



ACTION MEMORANDUM
for a
TIME-CRITICAL REMOVAL ACTION
OF PFC-CONTAMINATED WATER
At
Moose Creek, Alaska
by

EIELSON AIR FORCE BASE, ALASKA

Prepared By
United States Air Force
Air Force Civil Engineer Center
Eielson AFB, Alaska

FINAL
18 November 2015

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I. PURPOSE

The purpose of this Action Memorandum is to document approval and decision by the U.S. Air Force (USAF) to conduct an Emergency and Time-Critical Removal Action (TCRA) in response to the presence of perfluorochemicals (PFC) in drinking water wells in Moose Creek, Alaska and surrounding areas (to include Eielson AFB). Although the U. S. Environmental Protection Agency (EPA) Office of Water has classified PFCs as contaminants of emerging concern, there are currently no federal Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs) or promulgated cleanup levels regarding exposure levels. The EPA has established provisional health advisory (PHA) values that the Air Force is using as benchmarks to determine if response actions are needed. The PHA is in place since research has identified that there is potential risk to human health as a result of exposure to PFCs and regulatory standards are under consideration. PHA values are developed to provide information in response to an urgent or rapidly developing situation. They reflect reasonable, health-based hazard concentrations above which action should be taken to reduce exposure to unregulated contaminants in drinking water. EPA will update PHAs as additional information becomes available and can be evaluated.

The primary PFC of concern for the Eielson AFB and Moose Creek community areas is perfluorooctanesulfonic acid (PFOS) also known as perfluorooctane sulfonate. PFOS is found in ground water at concentrations exceeding the PHA. There are some low level detections (below the PHA value) of perfluorooctanoic acid (PFOA) in the groundwater. The actions planned as part of this TCRA will prevent, limit, and mitigate an imminent and substantial threat to public health, welfare, or the environment.

This action memorandum is issued in accordance with, and satisfies the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, at Title 42 USC §9604), as further implemented by the National Contingency Plan (NCP, at Title 40 CFR §300.415). The USAF Installation Restoration Program (IRP) is authorized by the Defense Environmental Restoration Program (Title 10 USC 2701 *et. seq.*). The DERP is the environmental restoration program the military services use to conduct CERCLA response actions and satisfy CERCLA lead agency functions as delegated by Executive Order 12580. This document is consistent with requirements in Alaska State law and regulations, including but not limited to Title 46 of the Alaska Statutes and regulations promulgated there under.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

1. Physical Location and Description

Eielson AFB lies approximately 120 miles south of the Arctic Circle, 23 miles southeast of Fairbanks, 9 miles southeast of the city of North Pole, and adjacent to the community of Moose Creek (Figure 1.1). The Base is located 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. The Richardson Highway (Highway 2) passes through the western portion of the Base. The Alaska Railroad terminates within the Base. The Trans-Alaska Pipeline, connecting Prudhoe Bay and Valdez, passes through the Base entering in the northwestern portion and exiting to the southeast.

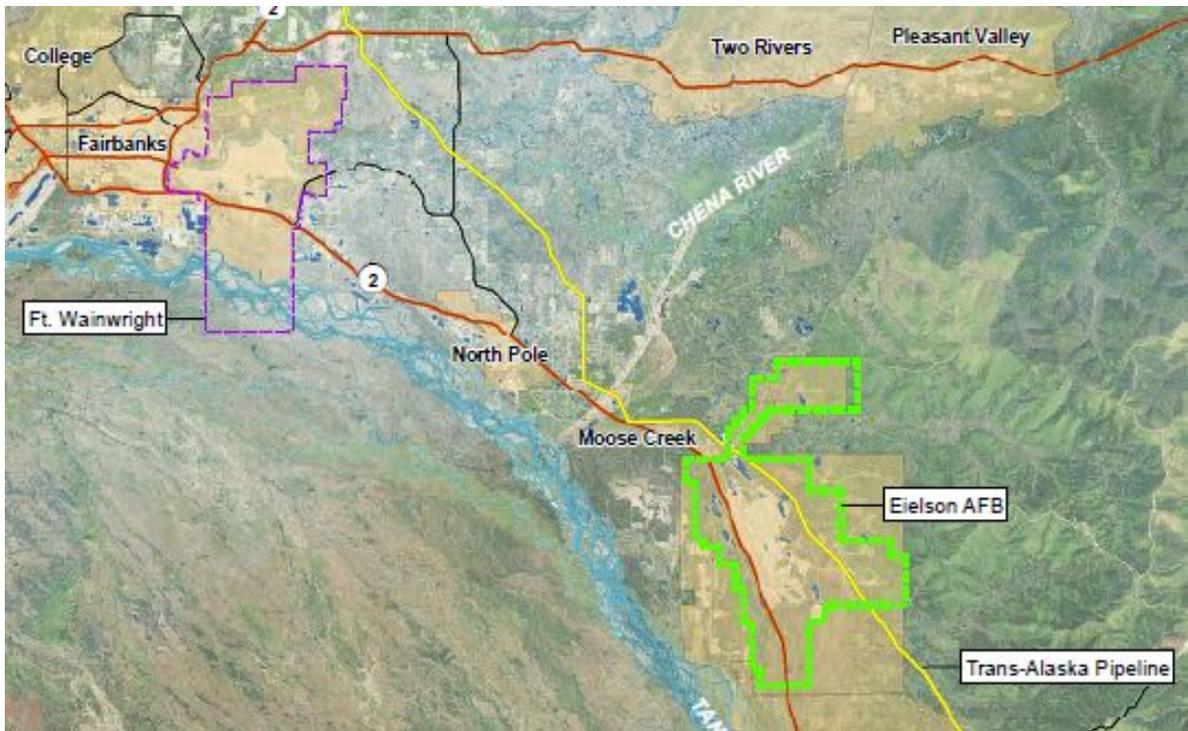


Figure 1 Eielson Location Map

Approximately 750 people live in the Moose Creek. Land use includes residential and industrial activities.

2. Site Operations History

Eielson AFB is an active military installation that has been used for military operations since its establishment in 1944. The mission of Eielson AFB is to train and equip personnel for close air support of ground troops in an arctic environment. Eielson AFB operations include industrial areas, aircraft maintenance and operations, an active runway and associated facilities, administrative offices, and residential and recreational facilities.

Eielson AFB provides housing for resident military personnel and their dependents, and employment and services for civilians from the surrounding area.

3. Removal Site Evaluation

During the field season of 2014, the Air Force conducted a project focused on PFC sampling at areas on Eielson AFB which were not fire training areas but were reported to have had aqueous film forming foam (aka firefighting foam) containing PFCs used. The site investigation report associated with that work was finalized in February 2015. The site investigation discovered both PFOA and PFOS in concentrations in groundwater above their respective PHAs. After reviewing the draft report, in January 2015 the U.S. Environmental Protection Agency Region 10 (EPA) requested that Eielson AFB test the drinking water wells on base to determine if PFOA or PFOS was present. Following sampling by the Air Force, both chemicals were found in the drinking water wells with PFOS exceeding the PHA determined by EPA. The base drinking water supply was switched over to draw from well(s) which did not exceed the PHA for PFOS.

The Air Force is presently implementing a nation-wide program of preliminary assessments and site inspections (PA/SI) of areas where a PFC release may have occurred. The completion of PA activities is planned for FY15 while the completion of SI activities is planned for FY16.

Since PFCs are water soluble and there is the potential for migration, additional site inspection was conducted to determine whether contaminants had migrated in ground water towards the northern base boundary and the nearby community of Moose Creek. In April 2015, the Air Force tested the water at the northern boundary which abuts the community of Moose Creek. PFOS exceeding the PHA was identified near the base boundary. As a result, the Air Force coordinated with the community to test private drinking water wells in Moose Creek.

4. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

The Draft 2015 Preliminary Assessment for PFCs at Eielson Air Force Base report identified areas where it is possible that PFCs were released into the environment and recommended Site Inspections (SIs) for those locations. These include the following:

- Current Fire Training Area (FTA) (FT09)
- Former FTAs by the Current Entomology Building
- Former FTA near the Antenna Farm
- Thunderdome (Building 1140)
- Hangar (Building 1344)
- KC-135 Fire Crash Site
- Foamed Runway and Biosolids Land Spreading Area
- Former Adak Building Fire
- South Ramp Spray Test Area

- Former Ball Field Spray Test Area
- Taxiway Charlie Spray Test Area
- Power Plant Cooling Pond
- WWTP and Biosolids Land Spreading Area
- Garrison Slough
- Dust Control Areas

Neither PFOS nor PFOA are listed CERCLA hazardous substances (40 C.F.R. Part 302, Table 302.4). However, the USAF and regulators have determined that PFOS and PFOA are 'contaminants'. CERCLA defines pollutant or contaminant as essentially any chemical that "...upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformation in such organisms or their offspring..." (42 U.S.C. § 9601(33)). The Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry (ATSDR) have reviewed the large toxicity databases for both PFOA and PFOS, summarizing the adverse effects to animals and humans following exposure. They concluded there is ample evidence of adverse effects, particularly in animals.

Based on information collected as part of the Draft PA and subsequent water supply well and direct push sampling, the presence of PFOA and PFOS in the groundwater is confirmation that a release of a contaminant has occurred. Groundwater flow at Eielson AFB is from south to north. Although delineation has not been completed, results of the Moose Creek water well sampling program identified a contaminant distribution pattern which is consistent with the groundwater flow direction and indicates a migration from south to the north. The majority of individual private drinking water wells tested in Moose Creek exceeded the PHA for PFOS.

5. NPL Status

Eielson AFB was listed on the National Priorities List (NPL) in 1989. Eielson Air Force Base is participating in the Installation Restoration Program (IRP), established in 1978. Under this program, the Department of Defense (DoD) seeks to identify, investigate, and clean up contamination from hazardous materials. To date, IRP source areas at Eielson AFB were grouped under the FFA into Operable Units (OU) 1 through 6. Four Records of Decision (RODs) containing final remedies for source areas within these six OUs were written and signed in 1994 and 1995 (note: OUs 3, 4, and 5 were addressed together, in the OU3,4,5 ROD), and a Sitewide ROD was issued in 1997 (Table ES-1). Additionally, two of the RODs (including the OU3,4,5 ROD) were amended in 2001. A wide variety of source areas have been identified at Eielson AFB. These include: closed and active unlined landfills, drum storage area(s), fuel spill areas, fire training areas, and other disposal or spill areas. An estimated 9,000 people obtain drinking water from wells within 3 miles of hazardous substances on the base. Surface water within 3 miles downslope of hazardous substances at the base is used for fishing. The base is in the floodplain of the Tanana River.

B. Other Actions to Date

1. Previous Actions

A site investigation that focused on PFC sampling at areas which were not fire training areas was finalized in February 2015. In March, April, and July 2015 the drinking water wells on base were tested with several of the wells exceeding the PHA for PFOS. In April 2015, the Air Force tested the water at the northern boundary which abuts the community of Moose Creek. PFOS exceeding the PHA was identified at this location prompting the Air Force to test private drinking water wells in Moose Creek starting in May 2015.

2. Current Actions

Four actions are on-going in the Moose Creek area.

- 1) Sampling of private wells in Moose Creek to determine the area impacted by PFC contamination. New locations continue to be added as owners request the sampling
- 2) Periodic resampling of wells (in Moose Creek and on Eielson AFB) that initially tested below the PHA. The goal is to establish a baseline for evaluating concentration trend(s), and ensure that all drinking water well locations with PFCs in excess of the PHA are identified.
- 3) The AF awarded a contract to purchase and install water treatment systems using granular activated carbon (GAC). Treatment systems are planned for private drinking water wells in Moose Creek that tested above the PHA.
- 4) The AF is providing clean, bottled water to homes and businesses that tested above the PHA for drinking and cooking uses.

3. Planned Actions

Multiple actions are currently planned in the Moose Creek area.

- 1) Complete installation of the off-base treatment systems and/or provide an alternate water supply (water tanks).
- 2) Conduct long-term operations and maintenance of the treatment systems including performance sampling to ensure the systems are effective in removal of PFCs to concentrations below the PHA levels.
- 3) Conduct periodic resampling of wells that initially tested below the PHA.
- 4) Conduct sampling of private wells not previously sampled as owners request the sampling and that are within the area thought to be at risk of PFCs.
- 5) Continue providing bottled water as needed.

C. Federal, State and Local Roles

1. Federal Agencies

With the discovery of the PFC contamination initially identified in the draft Site Inspection report, EPA is involved in the removal response. On January 19, 2015 EPA

sent a letter to Eielson AFB requesting sampling for PFCs be initiated for drinking water supply wells. Results documented in a memorandum to the EPA on March 25, 2015 indicated PFOS at a level above the PHA in three water production wells and one isolated water well location.

On April 10, 2015 EPA and the Alaska Department of Environmental Conservation (ADEC) jointly sent a letter to Eielson commenting on the AF Workplan to install temporary sampling wells and requesting that the Air Force resources would be better directed to immediately sample drinking water wells in the community of Moose Creek.

Furthermore, PFOA and PFOS are determined to be Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) pollutants and/or contaminants. Additionally, Eielson AFB is a National Priorities List (NPL) site under a Federal Facility Agreement (FFA), EPA will continue to be involved on this effort. EPA will be provided an opportunity to comment on this TCRA Action Memorandum.

2. State Agencies

The Alaska Department of Environmental Conservation, Contaminated Sites Program, has been involved along with EPA. ADEC is also a signatory on the FFA and will continue to be involved on this effort. ADEC will be provided an opportunity to comment on this TCRA Action Memorandum.

The Alaska Department of Health and Social Services is informed of the contamination and is supporting the Air Force, EPA, and ADEC by participating in the public meetings and providing fact sheets to the public.

The Alaska Department of Fish and Game and the Alaska Department of Natural Resources have been notified and are working with the Air Force in evaluating a fish advisory in Garrison Slough.

3. Local Authorities

Local authorities have been notified and include the Fairbanks North Star Borough (Mayor Luke Hopkins) and the Military Liaison Office (Shellie Severa), who have been supporting the Air Force by helping reserve public meeting locations, and speaking at some public meetings.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The AF identified there exists an immediate risk to public health or welfare or the environment due to the presence of PFC-contaminated ground water at the community of

Moose Creek. PFOS is present in private drinking water wells of human populations in Moose Creek.

Based on the current sampling data, routes of exposure in the Moose Creek area are ingestion of groundwater. Groundwater is the only pathway of concern at this time. Soil exposures are not currently believed to be a concern for the following reasons: 1) the only soil impacted would be below the groundwater level, 2) dermal soil absorption from PFC is not a pathway of concern and 3) Soils exposed to groundwater with a maximum concentration of 2 ppb would not result in a soil exceedance of 6 ppm (EPA PFOS soil screening level).

Some epidemiological studies have been conducted as part of human occupational studies. These efforts attempted to correlate PFOS blood serum levels to health characteristics (e.g., cholesterol, thyroid function, and reproductive and developmental health). In all cases, the results were inconclusive although suggestive that some relationship exists. Due to the limited extent of the studies and lack of sufficient data, the health effects from PFOS are not known in humans. Studies in animals have shown significantly different profiles between species. In general, there is evidence for immunological effects, increased liver weight, and a risk for low birth weight at exposures in the ppm range.

The initial assessment concludes most of the community has drinking water with PFOS above the PHA. Emergency Removal Action is warranted to provide bottled drinking water to impacted residents based on the following factors listed in 40 CFR 300.415(b)(2) of the NCP:

- (i) Actual or potential exposure to nearby human populations, or animals from hazardous substances or pollutants or contaminants;
- (ii) Levels above the PHA of hazardous substances or pollutants or contaminants in groundwater throughout the area used for drinking water.

Continued TCRA response action is immediately required to provide a longer term supply of clean drinking water. Currently in the community of Moose Creek there are 146 properties with private drinking water wells above the PHA and 19 properties with concentrations near the PHA. The scope of the affected area is not known but includes most of the community of Moose Creek which is an area approximately 3 miles by ½ mile. Alternative water supply sources need to be established as soon as possible so that all construction of groundwater treatment systems are completed before winter due to the climate of the affected area.

B. Threats to the Environment

The threats to the environment posed by the PFC contamination have not been quantified. Surface water impacts at Garrison Slough and Moose Creek have been identified, but are not addressed under this TCRA.

C. Statutory and Regulatory Authorities

PFOA and PFOS are not currently identified as hazardous chemicals as determined by CERCLA, however application of CERCLA criteria suggests that it is appropriate to consider them to be pollutants and/or contaminants. Further, the contamination level in the drinking water at the Moose Creek community does exceed the EPA's PHA of 0.2 µg/L PFOS. The concentrations of PFOS in the groundwater at the site presents a threat to public health or welfare or the environment. The TCRA presented in this memorandum is consistent with Title 40 CFR §300.415(e)(9) – which states, “Provision of alternative water supply—where necessary immediately to reduce exposure to contaminated household water and continuing until such time as local authorities can satisfy the need for a permanent remedy.”

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of pollutants and contaminants from Eielson AFB may present an imminent and substantial endangerment to public health, or welfare, or the environment.

CERCLA and the NCP along with EPA OSWER guidance equate “threat” and “danger” with “unacceptable risk” (see 42 U.S.C. § 9604(a)(1) and (b)(1)), 40 C.F.R. § 300.430(d) and OSWER 9355.0-30, *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*, April 22, 1991). Normally under the NCP and EPA guidance an unacceptable human health risk is present when cumulative human health cancer risk exceeds 1×10^{-4} or the non-cancer hazard index exceeds one, or in drinking water if an MCL is exceeded. Risk-based cleanup levels under CERCLA and EPA Office of Water (OW) health advisories are set at levels below these unacceptable risk levels. Accordingly, if PFOS or PFOA exist in a drinking water supply well above these risk-based response action trigger levels, such levels could present an unacceptable risk, threat and danger to human health. Specifically in the case of PFOA and PFOS since sampling shows exceedance of the respective PHAs in actual drinking water, there are sufficient grounds to find that an imminent and substantial danger to human health may exist.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

The Removal Action Objective (RAO) of the TCRA is to eliminate the imminent and substantial danger to human health or the environment posed by PFC-contaminated water used as drinking water by treating water from individual private water wells and/or providing an alternate water supply (water tank) to eliminate the ingestion exposure

pathway. Specifically, the RAO is to be achieved by treating the water exceeding the PHA with a GAC system and/or supplying a water tank and associated pumps and piping.

Access forms will be coordinated and acquired from residents to provide an avenue for communication as well as to ensure access for ongoing sampling efforts as well as installation and maintenance of the groundwater treatment systems. Site inspections for finalizing the treatment system design on a location-specific basis were initiated in August 2015. The intent is to have all treatment systems in place by the end of November; before outside temperatures drop to the point where construction activities are not feasible.

Further, water samples will be collected from groundwater in the suspected areas of contamination to determine which private water wells are impacted or may be impacted in the future, as well as other wells in the area to begin determining the lateral extent of the PFC contamination. Due to the varied nature of groundwater (e.g. flow rate, direction, contaminant concentration), water sampling will occur at a given location on multiple occasions over time to ensure that exposure risks are adequately addressed.

All PFC-contaminated wastes will be containerized and labeled in accordance with Department of Transportation (DOT) standards. All regulated wastes will be segregated and stored in specific containers, in preparation for off-site disposal at a regulated disposal facility. All non-regulated wastes, will be segregated, and stored for subsequent off-site disposal as required under the CERCLA off site rule (Title 40 CFR §300.440) or, if not applicable, in accordance with ADEC regulations.

2. Contribution to Remedial Performance

In November 1989, Eielson AFB was listed on the National Priorities List (NPL) of Federal Superfund sites by EPA. The USAF, State of Alaska, and the EPA then entered into the Federal Facility Agreement (FFA) for Eielson AFB under CERCLA Section 120, which was signed in 1991. The FFA established the procedural framework and schedule for developing, implementing, and monitoring CERCLA response actions. An additional goal of the FFA was to integrate the USAF's CERCLA response obligations and Resource Conservation and Recovery Act (RCRA) corrective action obligations. The actions proposed for the TCRA will achieve the general RAO associated with the groundwater by mitigating the immediate potential threat to human health and the environment. The objective will be met by removing PFCs from the drinking water and/or providing an alternate water source (i.e. bottled water or a water tank with delivered water) which eliminates the direct exposure potential to the PFC contamination. These actions ensure protectiveness, however the Air Force anticipates additional CERCLA related activities and is in the process of implementing a PA/SI. Data collected during the course of this TCRA will be included in the overall analysis of the plume and ultimately for determining a long-term solution.

3. Applicable or Relevant and Appropriate Requirements (ARARS)

There are no promulgated chemical specific ARARs for PFCs. In the absence of an ARAR, the PHA value is being used to justify a response action. In the absence of ARARs, cleanup levels are based upon "...other reliable information..." (See 40 C.F.R. § 300.430(e)(2)(i)). Reliable information is derived from other to be considered (TBC) criteria, advisories or guidance (40 C.F.R. § 300.400(g)(3)). The 2009 PHA value issued by EPA's Office of Water (OW) for both PFOA and PFOS is based upon the OW's calculated reference dose, which is a tier 3 toxicity value. The OW is working on issuing a long-term reference dose and final health advisory. The OW's provisional health advisory level reflects "...reasonable, health based hazard concentrations above which action should be taken to reduce exposure to unregulated contaminants in drinking water." (EPA 2009). Therefore, in the absence of an ARAR, the provisional health advisory value can be used as a trigger level to justify an appropriate response action.

Federal

- 1) Department of Transportation Title 49 CFR, parts 170 – 180.
These federal regulations are for hazardous materials transportation.
- 2) Clean Water Act Title 33 U.S.C. §1251
These federal regulations are for discharge of any pollutant from a point source into navigable waters. Under the CWA, EPA has set water quality standards for all contaminants in surface waters.

State

- 1) Portions of the substantive requirements of the Alaska Department of Environmental Conservation regulations are potential ARARs: The State of Alaska Title 18 Alaska Administrative Code (AAC) Chapter 75 details cleanup operation requirements and cleanup criteria for contaminated sites in the State of Alaska.

4. Project Schedule

The known contaminated wells in Moose Creek are to have treatment systems installed in 2015. The project is currently funded at approximately \$2,210,431 of a \$3,500,000 expected total requirement. Additional funding has been requested. The priority, to eliminate or reduce the current threat, will be the removal of the PFC-contamination from the drinking water. Long term operations and maintenance costs will be determined and a project programmed to meet the long term liabilities which are not known at this time. Estimations on the duration of this TCRA are not known at this time, but expect to last over one year. Evaluation of long-term options will be conducted over the next several months and as information on plume extent and behavior becomes available.

B. Costs

The cost for implementing the TCRA over the next year is estimated at \$3,500,000. This is based on current contract costs.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

A delayed action, or no action, will increase the potential for the exposure to the PFC-contaminated water via drinking. No action or a delayed action could endanger human health.

VII. OUTSTANDING POLICY ISSUES

DoD and AF policies for PFCs are not fully developed. PFOA and PFOS are emerging contaminants (ECs) that currently do not have regulatory standards based on peer-reviewed science (AFI 32-7020 Terms). DOD Instruction 4715.18 on Emerging Contaminants directs USAF to take response actions for ECs released from DoD facilities in accordance with the Defense Environmental Restoration Program (DERP) and consistent with CERCLA, the procedures in the Instruction and the Eielson FFA.

VIII. PUBLIC PARTICIPATION

Close communications and coordination is being maintained with the local community. Public meetings were held in June, July, and August 2015. Additional public meetings are planned but are not currently scheduled.

This TCRA Action Memorandum is subject to inclusion in the Administrative Record after a 30 day public comment period.

IX. ENFORCEMENT

There are no enforcement activities on-going related to this TCRA. The USAF is conducting this removal action as a part of the Defense Environmental Restoration Program.

X. RECOMMENDATION

This Action Memorandum documents the decision for the TCRA for PFC contaminated drinking water in the Moose Creek community and adjoining areas originating from Eielson AFB. This decision is developed in accordance with CERCLA as amended, and

is not inconsistent with the NCP. This decision is based on the administrative record file for the site. Conditions at the site meet the NCP section 300.415(b)(2) criteria for determining that the removal action was appropriate. The EPA and the ADEC have been participants in the planning and implementation of this action and supported the recommended action.

XI. SIGNATURES

The signature documents the decision made to conduct the TCRA. The decision may be reviewed and modified in the future if new information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health or the environment.



SUSAN M. RIORDAN-SMITH, Col, USAF
Deputy Director, Environmental Management Directorate

6 May 16

DATE