the USAF does not own the land/wells? Please clarify in the text.	**Agree** – Text added to 3rd Bullet to indicate that LUCs will be in the form of a Critical Water Management Area (CWMA) and compliance with the Uniform Environmental Covenants Act (UECA). Add text to 4th and 5th bullet point describing these. **DEC Disagree** Bullet 4: Text states: "The Alaska Uniform Environmental Covenants Act (UECA) will require…" However, the UECA is a voluntary agreement. UECA does not allow for recording of environmental covenants on impacted real properties without landowner consent.

				Please revise to indicate the USAF will negotiate agreements with impacted landowners to: 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property prohibiting future well installation/groundwater use. **Agree** – Additional bullet added stating "• The USAF will negotiate agreements with impacted landowners to: 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit~~ing~~ future well installation/contaminated-groundwater use." **4/3/2019 DEC ACCEPT**
10.	1-2	1.4	Fourth Bullet. Second sentence. Change text to read "In addition, the previously installed water tanks and granular activated carbon (GAC) systems will be removed.	**Agree** – will add '...previously installed ...' to the sentence **1/15/2019 DEC Accept**
11.	1-2	1.5	Following the text, "Because this remedy will result in contaminants remaining on-site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within 5 years after commencement of the remedial action," add "and be conducted every 5 years thereafter."	**Agree** – will add '…and be conducted every 5 years thereafter.' **1/15/2019 DEC Accept**
12.	1-9	Signatures	Where is the state concurrence signature page?	**Agree** – ADEC Concurrence Signature page will be added. **1/16/2019 DEC Accept**

13.	1-9	Signatures	Insert a State concurrence signature page with John Halverson, Environmental Program Manager as the signatory for ADEC. Update page numbers and page number references to reflect this change.	**Agree** – John Halverson will be added as signatory. Statement will say: 'The State of Alaska Department of Environmental Conservation agrees that, if properly implemented, the selected remedies for the Community of Moose Creek, Alaska Long Term Water Supply will comply with State law. This decision will be reviewed and may be modified in the future if information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health.' **1/16/2019 DEC Accept**
14.	2-3	2.4	Insert the word "response" after "TCRA" in the first sentence.	**Agree** – '…response…' will be added to sentence. Also added action after emergency **1/16/2019 DEC Accept**
15.	2-4	2.4	Change "drinking water source" to "domestic water source."	**Agree** – will change 'drinking water source' to 'domestic water source' **1/16/2019 DEC Accept**
16.	2-5	2.5.3	Change "drinking water wells" to "domestic water wells."	**Agree** – changed 'drinking water wells' to 'domestic water wells' four occurrences. **1/16/2019 DEC Accept**
17.	2-5	2.5.3	Last sentence. Change text to read, "…so the groundwater beneath Moose Creek has not been impacted by the sulfolane…"	**Agree** – will add '…beneath Moose Creek…' to sentence. **1/16/2019 DEC Accept**
18.	2-5	2.6.2	Is the last sentence on the page "No beneficial uses have been identified for surface water in the study area," correct? Surface water ponds? Moose Creek?	**Noted** – EPA comment #18 suggested text be revised, sentence changed to 'Surface water uses in the study area will be covered in the Full ROD.' **1/16/2019 DEC Accept**
19.	2-6	2.7.1	Change "drinking water supply" to "domestic water supply" and change "provide drinking water" to "provide domestic water."	**Noted** – EPA comment #1 on Section 2.7 suggested this paragraph be deleted. **1/16/2019 DEC Accept**
20.	2-6	2.7.1	Third paragraph, PFO should be PFOA.	**Agree** – agreed change to 'PFOA' **1/16/2019 DEC Accept**

21.	2-6	2.7.1.1	On August 20, 2018, DEC issued a tech memo naming six PFAS compounds as hazardous substances under state law: PFOS, PFOA, perfluorononanoic acid (PFNA), perfluorohexanesulfonic (PFHxS), perfluoroheptanoic acid (PFHpA), perfluorobutanesulfonic acid (PFBS). These compounds need to be listed as chemicals or pollutants of concern and be discussed in this document. Further, domestic water sources previously deemed to be below the EPA LHA for PFOS and PFOA need to be reexamined for all six PFAS compounds determined to be hazardous substances.	**Disagree** – Reference DOD Rec 10 Response, 2 Nov. 2018 that the listed compounds do not meet the CERCLA definition of an ARAR. **DEC Accept with Comment** The cleanup levels for these compounds are being reviewed by DEC prior to promulgation. If DEC promulgates levels prior to the final ROD, then the ROD will be required to incorporate the new cleanup levels if concentrations in the affected area are above those cleanup levels. **Agree** – No change to text, however the promulgated clean up level at the time of the Final ROD will be incorporate in that document. **4/3/2019 DEC ACCEPT**
22.	2-13	2.7.1.1	In the final sentence of the section change "contaminants" to "pollutants or contaminants."	**Agree** – will add '…pollutants or…' to sentence. **1/16/2019 DEC Accept**
23.	2-13	2.7.1.1	Move the final sentence of the section up in the paragraph to precede the sentence, "ADEC has listed both PFOS and PFOA as hazardous substances under 18 Alaska Administrative Code (ACC) 75, and each has…"	**Agree** – Will move the sentence as suggested 'Both the USAF and regulators have determined that PFOS and PFOA are "pollutants or contaminants", as defined by CERCLA (42 United States Code [USC] § 9601(33).' **1/16/2019 DEC Accept**

24.	2-13	2.7.1.2	Expand the discussion of exposure routes to include consuming food irrigated with contaminated water. Soil is a concern. Rewrite this section to discuss how dermal contact, ingestion, or inhalation of PFOS or PFOA-contaminated soil could be an exposure pathway for excavation workers. Irrigating lawns/gardens or washing vehicles with contaminated water would result/potentially has resulted in surface soil contamination leading to an ingestion risk among children mostly.	**Disagree** – The exposure pathways were identified during the Interim Feasibility Study stage. Dermal contact and ingestion of plants irrigated with contaminated water were not identified as pathways of concern for this I-ROD. **DEC accept with comment** This pathway should be identified in a Final FS and in the Final ROD. Please add a sentence to state that Dermal contact and ingestion of plants irrigated with contaminated water will be discussed in the Final ROD. **Agree** – The sentence "Exposure pathways for dermal contact and ingestion of plants irrigated with contaminated water will be discussed in the Final ROD." Added to end of first paragraph **4/3/2019 DEC ACCEPT**
25.	2-13	2.7.1.2	3) Remove the "for direct contact" text from the end of the sentence.	**Agree** – Delete 'for direct contact'. **1/16/2019 DEC Accept**
26.	2-13	2.7.1.4	It could simply be stated that there is currently insufficient information to calculate any potential carcinogenic risk	**Noted** – As per EPA suggestion, this section was deleted **1/16/2019 DEC Accept**
27.	2-15	2.7.3	Though neither PFOS nor PFOA is listed as a CERCLA hazardous substance, they are listed as pollutants or contaminants under CERCLA. Please revise to include this.	**Agree** – The sentence from 2.7.1.1 will replace the existing sentence about emerging contaminants of concern with 'Both the USAF and regulators have determined that PFOS and PFOA are "pollutants or contaminants", as defined by CERCLA (42 United States Code [USC] § 9601(33).'

				1/16/2019 DEC Accept
28.	2-15	2.7.3	The State of Alaska has also determined that 4 other PFAS compounds as hazardous substances. Please include PFNA, PFHxS, PFHpA and PFBS in the Basis for Action section.	**Disagree** – see comment #21 above. **DEC Accept with Comment** The cleanup levels for these compounds are being reviewed by DEC prior to promulgation. If DEC promulgates levels prior to the final ROD, then the ROD will be required to incorporate the new cleanup levels if concentrations in the affected area are above those cleanup levels. **Agree** – No change to text, however the promulgated clean up level at the time of the Final ROD will be incorporate in that document. **4/3/2109 DEC ACCEPT**
29.	2-15	2.8	Third Paragraph, First Sentence. Rephrase to include "by preventing human ingestion or use of PFOS or PFOA contaminated groundwater…"	**Agree** – Added 'and also any environmental impacts from the use of domestic water' to the second paragraph **1/16/2019 DEC Accept**
30.	2-15	Table 2-1	Revise table to include PFNA, PFHxS, PFHpA, and PFBS in addition to PFOS and PFOA per the August 2018 tech memo issued by DEC.	**Disagree** – see comment #21 above. **DEC Accept with Comment** If DEC promulgates levels prior to the final ROD, then the ROD will be required to incorporate the new cleanup levels if concentrations in the affected area are above those cleanup levels. **Agree** – The Final ROD will incorporate promulgated cleanup level at that time. **4/3/2019 DEC ACCEPT**

31.	2-16	2.9	Can the USAF enforce LUCs on property not owned by the USAF? How will the USAF enforce LUCs on private property?	**Noted:** Earlier text revised to include reference to the CWMA and UECA compliance to be established. **ADEC Comment** Please revise. See Comment #9**.** **Agree** – wording amended to agree with section 1-4 "…to prohibit future well installation and use of untreated contaminated groundwater (USAF, 2018)." **4/3/2019 DEC ACCEPT**
32.	2-16	Table 2-2	Alternative 5. Correct the word "dee" to "deep."	**Agree** - changed to 'deep' **1/16/2019 DEC Accept**
33.	2-16	Table 2-2	The table does not include stipends or buy outs as options, which were options brought up at the public meetings for the affected community members. Why were these options not listed?	**Noted**: The buyout option is listed in the Interim Feasibility Study at the General Response Actions screening stage. It was eliminated since the EPA is required to determine that a permanent relocation of persons is necessary, and the Agency has not done that. (see #43 below) Stipend payments could form part of a solution so are not identified at this stage. **1/16/2019 DEC Accept**
34.	2-16	2.9.1	Second Bullet. Change the AAC reference from 18 AAC 75(b) to 18 AAC 75.345(b).	**Agree** – changed to '18 AAC 75.345(b)' **1/16/2019 DEC Accept**
35.	2-17	2.9.1.1	The text "This does not meet either of the key ARAR requirements," should read, "This does not meet protection of human health and the environment or either of the key ARAR requirements."	**Agree** – will add '…protection of human health and the environment or...' to the sentence. **1/16/2019 DEC Accept**
36.	2-25	2.9.1.4	Last Bullet. Monthly cost to residents for water delivery is not discussed for this alternative. Please include.	**Disagree** – There is no monthly cost to the residents, as stated the AF will be responsible for supply the water.

				1/16/2019 DEC Accept
37.	2-25	2.9.1.5	Is there data to suggest that PFAS compounds would not migrate deeper into groundwater? Would drilling deeper through the contaminated groundwater table potentially introduce contamination into deeper groundwater?	**Noted**: There have been no draw down tests to confirm this occurrence, the possibility of it is highlighted in Long Term Effectiveness (2.10.3, 4th Paragraph), the alternatives it impacts are scored accordingly. **1/16/2019 DEC Accept**
38.	2-26	2.9.1.7	Are GAC systems still a viable alternative when all six PFAS compounds considered hazardous substances by the State of Alaska are considered?	**Noted**: GAC will remove all six compounds but with differing effectiveness. Currently no sampling data is available on the presence of the additional chemicals at Moose Creek to quantify any change to alternatives evaluated. **1/16/2019 DEC Accept**
39.	2-29	2.9.2	Second Bullet. Change "drinking water" to "domestic water."	**Agree** – will change 'drinking water' to 'domestic water' **1/16/2019 DEC Accept**
40.	2-30	2.10.1	Change "…that serves as the Moose Creek community's drinking water source," to "…that serves as the Moose Creek community's domestic water source."	**Agree** – will change 'drinking water source' to 'domestic water source' **1/16/2019 DEC Accept**
41.	2-30	2.10.1	Add "and the environment" following each statement involving protecting human health.	**Agree** –added 'environmental impacts from the use of domestic water' to first statement only. **1/16/2019 DEC Accept**

42.	2-30	2.10.1	Protection of the environment by ensuring all domestic water used in Moose Creek is uncontaminated should be addressed in the Interim ROD as it is illegal to discharge contaminated water.	**Agree** – First paragraph modified to: 'Overall protection of human health and the environment is the first threshold criterion. However, this interim action is limited in scope and addresses only contaminated groundwater that serves as the Moose Creek community's ~~drinking~~ domestic water source. The selected interim action is required to protect human health and the environmental impacts from the use of domestic water, in the short-term, while a final remedial solution is being developed. Protection of the environment will be addressed in the Final ROD.' **1/16/2019 DEC Accept**
43.	2-38	2.10.9	In reference to the USAF not buying the affected properties per the referenced EPA guidance: This guidance document does not prohibit the buying of the affected properties because an alternate water source is available as implied by the reference. Please rephrase as to why the USAF is not listing buying the affected properties as a possible alternative.	**Agree –** This sentence was deleted from the paragraph, the correct reference is EPA OSWER Directive 9295.5-02 dated June 14, 1985. This provides a MOU between EPA and FEMA which specifies that the authority granted by EO 12316 to FEMA for relocations re-delegates authority to EPA to determine the need for relocation. **1/16/2019 DEC Accept**
44.	2-39	2.12.2	Last bullet: Are there agreements in place for the AF decommissioning of private supply wells?	**Agree:** Bullet amended to state 'A CWMA will be implemented, …'. Another bullet has been added discussing the UECA. **DEC Comment** Please revise. See Comment #9. **Agree** – The additional text added to the end of the seventh bullet "The USAF will negotiate these agreements with impacted

				landowners to 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit future well installation/contaminated-groundwater use." **4/3/2019 DEC ACCEPT**
45.	2-40	2.12.2	LUCs. How will these LUCs be enforced on land not owned by the USAF?	**Noted:** The LUC text has been amended to indicate that a CWMA and UECA compliance will be established to prevent use of contaminated groundwater. **DEC Comment** Please revise. See Comment #9. **Agree** – The additional text added to the end of the second bullet "The USAF will negotiate these agreements with impacted landowners to 1) decommission existing wells, 2) discontinue use of the property groundwater for any purpose, 3) provide access for USAF monitoring of groundwater/LUCs, and 4) place a covenant on the property to prohibit future well installation/contaminated-groundwater use." **4/3/2019 DEC ACCEPT**
46.	2-40	2.12.2	LUCs. i. Spelling correction of aquafer to aquifer.	**Agree** – change to '…aquifer…' **1/16/2019 DEC Accept**
47.	2-40	2.12.2	LUCs. ii. Change "protection levels" to "cleanup levels."	**Agree** - change to '…cleanup levels…' **1/16/2019 DEC Accept**

48.	2-40	2.12.2	LUCs. ii. Replace "…to ensure the groundwater is not used for drinking water purposes…" with "…to ensure the groundwater is not used for domestic water purposes…"	**Agree** – will change 'drinking water' to 'domestic water' **1/16/2019 DEC Accept**
49.	2-40	2.12.2	LUCs. iii. Change to "Prevent access to or use of the groundwater, until EPA HA's are met and groundwater quality is demonstrated to be suitable for unrestricted use and unlimited exposure (UU/UE)."	**Agree** – will add '…and groundwater quality is demonstrated to be suitable for unrestricted use and unlimited exposure (UU/UE).' **1/16/2019 DEC Accept**
50.	2-40	2.12.2	LUCs. vii. State that the Land Use Control Management Plan will be developed by the Air Force with input from and approval by DEC and EPA.	**Agree** – will add new sentence 'The Implementation Plan will be developed by the Air Force with input from and approval by DEC and EPA.' **1/16/2019 DEC Accept**
51.	2-43	2.12.2	LUCs. xiv. Change "Eielson AFB shall not modify or terminate LUCs, implementation actions, or land use that are associated with the selected remedy without the approval of EPA and the opportunity for concurrence by ADEC," to "Eielson AFB shall not modify or terminate LUCs, implementation actions, or land use that are associated with the selected remedy without the approval of EPA and ADEC."	**Disagree** – The language provided in this instance is negotiated by HQ USEPA and HQ USAF and is not subject to change. **DEC Disagree** DEC is unaware of an agreement between the USEPA and the US Air Force that would eliminate DEC approval authority. Please provide documentation of this agreement. In accordance with 18 AAC 75.375(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. **Disagree** – The wording for the LUC checklist was agreed to between the SAF/IEE and FFRRO as part of the

				informal dispute resolution agreement for Nike Site Summit (SS047) at JBER. At the time, the USEPA was disputing all USAF NPL site RODs on the LUC language. The dispute was resolved with an agreement by SAF/IEE (Gerald Pease) and HQ EPA FFRRO (Reggie Cheatham) that USAF would use the LUC language contained in EPA's LUC checklist per OSWER Directive 9355.6-12 modified to incorporate checklist items #14 and #17. (see attached SS047 Informal Dispute Resolution). Communication between James Conrad (AFLOA/JACE-FSC) and Jen Currie (Alaska Dept of Law) on 4/8/2019, agreed that for this project, the language was accepted. **4/8/2019 DEC ACCEPT**
52.	2-43	2.12.2	LUCs. xiv. Change "Eielson AFB shall seek prior concurrence…" to "Eielson AFB shall obtain concurrence…"	**Disagree** – The language provided in this instance is negotiated by HQ USEPA and HQ USAF and is not subject to change. **DEC Disagree** DEC is unaware of an agreement between the USEPA and the US Air Force that would eliminate DEC approval authority. Please provide reference for this agreement. In accordance with 18 AAC 75.375(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. **Disagree** – See response to comment #51 **4/8/2019 DEC ACCEPT**
53.	2-44	2.12.2	Monitoring of Remedy Implementation. Add "and every 5 years thereafter," to the end of the last sentence.	**Agree** - add '…and every 5 years thereafter until the site can support unlimited use and unrestricted exposures (UU/UE).' **1/16/2019 DEC Accept**