05 April 2022

ACTION MEMORANDUM

FROM: NGB/A4V

SUBJECT: Non-time Critical Removal Action of Perfluorooctane Sulfonate and Perfluorooctanoic Acid, Montana Air National Guard Base, Great Falls International Airport, Montana

References: (a) DoDM 4715.20, 9 March 2012, incorporating Change 1, Aug 31, 2018, *Defense Environmental Restoration Program (DERP) Management.*
(b) BB&E Inc. (BB&E), April 2016, *Perfluorinated Compounds Preliminary Assessment Site Visit Report (Revised Final), Montana Air National Guard Base, Great Falls, Montana.*
(c) Leidos, February 2019, *Site Inspection Report for Perfluorooctane Sulfonate and Perfluorooctanoic Acid at Great Falls Air National Guard Base, Great Falls, Montana.*
(d) EA Engineering, Science, and Technology, Inc. (EA), April 2021, *Supplemental Site Investigation Report Per-and Polyfluoroalkyl Substances Emerging Contaminant Groundwater Investigation at Montana Air National Guard Base, Great Falls, Montana*.
(e) National Guard Bureau, Environmental Division, Restoration Branch, March 2022, *Engineering Evaluation/Cost Analysis for Off-base Drinking Water Response Action, at PFOS/PFOA Impacted Residential Drinking Water Well, Montana Air National Guard Base.*

1. **Purpose:** This Action Memorandum is to document approval and decision by the National Guard Bureau (NGB) to conduct a Non-Time Critical Removal Action (NTCRA) in response to the presence of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), (two (2) subsets of per- and polyfluoroalkyl substances (PFAS)), in one (1) off-base private residential drinking water (DW) well. The DW well is adjacent to and immediately downgradient of Great Falls International Airport (IAP) and Montana Air National Guard Base (ANGB) (herein referred to as "Base"), in Great Falls, Montana. The response action meets the requirements specified in the DoDM 4715.20 (reference (a)). The NGB proposes to install a whole house, point-of-entry treatment (POET) system at a residential location, to treat well water impacted with PFAS.

2. **Site Conditions and Background.**

A. Site Description:

Montana ANGB is the home of the 120th AW in Great Falls, Montana. Montana ANGB is located at the Great Falls IAP, the airport covers roughly 2,110 acres, has three asphalt runways, and is located 3 miles southwest of downtown Great Falls in Cascade County. The Base's facilities consist of more than 50 buildings, occupying approximately 125 acres on the

southeastern corner of the airport. The AF has leased the base from the Great Falls IAP since 1948 and in turn has licensed the facility to the state of MT for use by the MTANG. The area immediately south of the Base is designated for industrial and commercial uses. Part of the open area southwest of the airport is used for active outdoor recreation. Residential areas are located on and below the Sun River bench east, and to north of the Base.

Great Falls IAP started as a municipal airport in the late 1920s. The 120th AW of the Montana ANG was first organized as the 186th Fighter Squadron at Great Falls Airport in 1947 after the conclusion of World War II. The squadron maintained an active role in air combat and national defense missions until early 2014 when the Base was converted to the 120th AW. From 1940 to 1948, all airport facilities were leased to the United States military to support the war effort in Europe. The AF has leased the base from the Great Falls IAP since 1948 and in turn has licensed the facility to the state of MT for use by the MTANG. During this time, the airfield was renamed Great Falls IAP. Today, Great Falls IAP is still an active civil-military airport that supports air freight and services roughly 170,000 passengers annually. The 120th AW currently is an air reserve component of the U.S. Air Force and flies the C-130 Hercules cargo plane.

B. Removal Site Evaluation

In April 2016, the NGB completed a preliminary assessment (PA) at the Base to identify potential areas suspected or known to have had a release of AFFF (a source of PFAS) into the environment. The PA results indicated sufficient evidence of a potential release warranting additional investigation at eight (8) PRLs (PRL 3 through PRL 10). In February 2019, the NGB completed a SI of the eight (8) PRLs at the Base that were carried forward from the PA. Laboratory results from the SI confirmed the release of PFAS in environmental media above screening levels at seven (7) PRLs (PRL 3 through PRL 9). Laboratory sampling results from the SI did not confirm the release of PFAS in environmental media above screening levels at PRL 10.

NGB also completed a supplemental SI at Site 1 on April 2021 of an off-base former FTA in which soil and groundwater samples were collected and analyzed for PFOS/PFOA (Note: the former FTA (ERP Site 1) received regulatory closure for non-PFAS related contaminants.). Both media demonstrated exceedances of the established screening levels. Samples were collected within site boundaries but in close proximity of the subject off-Base DW well. Results indicated a groundwater exceedance of 216 ppt PFOS/PFOA at monitoring well MW3 (EA, 2021).

Review of publically available records identified up to five (5) off-base private wells located within one (1) mile downgradient from the Base. Field verification determined two (2) of five (5) off-base wells were used for DW purposes; two (2) of five (5) wells were not used for DW purposes; and one (1) of five (5) wells was not operational and collocated with one of the aforementioned active DW wells.

On July 20, 2021, NGB collected DW samples at the outside faucet and kitchen faucet for the subject downgradient off-Base private DW well serving a residential property. An existing reverse osmosis (RO) water treatment system treated water from the kitchen faucet. On August

5, 2021, the NGB notified the well owner via telephone that laboratory results indicated PFOS/PFOA was present above the USEPA lifetime HA (at 166 ppt) in the unfiltered DW water collected at the outside faucet, and was not detected in the RO treatment system filtered water emanating from the kitchen faucet. NGB arranged for same-day bottled water delivery. NGB commenced recurring bottled water delivery service on August 9, 2021 and continues to provide bottled water until a long-term DW solution is implemented. NGB conducted confirmatory sampling of the DW well to verify PFOS/PFOA concentrations in DW and received validated laboratory results (September 9, 2021) that confirmed PFOS/PFOA was present in unfiltered DW at the outside faucet at a combined concentration of 69.4 ppt. The RO treated DW emanating from the kitchen faucet remained at non-detect levels. NGB received permission to sample the DW well at a second residence on September 29, 2021. Results received November 2, 2021 indicated that PFOS/PFOA levels DW are below the USEPA lifetime HA at 44 ppt. Confirmatory samples were collected on November 2, 2021. Results of confirmatory sampling was also below the lifetime HA of 70 ppt at 44 ppt. At present, this property is vacant but habitable.

NGB evaluated existing data to determine if DW sampling is warranted beyond the initial one (1) mile focus area. Data indicates there is insufficient evidence of a potential complete exposure pathway from confirmed PFOS/PFOA release areas above screening levels to human DW receptors beyond the initial focus area.

C. Physical Location: The Base is located approximately three (3) miles southwest of Great Falls, Montana on the southeast side of the Great Falls International airport (Latitude/Longitude 47.4766/-111.3643).

D. Site Characteristics: The Base is situated within Great Falls IAP and is bounded by airport property to the north, west, and south and is adjacent to a rural community to the east. Monitoring wells installed at the Base and airport indicate that surface soil consists of unconsolidated sand and very thin gravel from the Taft Hill Member geologic unit of the Blackleaf Formation, and is underlain by weathered siltstone to fine sandstone of the Flood Member geologic unit of the Blackleaf Formation. Boring logs at ERP Site 1 indicate that depths of the Flood Member range from 55 feet below ground surface (ft bgs) to 85 ft bgs, which is then underlain by the Middle Flood Shale. GW occurs in the unconfined Upper Flood Sandstone aquifer and is encountered at approximately 28 ft bgs to 45 ft bgs. The aquifer is recharged predominantly through downward infiltration. On-base GW flow is generally to the west/northwest toward the off-base population.

E. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant: The MTANG operated an FTA (referred to as ERP Site 1) located on Great Falls IAP from 1968 to 1989 where the fire department sprayed AFFF that contained PFAS. The FTA closed in 1995. Neither PFOS nor PFOA are listed as CERCLA hazardous substances (see 40 C.F.R. Part 302, Table 302.4). However, the USEPA, U.S. Department of Defense (DoD), and Montana Department of Environmental Quality (MTDEQ) 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)). In 2016, the USEPA established human HA levels for PFOS and PFOA at 70 ppt in DW based upon peer-reviewed studies of the adverse health effects of ingesting these chemicals. Thus, PFOS and PFOA meet the CERCLA definition of pollutant or contaminant.

NPL status: Montana ANGB in not listed on the National Priority List (NPL).

Maps, pictures, and other graphic representations: See attached Montana ANGB Figure 1-1 which depicts Montana ANGB, the contamination source area and the Great Fall 1 mile focus area.

F. Other Actions to Date

Previous Actions: See Removal Site Evaluation discussed above

Current actions: The ANG is currently providing bottled water to the first residential well owner at no cost to the resident. Further, the ANG prepared an *Engineering Evaluation and Cost Analysis (EE/CA) For Off-base Drinking Water Response Action* (reference (which will be finalized March 2022) that evaluates removal action alternatives to provide a permanent alternative water supply for the residence with well DW that exceeds USEPA's lifetime HA (result of 166 ppt). The EE/CA evaluated alternatives of conducting no action, connection to an alternative municipal water supply; installation of a point of entry water treatment system; and continuing the home delivery of bottled water. NGB is coordinating planning for the installation of the recommended alternative, POET system.

G. State and Local Authorities' Role: The Montana Department of Environmental Quality (MTDEQ) is the state regulatory agency with oversight authority of the ANG CERCLA emergency removal response actions. MTDEQ participated in public meeting held in June 2021, and has been informed of NGB's actions at the two residences.

H. State and local actions to date: The NGB notified the MTDEQ on August 9, 2021 of the PFOS/PFOA laboratory results of the residential DW well and ANG's subsequent response actions to the PFOS/PFOA exceedances above the USEPA lifetime HA in DW. NGB forwarded validated sampling results to the MTDEQ on August 17, 2021. NGB continues to inform the MTDEQ regarding the status of NGB's off-base DW response actions within the vicinity of the Base. Based on discussions to date and the urgency of this action, NGB anticipates that MTDEQ will support this decision to conduct a NTCRA as provided in this Action Memorandum.

I. Potential for continued State/local response: Since the action taken is to provide a permanent and effective solution to address offsite DW well impacts, the NGB anticipates

receipt of a MTDEQ concurrence letter supporting this decision. No additional actions are required by State or local officials at this time.

3. Threats to Public Health or Welfare or the Environment and Statutory and Regulatory Authorities: The NGB identified an immediate, continuing risk to public health or welfare or the environment due to the presence of PFOS and PFOA impacted GW in the off-base residential DW well. Although NGB has established a bottled water contract at the impacted residence since August 2021, the potential for exposure to PFOS/PFOA still exist via ingestion of unfiltered DW from faucets in other than the kitchen, or the outside spigot. Also, PFOS and PFOA are present in one (1) off-base private DW well at concentrations exceeding the USEPA's lifetime HA levels at 166 ppt. These conditions meet two of the criteria listed in the National Contingency Plan (section 40 CFR 300.415(b)(2)(i) (potential exposure of nearby human populations) and (ii) (actual/potential contamination of DW supplies) supporting removal actions.

4. Endangerment Determination: Actual or threatened releases of pollutants and contaminants from past Montana ANGB activities at former Fire Training Area 1 presents an endangerment to public health, or welfare, or the environment. PFOS and PFOA are present in one (1) off-base DW supply above the USEPA's risk-based levels that trigger a response action. Such levels could present an unacceptable risk to human health. Since sampling shows exceedance of the respective USEPA lifetime HA in actual DW, there are sufficient grounds to find that a threat to human health may exist. This ANG NTCRA is authorized under CERCLA (§§ 104(a)(1) and (2)); and implemented pursuant to the National Contingency Plan (40 CFR §300.415).

5. Proposed Actions and Estimated Costs

A. Proposed Actions: The NGB proposes to install a whole house, point of entry treatment (POET) system at the one residence where PFOS/PFOA levels exceed USEPA human HA levels. The NGB considered and reviewed the feasibility of several alternatives to eliminate human health risk which are: connection to a local water utility installation of a POET system, and continued delivery of bottled water. As a baseline, the "no action" alternative was also evaluated but was eliminated as an option because this alternative is not protective of human health. Connection of the residence to the municipal system was ruled out due to high cost in comparison to other viable alternatives, and potential time consuming administrative requirements. In addition, continuing bottled water delivery service was ruled out as a long-term option because this option cannot ensure that all sources of DW within the residence such as bathroom faucets and outside spigots will not be used as a DW source. The Costs section of this Memorandum provides cost details of the alternatives evaluated.

NGB will continue to provide bottled water during installation of the POET system until analytical results confirm the system is operating properly to eliminate PFOS/PFOA from the DW. The POET system provides filtration via two granulated activated carbon (GAC) units. As water is pumped from the DW well to the residence, it is filtered as it enters the house before distribution via the residence's plumbing system via a process of physical adsorption, whereby the contaminants are trapped and held in to the granulated activated carbon as the water passes through carbon filtration tanks. There are plans for two GAC units to eliminate potential for

contamination breakthrough. NGB would provide for sampling, and operation and maintenance of the POET system until a different solution is selected or the well water is deemed safe to drink. Maintenance includes replacement and proper disposal of spent carbon canisters; routine sampling of pretreated and post-treated water to ensure the system is functioning properly; perform routine maintenance as needed, and monitor groundwater quality. The frequency of POET system operation and maintenance, and sampling activities will be determined based on sampling results and experience with similar treatment systems. The periodicity of sampling will be conservative initially and adjusted based on sampling results. Sampling reports will be prepared and submitted to the MTDEQ, with copies provided to the well owner. The POET system will remain in place until groundwater sampling confirms PFOS/PFOA concentrations no longer exceed the USEPA lifetime HA levels for DW, and there no longer exists a risk to human health. The NGB will seek MTDEQ concurrence prior to removing the treatment system. The estimated total present value of the providing all POET system equipment and maintenance over 30 years is $38,412.08. The initial investment to install the POET system is $4,000. Operation and maintenance is estimated at $2,500 per year. There are no other cost associated with operation of the POET system.

B. Contribution to Remedial Performance: Installation and operation of a POET does not contribute to remedial performance. Any contribution to remedial performance will be incidental. The objective is limited to immediately removing potential endangerment to human health by eliminating the ingestion exposure pathway. No human health or ecological risk assessment was conducted. Risk exposures were determined strictly upon the residential use of a DW well demonstrated sampling results at levels exceeding the USEPA lifetime HA advisory levels for PFOS and PFOA.

The POET system is not part of an overall remedial strategy to remove contamination from the aquifer. The NGB plans to study the overall PFOS/PFOA contamination in a remedial investigation of the Montana ANGB and off-base impacts. Based upon that study the NGB will conduct a feasibility study of viable remedial responses to guide its decision of an effective remedy to clean up the aquifer.

C. Engineering Evaluation/Cost Analysis (EE/CA): NGB prepared an *Engineering Evaluation/Cost Analysis for Off-base Drinking Water Response Action, at PFOS/PFOA Impacted Residential Drinking Water Well, Montana Air National Guard Base.* The highlights of that EE/CA are discussed below.

D. ARARs (Applicable or Relevant and Appropriate Requirements): Pursuant to 40 CFR 300.415(j), removal actions shall, to the extent practicable considering the exigencies of the situation, attain ARARs. There are no promulgated chemical-specific ARARs for PFOS and PFOA. In the absence of ARARs, cleanup levels are based upon "…other reliable information. …" (See 40 CFR§300.430(e)(2)(i)).

Reliable information can be derived from other to-be-considered (TBC) criteria, advisories, or guidance (40 CFR § 300.400(g)(3)). These advisories, criteria, or guidance are developed by USEPA, other federal agencies, or states and may be useful in developing the removal action. TBCs complement ARARs but do not override them. Therefore, in the absence of an ARAR,

NGB is using the USEPA lifetime HA as protective levels for human health in DW as TBC. MTDEQ, which has adopted the USEPA lifetime HA levels for PFOS and PFOA as MTDEQ-7 groundwater standards for the protection of human health.

E. Project Schedule: Continue to provide bottled water as needed until other remedial or removal response action negates the need to provide bottled water. The ANG anticipates conducting a home survey of the plumbing and historical water usage at the residence on or about March 2022. The survey is necessary to ensure proper design of the GAC POET system at that location. The ANG anticipates completion of the design and installation of the system no later than April 2022.

F. Estimated ANG Costs: Projected costs of alternatives evaluated in the EE/CA for this response action are provided below:

Alternative 1- No Action

- No Action, is the baseline against which the other alternatives were compared. As such, no costs are associated with Alternative 1.

Alternative 2 – Alternate (Municipal 'City') Water Supply

- **Capital Costs**: $1,442,681 = (19,008 ft of pipe (3.6 miles loop)). Costing provided by Great Falls Municipal Water Utility.
- **Annual Operation & Maintenance Costs**: Unavailable- O&M will be provided by City of Great Falls Municipal Water on behalf of customer
- **Water Usage Costs:** Paid by customer

Total Present Value = $1,442,681

Alternative 3 - Point-of-Entry Treatment System (estimated at present value costs)

- **Capital Costs:** $4,000
- **Annual Operation & Maintenance Costs:** $2,500 (Years 1-30 total)
- **Periodic System Upgrade Costs:** $0* (Years 5, 10, 15, 20, 25, 30 total)

Total Present Value = $38,412**

Alternative 4 – Continuation of Bottled Water (based on actual cost): $720/year and $21,600 over 30 year period. The NPV (over 30 yrs period) = $14,072.32

*****Assumes no additional cost will be required beyond regular maintenance of the POET system
******Assumes $2,500 in annual O&M at an interest rate of 6% and 30 year plus initial capital cost of $4,000 in year 1

Table 1. Comparative Analysis of Alternatives

Criterion	Alternative			
	1. No Action	2. Alt. Water	3. POET	4. Bottled Water
Protection of Human Health & the	4	1	2	3
Compliance with ARARs	4	1	1	2
Long-Term Effectiveness &	4	1	2	3
Short-Term Effectiveness	4	1	1	1
Reduction of Toxicity, Mobility or	4	4	1	4
Implementability	1	2	2	1
Present Value	1	4	3	2
TOTAL SCORE	**22**	**14**	**12**	**16**

(NOTE: Alternative feasibility is ranked relative to each other. The best rating is a 1 and the worst rating is scored with a 4. Comparable alternatives are ranked with the same score. Lowest score is the most feasible.)

6. Expected Change in the Situation Should Action Be Delayed or Not Taken: If this removal response action is not taken or is delayed, bottle water delivery will continue. Persons could be exposed to PFOS/PFOA via spigots discharging unfiltered water and endanger human health.

7. Outstanding Policy Issues: None

8. Enforcement: Enforcement actions are not expected.

9. Alternatives: No other adequate timely alternatives exist in the present case.

10. Recommendation: Install a whole house water POET system at the one (1) residential location where PFOS/PFOA levels exceed USEPA human HA levels.

A. Emergency Removal Action Memorandum Approval

This Action Memorandum documents the decision and approval of the National Guard Bureau for the emergency provision of a DW point-of-entry treatment system in the single-household dwelling immediately down gradient of the Great Falls IAP and Montana ANGB attributable to PFOS/PFOA originating from the ERP Site 1. This decision is in accordance with CERCLA as amended, OSD DERP guidance, and is consistent with the NCP. This decision is based on the administrative record file for the site. Conditions at the site meet the National Contingency Plan

(section 300.415(b)(2)) criteria for determining that the removal action was appropriate. The MTDEQ supports this response action.

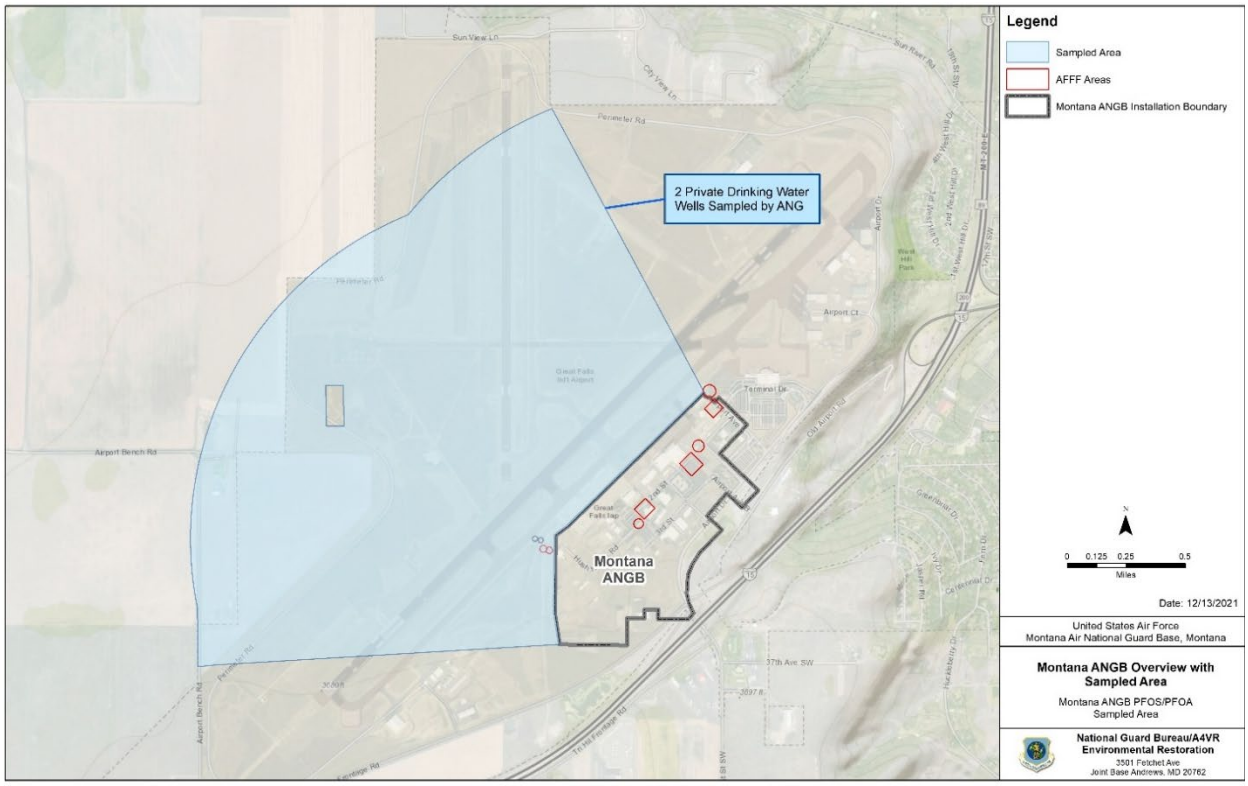
Approved by:

ELAINE A. MAGDINEC, PE, GS-15, DAF
Chief, Environmental Division

Attachment:

1. National Guard Bureau, 20 August 2021, Action Memorandum, *Emergency Removal Action of Perfluorooctane Sulfonate and Perfluorooctanoic Acid, Montana Air National Guard Base, Great Falls International Airport, Montana*
2. Figure - Montana ANGB PFOS/PFOA Sampling Results Overview
3. National Guard Bureau, Environmental Division, Restoration Branch, March 2022, *Engineering Evaluation/Cost Analysis for Off-base Drinking Water Response Action, at PFOS/PFOA Impacted Residential Drinking Water Well, Montana Air National Guard Base.*

Figure 1-1: Location of Montana ANGB, Great Falls IAP, Montana



ENGINEERING EVALUATION/COST ANALYSIS FOR OFF-BASE DRINKING WATER RESPONSE ACTION

CITY OF GREAT FALLS
PFOS/PFOA IMPACTED PRIVATE DRINKING WATER WELL

120TH AIRLIFT WING
MONTANA AIR NATIONAL GUARD BASE
Great Falls International Airport
Great Falls, Montana

Prepared by:
National Guard Bureau, Environmental Division,
Restoration Branch, Shepperd Hall
3501 Fetchet Avenue
Joint Base Andrews, MD 20762

April 2022

This page intentionally left blank

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AFFF	Aqueous film-forming foam
ANG	Air National Guard
ANGB	Air National Guard Base
ARAR	Applicable or relevant and appropriate requirement
ASD	Assistant Secretary of Defense
AW	Airlift Wing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DW	Drinking Water
EA	EA Engineering, Science, and Technology, Inc.
EE/CA	Engineering Evaluation/Cost Analysis
ERP	Environmental Restoration Program
FS	Feasibility Study
FTA	Fire Training Area
GAC	Granular activated carbon
HA	Health Advisory
HWRAP	Hazardous Waste Remedial Actions Program
IAP	International Airport
IX	Ion exchange
MW	Monitoring Well
MTDEQ	Montana Department of Environmental Quality
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NGB	National Guard Bureau
NTCRA	Non-time critical removal action
OUSD	Office of the Under Secretary of Defense for Acquisition and Sustainment
PA	Preliminary Assessment
PFAS	Per- and polyfluoroalkyl substances
PFC	Perfluorinated Compounds
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
POETS	Point-of-entry treatment system
ppt	parts per trillion
PRL	Potential Release Location
RAO	Removal action objectives
RO	Reverse osmosis
SAF/IE	Assistant Secretary of the Air Force (Installations, Environment & Energy
SI	Site Inspection
TBC	to-be-considered
TMV	Toxicity, mobility, or volume
USAF	United States Air Force
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

National Guard Bureau (NGB) has prepared this Engineering Evaluation/Cost Analysis (EE/CA) to support a non-time-critical removal action (NTCRA). The NGB is responding to the presence of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) (two subsets of per- and polyfluoroalkyl substances (PFAS)) above relevant United States Environmental Protection Agency (USEPA) lifetime Health Advisory (HA) levels in a drinking water (DW) well on a private residential property downgradient and in the vicinity of Montana Air National Guard Base (ANGB), in the City of Great Falls, Montana (Cascade County). This EE/CA was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the USEPA *Guidance for Conducting Non-Time Critical Removal Actions Under CERCLA* (USEPA, 1993), and the Defense Environmental Restoration Program (DERP). This EE/CA describes project background, removal action objectives (RAOs), development and evaluation of removal action alternatives, and identification of the recommended removal action alternative for the DW well. The NGB applies the CERCLA process and the 2016 USEPA lifetime HA of 70 parts per trillion (ppt) for PFOS and/or PFOA, both individually or combined, to respond to PFOS/PFOA DW impacts resulting from Air National Guard (ANG) mission-related activities.

Montana ANGB ("the Base") is the home of the 120th Airlift Wing (AW) in Great Falls, Montana. Montana ANGB is located at the Great Falls International Airport (IAP), which covers roughly 2,110 acres, has three (3) asphalt runways, and is located three (3) miles southwest of downtown Great Falls in Cascade County. The Base's facilities consist of more than 50 buildings, occupying approximately 125 acres on the southeastern corner of the airport. The AF has leased the base from the Great Falls IAP since 1948 and in turn has licensed the facility to the state of MT for use by the MTANG.

. The area immediately south of the Base is designated for industrial and commercial uses. Part of the open area southwest of the airport is used for active outdoor recreation. Residential areas are located on and below the Sun River bench east and northeast of the Base.

An April 2016 Preliminary Assessment (PA), February 2019 Site Inspection (SI), and subsequent April 2021 Supplemental SI confirmed PFAS releases above the screening level from environmental media at seven (7) of the identified eight (8) Potential Release Locations (PRLs) at Montana ANGB. One (1) private DW well was identified as a complete exposure pathway for the ingestion of PFOS/PFOA. In July 2021, NGB collected DW samples from the residence, at the outside faucet and the inside kitchen faucet, which has a reverse osmosis (RO) system installed. The outside faucet sample exceeded the USEPA lifetime HA. In August 2021, NGB began providing bottled water to the affected well owner.

The NGB uses the USEPA lifetime HA as an appropriate protective level for human health in DW. Accordingly, the following removal action objective (RAO) was developed for the EE/CA for the DW well with PFOS/PFOA exceedances:

- Prevent human exposure via ingestion of water containing PFOS/PFOA above USEPA lifetime HA levels of 70 ppt, either individually or combined.

This EE/CA evaluated the following four (4) alternatives for achieving the RAO:

- Alternative 1, No Action, the baseline condition. NGB would cease providing bottled water, and no further actions would be taken.
- Alternative 2, Municipal Water Supply
- Alternative 3, Treatment, whole-house treatment of well water
- Alternative 4, Bottled Water, is the current remedy

These alternatives provide a range of options to address the risks at the site. Alternative 1 is required under CERCLA, as a baseline for comparing other alternatives. Alternatives 2, 3 and 4 meet the RAOs, because they are protective of human health. The EE/CA includes an individual assessment of each proposed removal alternative based on the criteria of effectiveness, implementability, and cost. The proposed alternatives were then compared to each other on the same criteria and ranked from most desirable to least desirable.

Based on the comparative analysis, the recommended alternative is Alternative 3: Treatment. This alternative protects human health by providing an alternate point of entry treatment system (POETS) on the source of DW.

The recommended alternative has an estimated capital cost of $4,000 and an annual operation and maintenance cost of $2,500. This is a total present value cost of $38,412.08 for 30 years of operation. No additional bottled water will be provided once completed. This alternative meets the RAOs, meets the NCP criteria for protectiveness of human health and the environment, and is considered the best long-term solution for providing safe DW to the affected well owner.

1.0 INTRODUCTION

This document presents the Engineering Evaluation/Cost Analysis (EE/CA) completed to support non-time critical removal actions (NTRCAs). The National Guard Bureau (NGB) is responding to the presence of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) (two subsets of per- and polyfluoroalkyl substances (PFAS)) above relevant United States Environmental Protection Agency (USEPA) lifetime Health Advisory (HA) levels in a drinking water (DW) well on a private residential property downgradient and in the vicinity of Montana Air National Guard Base (ANGB), in the city Great Falls, Montana (Cascade County). The residence in the focus area depicted in Figure 1-1 is located in an unincorporated area of Great Falls. PFAS compounds are not currently regulated at the federal level but are regulated by the State of Montana (MTDEQ, 2019) which has adopted the Federal EPA HA of 70 ppt as the standard for protection of groundwater. The USEPA has established lifetime HA levels for PFOS/PFOA, both individually or combined, to protect against potential human exposure risk via DW.

1.1 Authority

Executive Order 12580 – Superfund Implementation (52 FR 2923, 3 CFR, 1987 Comp., p. 193) delegates the authority and responsibility to implement provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to the Department of Defense (DoD). Response actions are conducted pursuant to CERCLA (42 U.S. Code (U.S.C.) § 9601-9675), the Defense Environmental Restoration Program (DERP) *(10 U.S. Code § 2701 et seq), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300), as referenced in the DoD Remediation Plan for Cleanup of Water Impacted with PFOS or PFOA (Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSD] 2020). Per amendments to 10 U.S.C. § 10501, described in the DoD Directive 5105.77, the National Guard Bureau (NGB) is a joint activity of the DoD. NGB serves as a channel of communication and funding between the United States Air Force (USAF) and Air National Guard (ANG) Bases and Stations in the 54 U.S. states, territories, and the District of Columbia. The NGB oversees and implements the installation restoration process for the ANG facilities.

The NGB has prepared this EE/CA under DERP authorities for Site 1 (former FTA), located within the Airport property boundary but leased by the federal government and licensed to Montana for use and operation by the MTANG.

1.2 Purpose and Scope

The purpose of this EE/CA is to develop and evaluate alternatives and associated costs to eliminate the human exposure pathway between DW receptors and Site 1, where PFAS releases attributable to Montana ANGB mission activities have been confirmed above screening levels in environmental media. This EE/CA develops removal action objectives (RAOs) for one (1) impacted DW well, taking into consideration the most qualified, proven technologies to develop alternatives to achieve the RAOs. The development of alternatives considers a range of technically-viable response actions that includes a no action alternative, alternative water supply, bottled water delivery and treatment.

*DERP eligibility is pending approval

1.3 Regulatory and Project Background

The DoD and NGB conduct cleanups primarily under the CERCLA and as directed in the DERP with a goal of protecting human health and the environment in a risk-based, fiscally-sound manner. PFAS, to include PFOS and PFOA, are addressed in the same manner as other contaminants of concern within the DERP. In May 2016, the USEPA published PFOS and PFOA lifetime HA values of 70 parts per trillion (ppt), both individually or combined (USEPA, 2016a, 2016b and 2016c). By the August 11, 2016 Memorandum "SAF/IE Policy Perfluorinated Compounds (PFCs) of Concern", the Assistant Secretary of the Air Force (Installations, Environment & Energy) (SAF/IE) directed the NGB to identify all locations on installations where the NGB has reason to suspect there may have been a PFOS and/or PFOA release attributable to ANG actions and confirm whether there exists a potential unacceptable risk to human health or the environment, consistent with Federal requirements, and address any PFOS and/or PFOA releases that pose an unacceptable risk, including migration off-base, in accordance with CERCLA, NCP, and Department of the Air Force Instruction 32-7020, Environmental Restoration Program (DAFI 32-7020).

The NGB applies the CERCLA process and 2016 USEPA lifetime HA for PFOS/PFOA to guide cleanup actions and to respond to PFOS/PFOA DW impacts resulting from ANG mission-related activities. Montana has promulgated state regulatory limits for PFOS/PFOA. When the NGB identifies PFOS/PFOA impacts to DW above the USEPA lifetime HA as a result of past ANG mission activities, NGB will initiate an immediate response action, such as providing an alternate DW source, while a long-term remedy is identified (ASD, 2019).

1.4 Installation Description and Mission

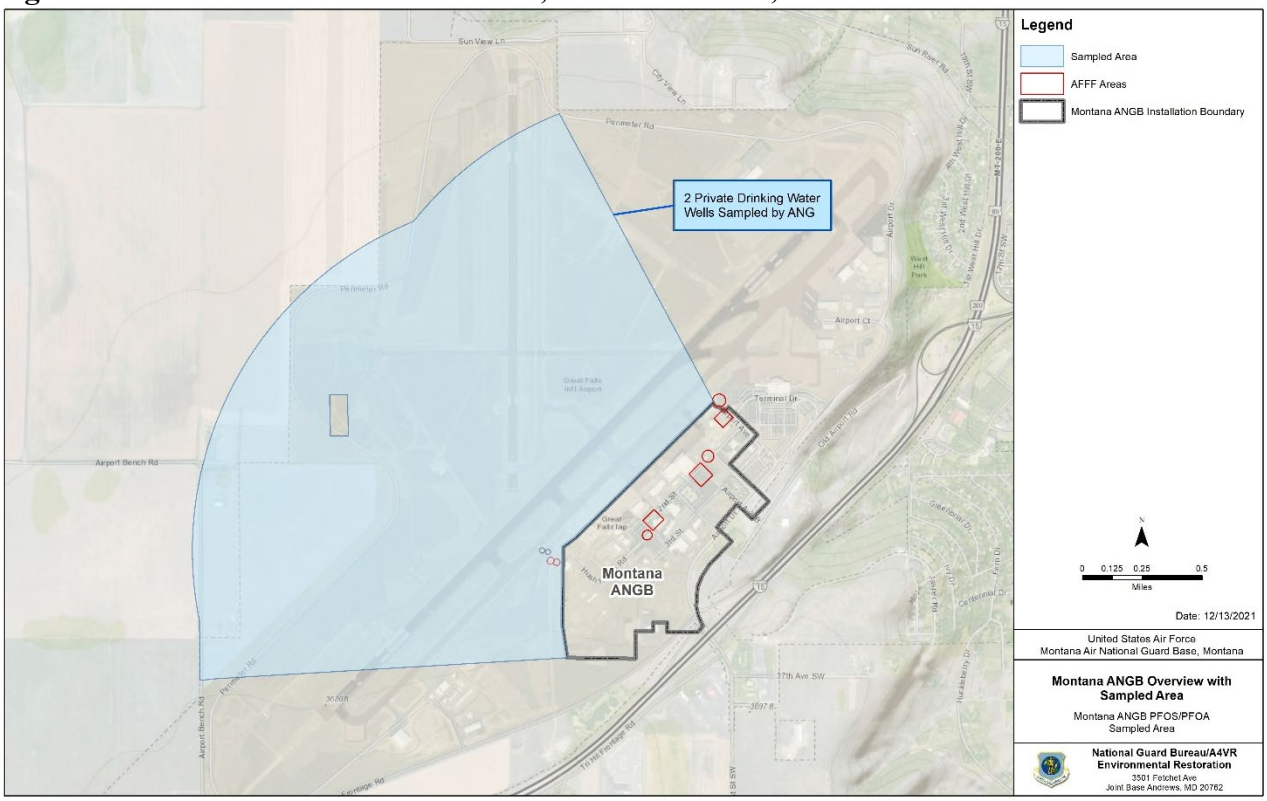
Montana ANGB is the home of the 120th Air Wing (AW) in Great Falls, Montana. Montana ANGB is located at the Great Falls International Airport (IAP) which covers roughly 2,110 acres, has three (3) asphalt runways, and is located three (3) miles southwest of downtown Great Falls in Cascade County. The Base's facilities consist of more than 50 buildings, occupying approximately 125 acres on the southeastern corner of the airport. The AF has leased the base from the Great Falls IAP since 1948 and in turn has licensed the facility to the state of MT for use by the MTANG since 1948. The area immediately south of the Base is designated for industrial and commercial uses. Part of the open area southwest of the airport is used for active outdoor recreation. Residential areas are located on and below the Sun River bench east, and to north of the Base.

The geology of the Base is characterized by a surficial layer of soil and weathered sandstone that commonly is 2 to 3.5 feet thick but ranges to as much as 20 feet thick. The unconsolidated and weathered deposits are underlain by more-competent sandstones of the Cretaceous period upper Flood Member. The fine-grained sandstones of the Flood Member are identified as the groundwater aquifer at the Base.

Great Falls IAP started as a municipal airport in the late 1920s. The 120th AW of the Montana ANG was first organized as the 186th Fighter Squadron at Great Falls Airport in 1947 after the conclusion of World War II. The squadron maintained an active role in air combat and national defense missions until early 2014 when the Base was converted to the 120th AW. From 1940 to 1948, all airport facilities were leased to the United States military to support the war effort in Europe. In 1948, the city of Great Falls regained control of the airfield for commercial air travel, with an exception that

space would be leased to the Federal Government to accommodate their operations. During this time, the airfield was renamed Great Falls IAP. Today, Great Falls IAP is still an active civil-military airport that supports air freight and services roughly 170,000 passengers annually. The 120th AW currently is an air reserve component of the U.S. Air Force and flies the C-130 Hercules cargo plane.

Figure 1-1: Location of Montana ANGB, Great Falls IAP, Montana



1.5 Previous PFOS/PFOA Investigations and Response Actions

In April 2016, the NGB completed a preliminary assessment (PA) at the Base to identify potential areas suspected or known to have had a release of Aqueous film-forming foam (AFFF) (a source of PFAS) into the environment. The PA results indicated sufficient evidence of a potential release warranting additional investigation at eight (8) potential release locations (PRLs) (PRL 3 through PRL 10)(BB&E, 2016). In February 2019, the NGB completed a Site Inspection (SI) of the eight (8) PRLs at the Base that were carried forward from the PA. Laboratory results from the SI confirmed the release of PFAS in environmental media above screening levels at seven (7) PRLs (PRL 3 through PRL 9). Laboratory sampling results from the SI did not confirm the release of PFAS in environmental media above screening levels at PRL 10 (Leidos, 2019).

NGB completed a supplemental SI at Site 1 in April 2021 of an off-Base former fire training area (FTA) used by MTANG in which soil and groundwater samples were collected and analyzed for PFOS/PFOA (Note: the former FTA previously received regulatory closure for non-PFAS related contaminants). Both media demonstrated exceedances of the established screening levels. Samples

were collected within site boundaries but in close proximity of the subject off-Base DW well. Results indicated a groundwater exceedance of 216 ppt PFOS/PFOA at monitoring well MW3 (EA, 2021).

NGB identified two active private DW wells downgradient of Montana ANGB and down gradient of the off-base former FTA. On July 20, 2021, NGB collected DW samples at the outside faucet and kitchen faucet for the subject downgradient off-Base private DW well serving a residential property. An existing reverse osmosis (RO) water treatment system treated water from the kitchen faucet. On August 5, 2021, the NGB notified the well owner via telephone that laboratory results indicated PFOS/PFOA was present above the USEPA lifetime HA (i.e. 166 ppt) in the unfiltered DW water collected at the outside faucet, and was not detected in the RO treatment system filtered water emanating from the kitchen faucet. NGB arranged for same-day bottled water delivery. NGB commenced recurring bottled water delivery service on August 9, 2021 and continues to provide bottled water until a long-term DW solution is implemented. NGB conducted confirmatory sampling of the DW well to verify PFOS/PFOA concentrations in DW and received validated laboratory results (September 9, 2021) that confirmed PFOS/PFOA was present in unfiltered DW at the outside faucet at a combined concentration of 69.4 ppt. The RO treated DW emanating from the kitchen faucet remained at non-detect levels. The other active private DW well was sampled and did not exceed the USEPA lifetime HA for PFOS/PFOA.

1.6 Streamlined Risk Evaluation

NGB is required to reduce exposure risk to human health resulting from USEPA lifetime HA exceedances for PFOS/PFOA in DW attributable to ANG mission-related activities. Laboratory data confirmed that PFOS/PFOA concentrations were above screening levels at 166 ppt in environmental media at Site 1 and poses an immediate risk to public health via DW.

In accordance with CERCLA and the NCP, the NGB took an immediate response action by providing regular deliveries of bottled water to the affected well owner to limit exposure. However, a permanent solution is still required to ensure the exposure pathway from ANG source areas to the impacted DW well has been eliminated.

2.0 DEVELOPMENT OF REMOVAL ACTION OBJECTIVES

This section discusses the justification for the removal action, applicable or relevant and appropriate requirement (ARARs), and the specific RAOs developed for the impacted private DW well.

2.1 Justification for the Proposed Removal Action

NGB identified the existence of an unacceptable risk to human health due to the presence of PFOS/PFOA above the USEPA lifetime HA in DW in one (1) off-base private DW well attributable to Montana ANGB mission-related activities. As such, due to potential exposure of PFOS and/or PFOA via DW ingestion, a removal action is warranted based on the following factors listed in the NCP:

- 40 CFR 300.415(b)(2)(i): "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;" and
- 40 CFR 300.415(b)(2)(ii): "Actual or potential contamination of DW supplies or sensitive ecosystems."

2.2 Applicable or Relevant and Appropriate Requirements

Pursuant to 40 CFR 300.415(j), removal actions shall, to the extent practicable considering the exigencies of the situation, attain ARARs. There are no promulgated chemical-specific ARARs for PFOS and PFOA. In the absence of ARARs, cleanup levels are based upon "…other reliable information. …" (See 40 CFR§300.430(e)(2)(i).).

Reliable information can be derived from other to-be-considered (TBC) criteria, advisories, or guidance (40 CFR § 300.400(g)(3)). These advisories, criteria, or guidance are developed by USEPA, other federal agencies, or states and may be useful in developing the removal action. TBCs complement ARARs but do not override them. Therefore, in the absence of an ARAR, NGB is using the USEPA lifetime HA as protective levels for human health in DW as TBC. MTDEQ has adopted the USEPA lifetime HA levels for PFOS and PFOA as MTDEQ-7 groundwater standards for the protection of human health.

2.3 Removal Action Objectives

The following RAO was developed for the EE/CA for one (1) DW well with PFOS/PFOA exceedances:

- *Prevent human exposure via ingestion of water containing PFOS/PFOA above USEPA lifetime HA levels of 70 ppt, either individually or combined.*

3.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section presents the removal action alternatives developed from the technologies that are applicable to the site conditions and contaminants in groundwater sources. The action applies to groundwater hydraulically-connected to the one (1) DW well downgradient from the Base.

The Guidance on Conducting Non-Time-Critical Removal Actions (NTCRA) Under CERCLA (USEPA, 1993), recommend the EE/CA discuss only the most qualified technologies that apply to the media or source of contamination. Limiting the number of alternatives to those selected in the past at similar sites or for similar contaminants provides an immediate focus to the discussion and selection of alternatives. Technologies are combined, if applicable, to create alternatives that will meet the RAOs that are appropriate for the site conditions and have been shown to be effective at similar sites.

This section identifies removal action alternatives that include no action, alternative water supply, treatment, and continued supply of bottled water. Each alternative is identified along with its advantages, limitations, and potential for being retained for further evaluation.

3.1 No Action (Alternative 1)

Alternative 1 is a No Action alternative and is included in this analysis to comply with the NCP. This alternative will provide a baseline for alternative comparisons. Under the No Action alternative, bottled water would stop and the resident would rely solely on the existing RO treatment system. There would be a continued higher human exposure risk resulting from potential ingestion of PFOS/PFOA-impacted DW above USEPA lifetime HA from other faucets within the dwelling faucets not attached to the RO treatment system. Also, there is uncertainty as to the maintenance and periodic sampling of DW to ensure breakthrough does not occur from the RO treatment system. There would be no cost or implementation required for this alternative. This alternative would not remove PFOS/PFOA from groundwater.

3.2 Municipal Water Supply (Alternative 2)

Alternative 2 involves connecting one (1) impacted dwelling to the City of Great Falls municipal water system for an ongoing permanent source of potable water. This action would involve disconnecting and capping the existing piping between the well and the dwelling. This alternative protects protect human health by providing an alternate source of clean DW that undergoes routine testing by the municipality. An advantage of this alternative is that a permanent source of potable water from a municipal water supplier, and there are no maintenance requirements.

Connecting to the municipal water supply line requires 1.8 miles of supply and 1.8 miles of return lines to and from the resident at a cost of $1.44M. The total cost of construction for installation of 3.6 miles of supply/return lines is a significant expenditure in comparison to other options and for connection of only one property. Note that the amount listed above is a rough order of magnitude estimate derived from a parametric estimating tool and is used to assist in making a determination of the most appropriate alternative. An actual cost estimate would be prepared if this alternative is selected.

Typically, for an impacted private DW well, alternate water is obtained by connecting to a public water system. However, there would be impediments to expedient implementation of this remedy if: the property is not within the incorporated area; does not have a water main close; or is also required to connect to public sewer if they connect to public water. It is important to fully understand all requirements that must be adhered to prior to undertaking an alternative involving connection of an unincorporated areas to municipal water. Additionally, there is uncertainty as to whether the property owner desires a connection to municipal water and recurring cost for this service. The dwelling resides in an unincorporated section of Great Falls, Montana which may present further issues when seeking to connect to City of Great Falls, Montana municipal water supply.

Other considerations include addressing potential safety risks for personnel performing construction activities, managing administrative requirements (e.g., annexation for municipal connection if not already in the municipal boundaries), and identifying capital costs for infrastructural upgrades, particularly if an extensive water main extension or other infrastructure is required. Depending on water district rules, the existing well may require proper abandonment. This alternative would not result in improvement of PFOS/PFOA impacted groundwater.

3.3 Treatment (Alternative 3)

For Alternative 3, a point of entry treatment system (POET) would be installed where the DW well supply pipe enters the residence. Treatment media in a POET is typically either granular activated carbon (GAC) or ion exchange resin (IX). GAC filter media has been selected for this property, because it has been proven effective in removing PFOS/PFOA from DW sources and is economical to replace when required. POET treats all water entering the home so that all faucets within the home are treated. This alternative will also necessitate periodic maintenance and monitoring of treatment system performance, generating waste in the form of used water filters and treatment vessel change-out. Recurring sampling of treated water over the lifetime of the system is required to identify the potential for breakthrough of PFOS/PFOA in DW, and to ensure timely GAC change out.

Other considerations include addressing potential minor safety risks for personnel performing construction activities to include professional design and installation of the treatment system, piping, and potentially a shed with lights and heat if indoor space is not available. Infrastructure upgrades may also be required if existing piping and electrical are not compliant with existing codes. This alternative removes insignificant amounts of PFOS and PFOA from the groundwater aquifer. The cost of this alternative is $38,412.08.

3.4 Bottled Water (Alternative 4)

Alternative 4 involves the continuation of bottled water deliveries as a replacement for DW from the one (1) private DW well. This alternative would continue to eliminate the human exposure risk resulting from potential ingestion of PFOS/PFOA-impacted DW above USEPA lifetime HA. However, one could not ensure that other sources of water such as a bathroom faucet would not be ingested. The cost to implement this alternative on a yearly basis is approximately $1700. This alternative would not remove or remediate groundwater impacted by PFOS/PFOA.

3.5 Evaluation Criteria

USEPA NTCRA Guidance recommends identifying and assessing a limited number of alternatives appropriate for addressing the RAOs. The technologies and methods proposed are all considered presumptive remedies, have been used before, and are generally accepted in the remediation industry. The identified alternatives are evaluated against three broad criteria, with sub-criteria, as noted below:

3.5.1 Effectiveness

- Protectiveness
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of Toxicity, mobility, or volume (TMV)
- Short-term effectiveness

3.5.2 Implementability

- Technical feasibility
- Administrative feasibility
- Availability of services and materials
- Regulatory acceptance
- Community acceptance

3.5.3 Cost

- Capital
- Annual O&M
- Periodic
- Present value

Each alternative is evaluated against the above criteria (as applicable) in the following paragraphs.

3.6 Effectiveness

3.6.1 Overall Protection of Human Health and the Environment

This criterion assesses whether each alternative provides adequate protection of human health and the environment. The evaluation of protectiveness focuses on the reduction or elimination of risks by the proposed remedial alternative. This criterion is considered a threshold for the evaluation and must be met by the selected alternative.

Alternative 1, No Action, is the baseline (and current) condition. It does not provide full protection of human health. The existing RO treatment system can treat water at one water tap source location only (i.e. kitchen faucet) and is protective for water consumed from that one tap if the system is maintained properly.

Alternative 2, Municipal Water Supply connection, provides protection of human health for affected public or private water source by obtaining potable water from another water source that undergoes regular treatment and water quality testing.

Alternative 3, Point of entry treatment system, protects human health by removing PFOS/PFOA originating from the DW source. POET system provides protection of human health by removing the PFOS/PFOA from DW for the occupied dwelling.

Alternative 4, Bottled water, is the current method of supplying DW for the affected well owner. This option provides protection of human health by providing an alternate DW source. It does not protect against other sources of water (e.g. bathroom faucet) within the dwelling being ingested.

3.6.2 Compliance with ARARs

The USEPA health advisory is not a promulgated standard and thus is a TBC criteria. The MTDEQ promulgated a groundwater standard in PFOS and PFOA at 70 ppt individually or combined (MTDEQ, 2019). PFOS/PFOA concentrations in DW will adhere to the USEPA's lifetime HA advisory levels under any chosen alternative.

3.6.3 Long-Term Effectiveness and Permanence

Each alternative is evaluated in terms of risk that remains after the RAOs have been met. The primary focus of this evaluation is the extent and effectiveness of controls used to manage the risk posed by treatment residuals or untreated wastes. Long-term effectiveness is one of the balancing criteria. The following factors will be considered in evaluating this criterion:

- Adequacy of remedial controls.
- Reliability of remedial controls.
- Magnitude of the residual risk.

Alternative 1, No Action, does not effectively remove PFOS/PFOA impacts to DW supplied by the impacted well and does not prevent human ingestion of PFOS/PFOA. This alternative does not satisfy the statutory requirement to be protective of human health.

Alternative 2, Municipal Water Supply connection, will permanently eliminate human exposure to PFOS/PFOA impacted DW originating from water supply well.

Alternative 3, Treatment, a POET will effectively remove PFOS/PFOA impacts to DW supplied by impacted well for as long as the system is properly maintained.

Alternative 4, Bottled Water, can effectively prevent the risk of ingestion of PFOS/PFOA. It does not ensure that other sources of water within the residence are ingested. This alternative potentially satisfies the statutory requirement to be protective of human health, but places the burden of ensuring that only the bottled water is used for DW on the property owner.

3.6.4 Reduction of Chemical Toxicity, Mobility, or Volume (TMV)

This evaluation criterion addresses the CERCLA statutory preference for treatment options that permanently and significantly reduce the TMV of PFOS/PFOA. The criterion is satisfied when treatment reduces the principal threats through the following:

- Destruction of toxic contaminants
- Reduction in contaminant mobility
- Reduction in the total mass of toxic contaminants
- Reduction in the total volume of contaminated media

Although CERCLA includes a statutory preference for treatment, this criterion is not a threshold that must be met.

Alternatives 1, 2 and 4 do not reduce the TMV, as PFOS/PFOA concentrations would remain unchanged in the groundwater. Alternative 3, a POET provides an insignificant reduction in TMV through removal of PFOS/PFOA supplied by well water.

3.6.5 Short-Term Effectiveness

This evaluation criterion addresses the effects of the alternative during the construction and implementation phase until the RAO is met. Under this criterion, alternatives are evaluated for their effects on human health and the environment during implementation of the removal action. The following factors will be considered:

- Exposure of the community during implementation
- Exposure of workers during construction
- Environmental impacts
- Time to achieve RAOs

Alternative 1, No Action, assumes no change and PFOS/PFOS concentrations in the DW well and impact would remain as is.

Alternative 2, Municipal Water Supply, would require continuation of bottled water deliveries until the household is connected to the municipal system/new well and would entail some construction, which is estimated to take 6 months for completion of work.

Alternative 3, Treatment, POETS, would require continuation of bottled water delivery until the treatment system is installed and would entail some construction, which is estimated to take about 1 week for completion of work.

Alternative 4, Bottled Water, would not require changes to the current remedy in the short term and would continue to be an effective replacement of DW as long as the bottled water is the only source within the dwelling used for DW.

Since bottled water is currently being provided, Alternatives 2 and 3 would not pose a significant risk to the residents or community. However, Alternatives 2 and 3 may pose some physical hazards for

workers, but not an exposure hazard to PFOS/PFOA. Hazards would be reduced by following a properly implemented health and safety program.

3.7 Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials that may be required during its implementation. The following factors were considered:

- Ability to construct the technology
- Monitoring requirements
- Availability of equipment and specialists
- Ability to obtain approvals from regulatory agencies

Alternative 1, No Action, does not require an action to implement and water deliveries would be discontinued. Alternatives 2 (Municipal Water Supply) and 3 (Installation of a POET system) would require an advance notice for equipment, supplies, and vendors to be contracted to execute the installation, along with coordination with property owners. No technical or administrative feasibility concerns associated with the alternatives are anticipated. These Alternatives are similar to other actions performed for other residents or at other sites with PFOS/PFOA contaminated DW wells. There are also no anticipated availability of services and materials concerns associated with the alternatives. Alternative 1 has no actions to be performed. Services and materials for Alternatives 2 and 3 are readily available with advance notice. Alternative 4 is easily implemented but presumes that funding and supply sources for the ongoing provision of DW would be available in perpetuity.

3.7.1 Regulatory Acceptance

The MTDEQ will conduct a review of the Draft Final EE/CA Report, with comments incorporated into the Final EE/CA Report following USEPA/MTDEQ concurrence. Since the action is minor in nature and prevents exposure to PFOS /PFOA, there are no anticipated issues with the regulators accepting either Alternative 2 or 3.

3.7.2 Community Acceptance

Since the public has not yet been provided an opportunity to review the detailed analysis of removal action alternatives, no formal comments are available for evaluation of community acceptance at this time. However, the public will be afforded a 30-day comment period to review the Final EE/CA Report. Following the 30-day review period, the Project Team will review and provide a written response to significant comments in the Administrative Record file and will incorporate these comments into the Action Memorandum, as needed, to provide sufficient detail to justify the selected alternative. It is believed that either Alternative 2 or Alternative 3 will be acceptable to the community since they prevent exposure to PFOS/PFOA at the impacted residence.

Regarding regulator and community involvement in this NTCRA, the NCP requires that the federal agency follow 40 CFR § 300.820(a), which in this case includes the community notice requirements in 40 CFR 300.415(n)(1) and (4), and requires the following among others: 1) Publish a notice of availability of the administrative record in a major local newspaper of general circulation or use one

or more other mechanisms to give adequate notice to a community at the time the EE/CA is made available for public comment; 2) Provide a public comment period, as appropriate, of not less than 30 days from the time the administrative record file is made available for public inspection; and 3) Prepare a written response to significant comments.

3.8 Cost

All alternative costs are based on actual contract cost, standard cost estimating data and previous experience with other similar projects. These costs represent the total worst-case cost scenario to NGB over a 30-year period.

Alternative 1, No Action, is the baseline against which the other alternatives were compared. As such, no costs are associated with Alternative 1.

Alternative 2, Municipal Water Supply connection, would be funded by the NGB. NGB would not pay for recurring water costs associated with water usage. Prior to connection, the owner must agree to bear all water usage costs in perpetuity.

Alternative 3, NGB would fund all cost associated with installation and operation & maintenance of the POET system which includes the equipment, electrical connection and plumbing required to install the POET system; periodic testing of the water to prevent exposure via break-through; and change out and disposal of granulated activated carbon canisters. O&M activities will be conducted until resident's well no longer presents a threat to human health resulting from ANG mission-related activities.

Initial cost to provide and install the POET system is approximately $4000 with periodic testing and maintenance estimated at $2500/year. Note: The frequency of change out of GAC canisters would be predicated on water usage and sampling results.

Alternative 4, Cost to provide bottled water will be funded by NGB on an ongoing basis at approximately $1700/year.

3.8.1 Alternative 2 – Alternate Water Supply

Capital Costs: $1,442,681 (based on parametric tool estimate) for installation 3.6 miles of water piping from the impacted dwelling to a connection on airport property. If this option was selected, an actual quote would be requested from the selected contractor.

Annual Operation & Maintenance Costs: N/A

Municipal Water Usage Costs: Paid by customer

Total Present Value = $1,442,681.00

3.8.2 Alternative 3 – Point-of-Entry Treatment System (estimated at present value costs)

Capital Costs: $4,000

Annual Operation & Maintenance Costs: $2,500 (Years 1-30 total)

Periodic Costs: $0 (Typically, Years 5, 10, 15, 20, 25, 30 total)

Total Present Value = $38,412.08*

*Assumes $2,500 in annual O&M at an interest rate of 6% and 30 year plus initial capital cost of $4,000 in year 1

3.8.3 Alternative 4 – Bottled Water (estimated at present value costs)

Capital Costs: $0

Annual Costs: $720.00 (Years 1-30 total)

Total Present Value = $14,072.32

4.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

In this section, the three (3) assembled alternatives are compared to one another relative to the RAOs, following the NTCRA Guidance. A comparative analysis of the removal action alternatives is summarized below in **Table 4-1**.

Table 4-1. Comparative of Alternatives

Criterion	Alternative			
	1. No Action	2. Alt. Water	3. POET	4. Bottled Water
Protection of Human Health & the Environment	4	1	2	3
Compliance with ARARs	4	1	1	2
Long-Term Effectiveness & Permanence	4	1	2	3
Short-Term Effectiveness	4	1	1	1
Reduction of Toxicity, Mobility or Volume	4	4	1	4
Implementability	1	2	2	1
Present Value	1	4	3	2
TOTAL SCORE	**22**	**14**	**12**	**16**

(NOTE: Alternatives ranked relative to each other with the best rating scored with a 1 and the worst rating scored with a 4. Comparable alternatives are ranked with the same score.)

5.0 RECOMMENDED ALTERNATIVE

Four alternatives were evaluated to achieve the RAOs for the impacted private DW well. These alternatives consist of the following:

- Alternative 1 — No Action
- Alternative 2 — Connection to an alternative water supply
- Alternative 3 — Installation of POETS
- Alternative 4 — Continued delivery of bottled water

5.1 Selected Alternative

The recommended response action is Alternative 3, the installation of a POET to address the impacted well. NGB is currently providing bottled water to the affected well owners and will provide a POET indefinitely until PFOS/PFOA detections in the well resulting from ANG mission-related activities are below the USEPA lifetime HA. This alternative involves NGB providing all equipment, labor, testing and operations and maintenance on the treatment system until well water is considered safe to drink. These activities are at no cost to the resident.

5.2 Scope of Removal Action

POET - Equipment and materials may consist of:

- Pre-filtration, including sediment filter and/or iron and manganese removal
- At least two primary treatment vessels in lead/lag series configuration utilizing PFAS-selective GAC with a bed depth of not less than 36 inches and empty bed contact time of 2.5 minutes
- Clear particle filter
- Carbon post-filtration
- Totalizing flow meter
- Sample ports and pressure gauges before and after each treatment vessel
- Plastic piping, manifold, fittings, and valves, as required, to connect the vessels and allow for GAC change outs and isolation

6.0 REFERENCES

Assistant Secretary of Defense, 2019. Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program, October 15, 2019.

BB&E, 2016. Revised Final Perfluorinated Compound Preliminary Assessment Site Visit Report, April 2016

EA, 2021. Final Supplemental Site Investigation Report Per- and Polyfluoroalkyl Substances Emerging Contaminant Groundwater Investigation, Montana Air National Guard, Great Falls, Montana, April 2021.

LEIDOS, 2019. Final Site Investigation Report Perfluorooctane Sulfonate and Perfluorooctanoic Acid at, Great Falls Air National Guard Base, Great Falls, Montana, February 2019.

MTDEQ, 2019. Montana Department of Environmental Quality, Water Quality Division, Water Quality Planning Bureau, Water Quality Standards and Modeling Section, Helena, Montana. DEQ-7 Montana Numeric Water Quality Standards, June 2019.

OUSD, 2020. DoD Remediation Plan for Cleanup of Water Impacted with PFOS or PFOA .Office of the Under Secretary of Defense for Acquisition and Sustainment, June 2020.

USEPA, 2016a. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)*, EPA 822-R-16-004. United States Environmental Protection Agency, May 2016.

USEPA, 2016b. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)*, EPA 822-R-16-005. Unites States Environmental Protection Agency, May 2016.

USEPA, 2016c. *Drinking Water Health Advisories for PFOA and PFOS*, Retrieved from: https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos

USEPA, 1993. Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA requirements. EPA540-R93-057, August 1993.