Introduction

This Proposed Plan provides information to the public on the US Army Corps of Engineers (USACE) recommended remedial action for groundwater contamination at the former Bucks Harbor facility in Machiasport, Maine. This is intended to inform the community of the rationale for the selection of the preferred alternative and to encourage and facilitate community participation.

The Proposed Plan

This Proposed Plan has been prepared by the US Army Corps of Engineers (USACE) New England District to present the proposed remedial action for groundwater contamination at the Bucks Harbor Former Air Force Radar Tracking Station Site and Former Ground/Air/Transmitter/Receiver Site in Machiasport, Maine. This plan describes the USACE rationale for recommending Alternative 2- Long Term Monitoring With Enhanced Site Controls and Alternative 2A – Alternate Water Supply, which includes:

- Monitored Natural Attenuation;
- Long term monitoring of groundwater;
- Alternate Water Supply or Point of Entry Water Treatment for impacted water supply wells;
- Monitoring of indoor air; and
- Land Use Controls.

Federal and state environmental laws govern characterization and response activities at federal facilities. The Department of Defense (DOD) has the responsibility for identifying, investigating, and determining clean-up activities related to former DOD facilities under the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS). The federal statute, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), better known as Superfund, establishes procedures for site investigation, evaluation, and remediation. Under the framework of CERCLA, the USACE has been working towards a solution for the former Bucks Harbor facility. USACE has worked closely with the Maine Department of Environmental Protection (MEDEP), the Machiasport Board of Selectmen, and representatives from the local community.

As the lead agency for implementing the environmental response program for the former Bucks Harbor facility, USACE has prepared this Proposed Plan in accordance with CERCLA Section 117(a) and Section 300.430(f)(2) of the National Contingency Plan (NCP) to continue its community awareness efforts and to encourage public participation. This plan has been developed with support from the MEDEP.

The former Bucks Harbor facility consists of two projects within the FUDS program. One project is located on a spur ridge of Howard Mountain and is called the Bucks Harbor Former Air Force Radar Tracking Station and consists of: radar operations, the cantonment Area, and the housing Area, and the Transmitter Site. This project includes the Howard Mountain and Transmitter Sites, and is identified as FUDS project D01ME0486. The other project is located on Miller Mountain and is called the ground-to-air transmitter and receiver (GATR) Site. The Miller Mountain Site is identified as FUDS project D01ME0509. This Proposed Plan covers both FUDS projects, collectively identified as the Bucks Harbor facility in this Proposed Plan.

Purpose of Proposed Plan

The purpose of this Proposed Plan is to ensure that the community understands the information compiled for the former Bucks Harbor facility and the proposed action that is being recommended. After the public has had the opportunity to review and comment on this Proposed Plan, USACE will summarize and

respond to all comments received during the comment period and the public meeting in the Responsiveness Summary section of the Decision Document for the Site. Refer to the ***Public Comments are Requested*** highlight box for public comment period, public meeting date and time. USACE will carefully consider all comments received. The decision of which action is appropriate for the site will be documented in the Site Decision Document. All comments will be considered before the Decision Document is finalized.

Public Comments are Requested

PUBLIC COMMENT PERIOD
April 20, 2016 to May 27, 2016
Written comments on this Proposed Plan can be submitted to USACE during this comment period. Comment letters must be postmarked no later than **May 27, 2016** and can be sent to Ms. Marie Wojtas, Project Manager, US Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751. Comments can also be e-mailed to: marie.a.wojtas@.usace.army.mil

PUBLIC MEETING – **May 5, 2016**
The USACE will host a public meeting from 6:30pm to 8:00 pm at the **Fort O'Brien Elementary School, 492 Port Road, Machiasport, ME**. This meeting is intended to inform the community of the rationale for the selection of the recommended remedial alternative. Public comments may be submitted either verbally or in writing.

This Proposed Plan highlights key information from previous reports regarding the former Bucks Harbor facility. Much of the site characterization detail for the former Bucks Harbor facility is presented in the Remedial Investigation (RI) Report. To support the identification and evaluation of cleanup technologies, supplemental characterization information was collected, evaluated and documented in the Feasibility Study (FS) Report, which presents the evaluation of the remedial alternatives applicable to the site. This Proposed Plan provides rationale for selection of the recommended remedial alternative. These and other documents that support this Proposed Plan are available locally at the Information Repository (see page 14) at the Machiasport Town Hall.

Site Background

Where is the former Bucks Harbor facility?

The three study areas (also known as "sites") that comprise the former Bucks Harbor facility are: Howard Mountain, Miller Mountain, and the Transmitter Site. All three areas are in Machiasport, Maine, approximately 25 miles from the Canadian border. The coastal communities in the area include Larrabee, Bucks Harbor and Starboard Cove. The sites are each located on top of small, coastal mountains, as depicted in the map (see Figure1).

Machiasport is predominantly rural residential with a few commercial operations. The community and its nearby towns rely on the fishing/lobster industry, tourism and blueberry harvest for economic growth. Machiasport is a small community with several dozen homes and two formerly-active industrial facilities owned by Atlantic Salmon, Inc.

What was the former Bucks Harbor facility used for?

The former Bucks Harbor facility was used by the US Air Force as a radar tracking station from 1954 to 1984. During its period of operation, the facility included three central operational areas: Radar

Operations, the Cantonment Area, and the Housing Area. Three outpost facilities were also associated with the facility: the Receiver Site and the Transmitter Site, which were located on a spur ridge of Howard Mountain, and the ground-to-air transmitter and receiver (GATR) site at Miller Mountain.

With the advent of more sophisticated satellite-based tracking systems, the Air Force ceased operations at the facility in 1984. The radar operations facility, located near the Howard Mountain summit, was transferred to the Federal Aviation Administration (FAA) for use in tracking commercial air traffic, and the Cantonment Area was transferred to the State of Maine Department of Corrections for use as a minimum-security prison, the Downeast Correctional Facility (DCF). The former Housing Area and the Transmitter Site were also transferred to the State of Maine and are used by the DCF. The DCF Housing Area consists of 27 housing units, which historically have been used as rental units and/or for material storage by the DCF and its employees. The units are currently unoccupied. Inmates and DCF employees currently use the Transmitter Site as a carpentry shop. The adjacent Receiver Site was sold to a private party and is currently used as a residence.

The Air Force maintained ownership of the GATR site at Miller Mountain before transferring the property to the US Department of the Interior (DOI) in 1982. In 1992, the DOI stopped using the site and transferred the property to its current owner, the Town of Machiasport.

Summary of Site Investigations

What is the contamination problem and where did it come from?

In 1995, USACE conducted an investigation to characterize the geology and hydrogeology at the DCF Housing Area to evaluate the potential impacts associated with fuel oil underground storage tanks removed from the area between 1991 and 1995. These investigations included analysis of soil and groundwater samples. The results indicated that solvents (Trichloroethylene (TCE) and other chlorinated volatile organic compounds (VOCs)) were present in the groundwater. In 1999, further evaluations were performed in the vicinity of the Transmitter Site. In 2002, a Remedial Investigation (RI) was initiated to characterize the nature and extent of contamination and evaluate the human health and ecological risks associated with the contamination.

Based on the history of facility activities, prior investigations, and the results of the RI program, it was determined that the contaminant of concern (COC) which contributes the greatest risk at the Bucks Harbor facility is TCE. TCE is a chlorinated aliphatic VOC that is slightly soluble in groundwater. TCE is carcinogenic to humans by all routes of exposure. It has a Federal Safe Drinking Water Act maximum contaminant level (MCL) of 5 ug/L in drinking water. Its presence in groundwater has been the primary focus of site investigations. TCE metabolites (cis-1,2-Dichloroethene and Vinyl Chloride) are also present at some locations, likely due to biodegradation of TCE. Tetrachloroethylene (also known as Perchloroethylene (PCE)) and other chlorinated VOCs (such as 1,1,1-Trichlorethane and 1,1-Dichloroethene) are also present at some locations, primarily in the Miller Mountain area. These chlorinated VOCs have been detected above their respective MCL at some locations. These chlorinated VOCs also have similar physical characteristics as TCE, therefore, technologies evaluated for TCE remediation will address these chlorinated VOCs.

Historical operations at the facility included the use of TCE as a cleaning solvent for radar and related equipment. Routine use of TCE resulted in its release to the ground surface or to on-site septic or drain systems, and ultimately migration to the groundwater in the underlying fractured bedrock. The apparent discharges of TCE were located around the former Building 114 area at Howard Mountain, possibly the formerly active leach field at the summit of Miller Mountain, and the Building 300 and septic tank area at the Transmitter Site.

TCE has been detected in monitoring wells in the immediate vicinity of operational areas of the former facility property at concentrations up to approximately 4,800 ug/L. TCE has been detected in residential wells at concentrations up to 93 ug/L.

Natural attenuation is a term used to refer to the natural degradation, dispersion, dilution and overall dissipation of groundwater contaminants over time, as they migrate through the subsurface. Most monitored locations have remained stable over time. Some locations have shown an increase or decrease in concentration. These changes are likely due to contaminant plume migration through advection.

What is the conceptual site model?

The conceptual site model presents how the hydrologic cycle interacts with local geology, describing the migration of water and dissolved materials through the system. The conceptual site model is based on all available data developed during the RI. In the Bucks Harbor area, precipitation reaches the water table in upland areas (Howard Mountain, Miller Mountain, and the Transmitter Site), and moves downward through the thin till deposits, into shallow bedrock fractures and then into deeper bedrock fractures. Once in the bedrock, the groundwater moves along the fractures toward the coastline. The shallow (less than 50 feet) water-bearing fractures at Howard Mountain do not connect with deeper (greater than 130 feet) water-bearing fractures.

The COC, TCE, was historically discharged to the ground surface during routine Air Force activities when the site was operated as a radar tracking station (from 1954 to 1984). Due to the long elapsed time it is likely that little or no TCE remains in the soil. Overburden soil is shallow, with maximum thicknesses of 20 feet at the Howard Mountain former Building 114 location. The soil is generally unsaturated, and therefore TCE discharged to the soil decades ago has been able to evaporate and dissipate. Liquid TCE that migrated to the bedrock is able to dissolve into groundwater. Dissolved TCE migrates with the groundwater in a tortuous zig-zag pattern following the bedrock fractures. Chlorinated solvents, such as TCE, are denser than water and are particularly difficult to locate and remove from the subsurface due to their ability to sink through the saturated zone and penetrate deeper portions of aquifers, which is one of the properties that make them very difficult to access and remediate.

In the Howard Mountain area, groundwater in the bedrock tends to move along fractures oriented to the southeast, eventually discharging into Howard Cove. Bedrock groundwater originating beneath the Transmitter Site splits, with some flow to the east toward Howard Mountain and eventually Howard Cove, and some flows to the west where it discharges to Little Kennebec Bay. The Howard Mountain Fault is a regional, north northwest – south southeast (NNW-SSE) striking, inactive fault located immediately east of the former Building 114 area on Howard Mountain and is responsible for the steep scarp (a very steep bank or slope) along the northeast side of the Howard Mountain and appears to control the flow of contaminated water towards wells located along the fault. Bedrock groundwater at Miller Mountain also moves in a southeastern direction, discharging into Bucks Harbor.

Is drinking water impacted?

Private residential well water is the main source of potable water in the area. Most of the residential water supply wells are bedrock wells drilled into the fractured bedrock aquifer that underlies the region.

A public water supply well (WY-03) that supplies water to the DCF and the FAA facilities is located in the northeastern corner of the DCF Housing Area. The well is 340 feet deep with an estimated pumping rate of 45 gallons per minute (gpm).

A residential groundwater monitoring (GWM) program was initiated by USACE in May 1995 and is currently ongoing. The program includes collecting water samples from a variety of residential/domestic wells (DW), public water supply wells (WY), selected test wells (TW), groundwater seeps/springs, and environmental groundwater monitoring wells (MW). Since 1995, wells have been added or deleted from the sampling program after consultation with the MEDEP.

TCE has been detected in groundwater at several residential water supply wells in the former Bucks Harbor facility area, most in the immediate vicinity of Howard Mountain. Five residential water supply wells are currently equipped with granular activated carbon (GAC) point-of-entry treatment (POET)

systems to remove TCE from their water supply. The decision to install the treatment systems at these locations was based on either prior analytical results or their proximity to the contamination.

The GAC systems consist of a minimum of two carbon filters placed in series. Periodically, water samples are collected before the first filter and between the first and second filters. During the 20 years of GAC treatment and contaminant testing conducted to date, the results have shown that the GAC systems (with proper maintenance) are extremely effective in removing TCE from the water and protecting users from ingesting and inhaling vaporized TCE.

Summary of Site Risks

A human health risk assessment, included as part of the RI report, evaluated the risk to human health as a result of the groundwater contamination. The risk assessment was conducted in accordance with US Environmental Protection Agency (EPA) guidelines in 2005. The risk assessment included evaluation of several reasonably possible exposure pathways for the chemicals of potential concern detected at the site. The risk assessment concluded that the total carcinogenic risks and total noncarcinogenic risks for current residents using private wells (at the most highly contaminated current location) were at acceptable levels, as defined by EPA guidelines. However, the carcinogenic risk exceeded the level set by MEDEP and the Maine Center for Disease Control. The hypothetical future adult resident scenario in the Howard Mountain area had an unacceptable total carcinogenic and noncarcinogenic risk, based on exposure to elevated concentrations of primarily TCE detected in onsite bedrock monitoring wells in the area. The toxicity values for TCE and PCE have changed since 2011, and the RI report now underestimates risk. However, response actions already have been taken by installing GAC systems to prevent exposure to VOCs in drinking water, and will continue to do so as a component of the remedy described in this Proposed Plan (see the question above; *Is drinking water impacted?*). Also, note that the change in toxicity values has not altered the selected cleanup goals, which are based on MCLs that have not changed since the RI was completed in 2005.

A screening level ecological risk assessment was also conducted, using results from surface water and sediment samples. VOCs were not detected in these media, and it was concluded that the contamination do not pose a significant risk to ecological receptors or the surrounding environment.

Indoor air quality testing (also known as Vapor Intrusion testing) has been performed at the most likely impacted residential and commercial properties in the Howard Mountain and Miller Mountain areas. Indoor air and sub-slab soil vapor samples were collected during two sampling events, one in April and one in August/September 2012. Results of indoor air samples collected from residential properties did not exceed guidelines for safe levels, as established by EPA. It was determined that a complete vapor intrusion pathway may exist between the groundwater and indoor air at two commercial buildings in the Howard Mountain and Transmitter Site areas. The two buildings are the FAA Building, which is used for tracking commercial air traffic, and the DCF Building 300, which is used as a carpentry workshop by the correctional facility inmates. Building 300 contained levels of TCE in the indoor air which exceeded EPA Regional Screening Levels (RSLs) for Chemical Contaminants. These RSLs represent conservative chemical-specific levels in air below which no health risks are expected. Risk estimates show the cancer and non-cancer hazards associated with contaminants which have a complete VI pathway from the groundwater to indoor air do not reach a level of concern that requires a response.

Site Characterization

What kind of information was collected to characterize the area?

The RI Report was completed in 2005, after which the USACE enlisted the services of additional professionals to expand their understanding of the three study areas, in three dimensions. These included the US Army Topographic Engineering Center (TEC), Geophysical Applications, Inc. (GAI), the United States Geological Survey (USGS), Argonne National Laboratory (ANL), The Johnson Company (JCO), Hager-Richter, Radon Abatement System Integrated Subsystem Evaluation (RAS), Weston Environmental Solutions, ENSR, Woods Hole Group, Battelle, and AECOM. Refer to the

Characterization Tools highlight box for the investigatory methods used.

Characterization Tools

- Geologic and fracture mapping
- Surface and borehole geophysical surveys
- Whole-well and packer sampling
- Monitoring well installation and angled coring
- Rock matrix analysis
- Spring identification and sampling
- Rock mass characterization
- Soil sampling
- Photolineament analysis
- Historic air photo analysis
- Borehole radar investigation
- Hydrophysical logging
- Packer sampling
- Water level monitoring
- Monitoring and residential well sampling
- Vapor Intrusion testing and evaluation

Why are such sophisticated tools necessary to investigate and characterize the Site?

Groundwater flow through bedrock, particularly fractured bedrock, is very complex. Rather than migrating through soil in a generally downhill direction, groundwater at the Bucks Harbor sites in bedrock meanders through a tortuous network of fractures in response to the path of least resistance. The mountainous environment of the former Bucks Harbor site is particularly complex, and the array of tools employed were selected to characterize the distribution of TCE in the subsurface (bedrock) and the potential groundwater migration pathways at each of the three study areas.

Bedrock is exposed in many locations throughout the former Bucks Harbor study areas. Bedrock fractures measured at outcrops in the study areas, and interpreted from boreholes, strike in a variety of directions, with the most common orientations reflecting the regional tectonic strike as northeast, and the mapped fault orientation as north-northwest. While some large-scale groundwater flow pathways may be apparent or can be inferred from the existing data, it remains very difficult to characterize smaller-scale fractures that contain groundwater and transport contaminants.

At the former Bucks Harbor site, some individual wells and fractures that are proximate to one another actually appear to be hydraulically and chemically isolated (not connected to each other). In such cases, significant hydraulic gradients do not necessarily lead to flow. The degree of interconnectedness of fractures is highly variable, which makes complete local-scale characterization and control of contaminant migration extremely challenging – and virtually impossible.

The characterization tools selected, and the sequence of the investigation and evaluation process, were necessary to begin understanding how groundwater behaves at the three study areas. Site characterization data was also used to try and identify the presence and location of residual sources of TCE within the soil and bedrock. Due to the slight solubility of TCE, even small residual amounts in secondary fractures or in the rock matrix can contribute to long-term groundwater impacts.

With the information obtained, USACE was able to complete the RI and FS phases of the project to determine the nature and extent of contamination, and to identify and evaluate technologies for selection of an appropriate site remedy. A groundwater monitoring program has been in effect since 1995. A summary of the TCE groundwater results for each study area is shown in Figures 2 and 3.

The TCE groundwater results shown in Figure 2 and 3 are intended to represent the TCE distribution at the Howard Mountain and Transmitter Sites (Figure 2) and the Miller Mountain Site (Figure 3). Recent data (from 2013 or 2014) for locations currently in the groundwater monitoring program are represented as circles. Results from historic sample locations (sampled between 2003 and 2011) are shown as squares. In all cases, the most current data was used to represent the concentrations at each location, as defined in the figure legend. The black dashed line shows the approximate extent of TCE impacted groundwater.

Remedial Action Objectives

The FS identified the following objectives for the former Bucks Harbor facility to ensure protectiveness of the community, which has been USACE's primary goal since TCE contamination (and other VOCs) was first discovered at the site in 1995:

1. Prevent ingestion of drinking water that contains TCE greater than 5 ug/L, which is the Federal Safe Drinking Water Act MCL. [Note: This Remedial Action Objective also applies to other chlorinated VOCs historically detected at the Site, including: 1,2-Dichlorethene (MCL = 70 ug/L), Vinyl Chloride (MCL = 2 ug/L), PCE (MCL = 5 ug/L), 1,1,1-Trichloroethane (MCL = 200 ug/L), and 1,1-Dichloroethene (MCL =7 ug/L)].

2. Restore the groundwater within the Site to MCLs.

3. If present, prevent inhalation of vapors from VOCs in groundwater that could pose potential risks in excess of regulatory thresholds.

The first objective has been achieved since 1995 with the installation of the GAC filter systems. The second objective is expected to take decades to achieve due to the slow rate of TCE dissipation. The third objective refers to the potential for vapors emanating from contaminated groundwater migrating upwards into residential basements (similar to radon). This is referred to as vapor intrusion (VI). Results from VI testing at residential and commercial properties have determined that risks from vapor intrusion are acceptable at properties in the vicinity of the former Bucks Harbor facility. Therefore, the third remedial action objective is currently met, and will be confirmed by performing VI sampling on a regular basis.

Evaluation of Remedial Alternatives

What is a Feasibility Study (FS)?

The FS Report was completed in 2007. A FS Addendum Report was completed in 2011. The FS consists of identifying Remedial Action Objectives (RAOs), evaluating physical, hydrogeologic, and geochemical conditions, and identifying and evaluating potential options to achieve the RAOs for a specific site. The potential options incorporate remedial technologies that are used to develop comprehensive remedial alternatives for the site. The FS Addendum report evaluated the feasibility of providing an alternate water supply to impacted residents.

What alternatives were considered in the FS?

The FS explored the viability of dozens of potential remedial technologies. Some technologies included removing groundwater, treating it above-ground to remove TCE, and discharging the treated groundwater back into the ground. Other approaches consisted of adding a treatment agent directly into the groundwater to eliminate the TCE. These alternatives were screened to determine if they should be retained for further consideration. Due to the complex bedrock geology of the aquifer containing the contaminated groundwater, the difficulty of finding and accessing residual TCE sources in the tight bedrock formation, and the dispersed and dilute nature of the plume, no active remedial options were considered to be likely to effectively remediate the groundwater substantially faster than natural attenuation. In other words, active remedies such as pumping and treating groundwater, thermal

destruction, etc. were rejected (i.e., not retained for further evaluation) in favor of using monitored natural attenuation, a passive remedy.

Monitored natural attenuation (MNA) is a process wherein natural subsurface processes—such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials—are allowed to reduce contaminant concentrations to acceptable levels. MNA is appropriate in situations where the contamination will dissipate in a timeframe that is reasonable compared to that of the more active clean-up methods. In addition, the community needs to be protected from any risks associated with the contamination during the natural attenuation period. MNA is appropriate at Buck Harbor because the plume appears to be stable (not expanding), contaminant concentration trends are stable at all except four wells, dissolved concentrations are generally low, and there is some evidence on the most contaminated well that biodegradation of the TCE is occurring (i.e., a decline of TCE and detection of TCE biodegradation by-products). However, the rate of dissipation of the plume appears to be slow, and the timeframe to achieve MCLs may be quite long, perhaps 50 years or longer. Unfortunately, active remediation of TCE plumes in similar bedrock settings has not been demonstrated to substantially reduce this cleanup timeframe. The timeframes for any remediation (active or passive) of chlorinated VOCs in bedrock are difficult to predict and would likely require several decades of monitoring and measurement to observe and quantify.

Therefore, MNA has been selected as the remediation approach, while ensuring protectiveness of the community during the cleanup period by providing clean drinking water to homes with residential wells that have TCE in groundwater approaching or exceeding 5 ug/L. Clean water will be provided by providing an alternate water supply or equipping residences with GAC filtration systems to eliminate the possibility of ingesting TCE in drinking water or inhaling TCE while showering. This is why each alternative retained for consideration in the FS includes an alternate water supply provision or GAC filtration.

Refer to the ***Remedial Alternatives*** highlight box for the alternatives that were identified in the FS as being potentially viable solutions to achieve the site objectives.

Remedial Alternatives

- Alternative 0 – No Action
  - No activities conducted to address site contamination.

- Alternative 1 – Long Term Monitoring and domestic wellhead treatment
  - Continue existing granular activated carbon (GAC) treatment of residential/domestic water supply wells with TCE > 5 ug/L in groundwater (see FS Addendum, below).
  - Continue existing groundwater monitoring (GWM) program of selected residential water supply wells and monitoring wells.

- Alternative 2 – Long Term Monitoring and Enhanced Site Controls
  - Includes Alternative 1 components plus vapor intrusion mitigation if necessary, land use controls within an established institutional control zone (ICZ), and an evaluation of monitored natural attenuation (MNA).

- Alternative 3 – Long Term Monitoring, Enhanced Site Controls, and Source Removal
  - Includes Alternative 1 and 2 components plus excavation of soil, in the most likely TCE primary source areas.

- Alternative 4 – Long Term Monitoring, Enhanced Site Controls, Source Removal, and *in-situ* Treatment
  - Includes Alternative 1, 2, and 3 components plus the application of *in- situ* chemical oxidation (ISCO), injection of chemicals into groundwater on the exposed bedrock surface in the excavation areas.

- FS Addendum – Alternate Water Supply. The FS Addendum evaluated options for provision of an alternate water supply, as a substitute for GAC treatment of residential/domestic water supplies (see Alternative 1, above). Note that the alternatives considered in the FS Addendum are alternatives to the GAC treatment component of the FS alternatives (listed above), to be used in conjunction with any alternative which includes GAC treatment (i.e., FS Alternatives 1, 2, 3, and 4).
  - FS Addendum - Alternative 1 – Site New Well for Water Supply
  - FS Addendum – Alternative 1A – Site New Well for Water Supply and Pretreatment
  - FS Addendum - Alternative 2 - Connection to Existing Downeast Correctional Facility Water Supply
  - FS Addendum - Alternative 2A - Connection to Existing Downeast Correctional Facility Water Supply and Pretreatment
  - FS Addendum - Alternative 3 – Desalination – Reverse Osmosis

Rationale for the Recommended Remedial Alternative

Each remedial alternative was evaluated based on the first seven of nine evaluation criteria, as outlined in the ***Explanation of the Nine Evaluation Criteria*** **highlight** box. Modifying criteria eight and nine will be evaluated after comments are received on this Proposed Plan. A variety of remedial options were considered, as summarized in the ***Evaluation of Alternatives*** highlight box.

Explanation of the Nine Evaluation Criteria		
CERCLA and NCP [40 CFR 300.430(e)(9)(iii)(A)-(I)] require the evaluation of each alternative to address the following nine criteria :		
Criteria	**Threshold**	**1. Overall Protection of Human Health and the Environment** – Evaluates whether a cleanup alternative provides protection and evaluates how risks are eliminated, reduced, or controlled through treatment, engineering controls, or local government controls.
		2. Compliance with Applicable or Relevant and Appropriate Requirements – Evaluates whether a remedial alternative meets cleanup standards, standards of control, and other substantive requirements, criteria, or limitations established under Federal environmental, state environmental, or facility siting laws, or justifies a waiver.
	Primary Balancing	**3. Long-Term Effectiveness and Permanence –** Considers any remaining risks after cleanup is complete and the ability of a cleanup option to maintain reliable protection of human health and the environment over time once cleanup goals are met.
		4. Reduction of Toxicity, Mobility, or Volume through Treatment – Evaluates a cleanup option's use of treatment to reduce the harmful effects of the contaminants, their ability to move in the environment, and the amount of contamination present.
		5. Short-Term Effectiveness – Considers the time needed to clean up a site and the risks and adverse effects a cleanup option may pose to workers, the community, and the environment until the cleanup goals are met.
		6. Implementability – The technical and administrative feasibility of implementing a cleanup option, including factors such as the relative availability of goods and resources.
		7. Cost – Includes estimated capital and annual operations and maintenance costs.
	Modifying	**8. State Acceptance** – Considers whether the state (Maine) agrees with USACE's analyses and recommendations as described in the Proposed Plan.
		9. Community Acceptance – Considers whether the local community) agrees with USACE's analyses and proposed cleanup plan. The comments USACE receives on its preferred alternative are important indicators of community acceptance.

Threshold Criteria: Alternative 0 (No Action) would not be protective of human health for current and future users of groundwater at the Site. Alternative 1 would not be fully protective of human health due to the potential for future users of groundwater impacted from the Site to be unaware of the potential risks. Alternatives 2, 3, and 4 would be protective of human health due to the implementation of LUCs (in the form of notifications of potential risks and treatment of groundwater).

All Alternatives, except Alternative 0, are compliant with Applicable or Relevant and Appropriate Requirements (ARARs) for this Site.

Primary Balancing Criteria: Alternatives 2 and 3 favorably meet criteria for Long Term Effectiveness and Permanence, Short-Term Effectiveness, and Implementability. Alternative 0 does not meet any primary balancing criteria except implementability. Alternative 3 is not considered to provide additional benefit because there are no known distinct overburden soil source currently contributing to the groundwater contamination. Effective implementation of Alternative 4 would difficult because of the complexities of

contaminant distribution in fractured flow conditions for low concentration plumes, and difficulties in delivering treatment amendments in a manner that would contact contaminants in a bedrock matrix. Also, Alternative 4 would not be expected to restore groundwater to MCLs in a shorter timeframe than natural attenuation based on case study data for comparable groundwater remediation sites.

The primary advantages of Alternative 2 and 2A are:

- The remedy allows for a provision of uncontaminated water to current and future users.
- The remedy is implementable.

Evaluation of Alternatives

	Feasibility Study					Feasibility Study Addendum				
			Preferred					Preferred		
	Alternative 0	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 1	Alternative 1A	Alternative 2	Alternative 2A	Alternative 3
Threshold Criteria										
Overall Protection of Human Health and the Environment	■	□	●	●	●	□	●	□	●	●
Compliance with Applicable or Relevant and Appropriate Requirements	■	●	●	●	●	●	●	●	●	●
Primary Balancing Criteria										
Long-Term Effectiveness and Permanence	■	□	●	●	●	□	●	□	●	●
Reduction of Toxicity, Mobility, or Volume through Treatment	■	■	■	■	■	■	■	■	■	■
Short-Term Effectiveness	■	●	●	●	●	●	●	●	●	●
Implementability	●	●	●	●	□	●	●	●	●	■
Cost	$0	$2.1 M	$3.3 M	$6.7 M	$8.0 M	1.6M	2.3M	0.5 M	1.3M	2.3 M
Modifying Criteria										
State Acceptance	Will be evaluated following public comment period									
Community Acceptance	Will be evaluated following public comment period									

● = Favorable, meets criteria
□ = Moderately favorable
■ = Not favorable, does not meet criteria

Recommended Remedial Alternative

What is the recommended alternative for the site?

Alternative 2 – Long Term Monitoring and Enhanced Site Controls (with FS Addendum Alternative 2A) – is the preferred remedy recommended by USACE. Alternative 2 includes Monitored Natural Attenuation to achieve aquifer restoration to MCLs, long term groundwater monitoring to evaluate the remedial process, treatment (GAC filtration) of residential/domestic water supply wells with TCE greater than the MCL to impacted residents, monitoring of indoor air, and Land Use Controls. Alterative 2A includes connection to an alternate water supply (connection to the Downeast Correctional Facility (DCF) water supply) for impacted residents within the Howard Mountain vicinity. The only applicable, relevant and appropriate requirement (ARAR) for this alternative is the Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR Part 141.11 and 141.61. The exposure route for ingestion of contaminated water is circumvented with the alternate water supply or GAC filtration component of this remedy. This alternative also adds an increased measure of protectiveness by providing Land Use Controls (see below) for those properties where TCE could potentially approach the MCL (5 ug/L). The timeframe for an MNA remediation is difficult to predict and will likely require several decades of monitoring and measurement to observe and quantify. Should it become apparent that MNA will not meet the RAOs in a reasonable timeframe or is not protective of human health and the environment, as determined during mandatory five-year reviews, then additional studies and alternative analysis will be performed to support a Decision Document amendment or an Explanation of Significant Difference.

How will the alternate water supply be implemented?

Based on community and MEDEP comments generated on the Proposed Plan and public presentation for the former Bucks Harbor facility in June 2008, USACE investigated the feasibility of providing an alternate water supply for impacted residents in the vicinity of the former Bucks Harbor facility. Of the alternatives evaluated in the Feasibility Study Addendum, connection to the existing DCF water supply was the preferred alternative for provision of potable drinking water to impacted residents. USACE will install the water line to the impacted residents in the Howard Mountain vicinity. Maintenance of the water shall be performed by the USACE. Agreements between all parties involved will be put in place to establish a mutual framework governing the respective parties for the supply of potable drinking water. No additional land in Machiasport, other than that already used as a water supply (and any required easements) will be needed to enact this component of the remedy.

How will the Land Use Controls work?

The USACE will provide annual notification letters to the property owners within the institutional control zone (ICZ) to ensure that they are aware of the potential contaminated groundwater under their property; and to indicate that USACE will test any new drinking water well for VOCs, and connect to an alternate water supply (DCF water supply) or install and maintain GAC filters, if MCLs are exceeded (due to past Department of Defense contamination) or if concentrations are trending toward an MCL exceedance. Additionally, vapor intrusion will be evaluated to determine if investigation and/or mitigation of vapors in indoor air is necessary. These letters will be sent by USACE and will be based on Town tax records to ensure that current owners of the property are notified. The properties designated in the ICZ are those which have historically had detections of TCE greater than the MCL, or those that may become impacted due to their proximity to impacted properties. Annual notification letters will also be sent to property owners within the ICZ even if there is no well currently on their property. Figures 4 and 5 show the ICZ area for the Howard Mountain and Miller Mountain areas, respectively. Note that the ICZ may change as the TCE impacted groundwater areas change over time.

In addition to annual notifications to property owners, USACE is working with the Town of Machiasport to develop notices that will be provided with each building permit issued by the town. The notice will provide information on the areas which contain groundwater contamination and advise the public of the potential need for water treatment. USACE will request that the Town of Machiasport include a notice with each building permit.

The Town of Machiasport or MEDEP may decide to record deed restrictions or notifications on properties within an ICZ. The USACE cannot record deed restrictions or notifications, but may provide assistance to the Town of Machiasport or the MEDEP in developing such instruments.

Next Steps

What happens next?

Once the community has reviewed this Proposed Plan, USACE and MEDEP will consider all comments received. USACE will provide written responses to all formal comments and combine them into a *Responsiveness Summary*, which will be included in the *Decision Document* for the site. The Recommended Alternative presented in this document is based on current information and it could change in response to public comments or new information. The Decision Document will describe the selected remedy and summarize community participation in the process. USACE and MEDEP anticipate that the Decision Document will be finalized and signed by September 2016, at which time the document will be made available to the public at the Information Repositories listed on page 14 of this Proposed Plan.

As required by CERCLA, after the Decision Document is signed, the effectiveness of the selected remedy will be evaluated in reviews conducted every five years, and documented in the Five Year Review reports. The Five Year Review report evaluates if the selected remedy continues to be protective of human health and the environment and the implementation and performance of the selected remedy. The selected remedy and Five Year Review reports will continue until a condition of unlimited use and unrestricted exposure (UU/UE) is attained.

Community Participation

USACE is committed to keeping the community informed of the environmental program at the Former Bucks Harbor facility. The USACE Project Manager will continue to communicate through contact with the Board of Selectmen, the residents within the GWM Program, and other forums. USACE will also continue to maintain the project mailing list for distributing key information to the community. If you are not on the mailing list and would like to be added, please refer to the contact information on page 14 of this Proposed Plan.

Contact Information

Ms. Marie Wojtas.
Project Manager
US Army Corps of Engineers
New England District
696 Virginia Road Concord, MA 01742-2751
(978) 318-8788

Mr. Iver McLeod
Project Manager
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection (MEDEP)
State House Station #17
Augusta, ME 04333
(207) 287-8010

Mr. Jeffrey Davis
Town of Machiasport Board of Selectmen
8 Unity Square
PO Box 267
Machiasport, ME 04655
(207) 255-0628

Information Repositories

Machiasport Town Hall
PO Box 267
8 Unity Square
Machiasport, ME 04655
(207)-255-4516

US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751
(978)-318-8788

Glossary of Terms

Bedrock: The native rock underlying the Earth's surface. At Bucks Harbor, the rock is primarily igneous in origin and ranges from very hard and dense to highly fractured. Groundwater meanders through fractures within the rock masses.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA), commonly known as Superfund. The USACE characterization and remediation at sites is conducted under the framework of CERCLA/SARA, while funded by the Defense Environmental Restoration Program (DERP).

Conceptual Site Model: The Conceptual Site Model (CSM) is an important planning tool that shows relationships between where contaminant sources are (or where they have been) and where contaminants might migrate. The CSM also shows what exposure pathways are or could be complete. The CSM is also iterative and should be reviewed and updated as needed as new data are collected and analyzed.

Decision Document: A legal, technical and public document that explains the rationale and remedy decision for a given site. It also summarizes the public's involvement in the decision.

Feasibility Study (FS): An engineering study of the potential remedies for a site.

Granular Activated Carbon (GAC): Specially formulated carbon used to filter organic contaminants out of drinking water. One pound of carbon contains a surface area of approximately 500,000 square meters. The activation process adds a positive charge to the carbon, which enables the carbon to more effectively attract (and filter out) negatively charged water contaminants.

Groundwater: Groundwater is the water found beneath the earth's surface that fills pores between such materials as sand, soil or gravel. In the case of the former Bucks Harbor site, groundwater is predominantly found within bedrock fractures.

Groundwater Monitoring Program: USACE has been implementing a sampling program at the former Bucks Harbor area since 1995. Currently, the program includes 17 residential or public supply wells (including 5 with GAC systems), 13 monitoring wells, and one seep location.

Information Repository: A public file containing site/project information and documents of onsite investigation and remedial activities in either hard copy or electronic form.

Institutional Control Zone (ICZ): Area in which annual property owner notification letters are provided to advise property owners that their property may be potentially impacted by the presence of site contaminants. Other land use control notifications may also be administered by the MEDEP and/or the Town of Machiasport.

Maximum Contaminant Level (MCL): Enforceable drinking water standard developed by the Environmental Protection Agency (EPA) based on laboratory research and toxicity data for impacts of specific chemicals. The Federal Safe Drinking Water Act MCL for TCE is 5 ug/L.

Monitored Natural Attenuation (MNA): MNA is the reliance on natural attenuation processes (within the context of a carefully controlled and monitoring clean-up approach) to achieve site specific remedial objectives within a time frame that is reasonable compared to other methods. The attenuation processes can include microbial degradation, abiotic chemical and physical transformations, dispersion, and dilution. Monitoring often includes collection of data that helps assess the rate of contaminant reduction through these natural processes.

Strike: Geology term for the direction of the line formed by the intersection of a fault, bed, or other planar feature and a horizontal plane. Strike indicates the attitude or position of linear structural features such as faults, beds, joints, and folds.

Remedial Investigation (RI): The collection of data and information necessary to characterize the nature and extent of contamination at a site. The RI also includes information as to whether or not the contamination poses a significant risk to human health or the environment.

Tetrachloroethylene (also known as Perchloroethylene or PCE): PCE is a solvent used for degreasing. It was reportedly used for cleaning electronic components at Department of Defense Formerly Used Defense Sites, and is also commonly used in parts washers and vehicle maintenance.

Till: Till or glacial till is unsorted glacial sediment. Glacial till was deposited directly by the glacier. Its content includes clay, silt, sand, gravel, and boulders. This material is derived from the sub-glacial erosion and entrainment by the moving ice of the glaciers.

Trichloroethylene (also known as Trichloroethene or TCE): TCE is a solvent used for degreasing. It was reportedly used for cleaning electronic components at Department of Defense Formerly Used Defense Sites, and is also commonly used in parts washers and vehicle maintenance.

US Army Corps of Engineers (USACE): The U.S. Army Corps of Engineers provides comprehensive environmental restoration services for the Army, Department of Defense (DOD), Environmental Protection Agency (EPA), Department of Energy (DOE), and other federal agencies. The DOD has designated USACE to oversee the environmental program at the Former Bucks Harbor site, under the Formerly Used Defense Site (FUDS) program.

Chemical Concentration Units

Refer to the ***Engineering Units*** highlight box for information on chemical concentrations represented as parts per billion. Note that even though concentrations detected at the site represent small concentrations (in the part per billion range), these concentrations can still have risk associated with them.

Engineering Units

1 microgram per liter (ug/L) is referred to as a part per billion (ppb). It is a common unit of measure for an organic contaminant in groundwater, such as TCE, and represents the concentration of that particular chemical.

For context, one part per billion is one inch out of a journey of 16,000 miles. A value of 1% of a chemical in groundwater is 10,000,000 ug/L (ppb). A chemical concentration of 5 ug/L is a very small fraction of a percent (0.0000005%).