U.S. Army Corps of Engineers
New England District

DECISION DOCUMENT

Former Ground to Air Transmitter (GAT) Facility
Glenburn, ME

FORMERLY USED DEFENSE SITE
PROPERTY NUMBER D01ME0566
Project Number 01

January 2016

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LIST OF ACRONYMS

µg	Micrograms
µg/kg	microgram per kilogram
µg/L	micro grams per liter
µg/m3	micrograms per cubic meter
ANL	Argonne National Laboratory
ARAR	Applicable or Relevant and Appropriate Requirement
CDC	Center for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Cis-1,2-DCE	*Cis*-1,2 dichloroethene
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
CVOC	Chlorinated volatile organic compound
DERP	Defense Environmental Restoration Project
DNAPL	Dense Non Aqueous Phase Liquid
DoD	Department of Defense
EC	Environmental Covenant
ELCR	Excess Lifetime Cancer Risk
EPC	Exposure Point Concentration
fbgs	Feet below ground surface
FLUTe	Flexible Liner Underground Technology
FS	Feasibility Study
Ft	Feet
fbgs	Feet below ground surface
FUDS	Formerly Used Defense Site
GAC	Granular Activated Carbon
GAI	Geophysical Applications Incorporated
GAT	Ground to Air Transmitter
GIS	Geographic Information System
GPM	Gallons per Minute
GSA	General Services Administration
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HTRW	Hazardous, Toxic, and Radioactive Waste
IAT	Indoor Air Target
In	Inch
J&E	Johnson & Ettinger
JCO	The Johnson Company
LTM	Long Term Monitoring
LTMP	Long Term Monitoring Plan

M	Meters
MCL	Maximum Contaminant Level
ME	Maine
MEDEP	Maine Department of Environmental Protection
MEDHHS	Maine Department of Health and Human Services
MEG	Maximum Exposure Guidelines
MEGIS	Maine Geographic Information System
MNA	Monitored Natural Attenuation
NAPL	Non Aqueous Phase Liquid
NAVD88	North American Vertical Datum of 1988
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NE	Northeast
NGS	Northeast Geophysical Services
NPL	National Priorities List
NRCS	Natural Resource Conservation Service
NW	Northwest
O&M	Operation & Maintenance
OSHA	Occupational Safety and Health Administration
POTW	Publicly Owned Treatment Works
ppbV	parts per billion by volume
RA	Remedial Alternative
RAG	Remedial Action Guideline
RAO	Remedial Action Objective
RAS	Radon Abatement Systems Integrated Subsurface Evaluation
RBC	Risk Based Concentration
RfC	Reference Concentration
RfD	Reference Dose
RG	Remedial Goal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RSL	Regional Screening Level
SE	Southeast
SLERA	Screening Level Ecological Risk Assessment
SW	Southwest
TBC	To Be Considered
TCE	Trichloroethene (also known as Trichloroethylene)
TEC	Topographic Engineering Center
UCL	Upper Confidence Limit
UMO	University of Maine at Orono
USACE	United States Army Corps of Engineers
USAF	United States Air Force
US DoD	United States Department of Defense
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

UST	Underground Storage Tank
UU/UE	Unrestricted Use/Unrestricted Exposure
VC	Vinyl Chloride
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

1.0 THE DECLARATION

1.1 SITE NAME AND LOCATION

The former Ground to Air Transmitter (GAT) Facility site (the Site) is located in Glenburn, Maine (see Figure 1). The Site is a Formerly Used Defense Site (FUDS) (Property Number D01ME0566 01), but is not listed on the National Priorities List (NPL).

1.2 STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the final remedy selected for the Site, which was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9601 et. seq. and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as amended, 40 C.F.R. Part 300. This final decision for the Site is based on the Administrative Record which was developed in accordance with Section 113(k) of CERCLA and is available for public review at the Glenburn Municipal Building, 144 Lakeview Road, Glenburn, ME 04401, and the U.S. Army Corps of Engineers New England District Office, 696 Virginia Road, Concord, MA 01742-2751.

The United States Army Corps of Engineers (USACE) is the lead agency for this response action and has the authority to approve this Decision Document. Approval authority for Decision Documents that have a selected remedy with a present worth cost estimate of more than $2 million, but less than or equal to $10 million, reside at Headquarters USACE. The lead regulatory agency for this site is the Maine Department of Environmental Protection (MEDEP), Division of Remediation, Bureau of Remediation & Waste Management. The State of Maine concurs with the Selected Remedy described herein.

1.3 ASSESSMENT OF THE SITE

The primary contaminants of concern at the Site are chlorinated volatile organic compounds (CVOCs); in particular, trichloroethene (TCE). TCE was used by the United States Air Force (USAF) during their historical operations at the former GAT Facility Site which is now owned by the Town of Glenburn (Lot 46 on Figure 2). Dissolved phase TCE in

groundwater (maximum of 60 µg/L (micrograms per liter) detected in 2005) and sorbed-phase TCE in soils (maximum of 16 µg/kg (micrograms per kilogram (estimated value) detected in 2008) have been historically detected at the Site. TCE has been detected in seven existing off-site drinking water wells, all at concentrations below the U.S. Environmental Protection Agency's (USEPA) Maximum Contaminant Level (MCL) of 5 µg/L, with the exception of one sample collected in 2007. Despite the presence of TCE in groundwater and soil at some locations at the Site , the on-site public water supply well that serves the former GAT Facility (currently used as Town of Glenburn municipal offices) has never had any detections of TCE. Also, no data collected at the Site to date have indicated any remaining source areas in the subsurface. Currently there are no unacceptable human health or ecological risks; however, the response action selected in this Decision Document is necessary to ensure the protection of public health from potential exposure to hazardous substances in the future.

1.4 DESCRIPTION OF SELECTED REMEDY

Details relating to the Selected Remedy are described in Section 2.9.1. The final remedy selected by the USACE for the Site (the Selected Remedy) is:

1. Monitored Natural Attenuation (by dispersion);
2. Long term monitoring;
3. Point of use water treatment for water supply wells;
4. Monitoring of indoor air; and
5. Land use controls (also known as institutional controls (ICs)); and

The Selected Remedy includes the following features:

- Monitored Natural Attenuation (MNA) is the reliance on natural attenuation processes (with the context of a carefully controlled and monitored clean-up approach) to achieve site-specific remedial objectives within a timeframe that is reasonable compared to other methods. The "natural attenuation" process can include a variety of physical, chemical, or biological processes that can reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater or soil. The attenuation process can include microbial degradation, abiotic chemical and physical transformations, dispersion and dilution. The primary MNA process at the Site is through dilution or dispersion.

Performance of the MNA process will be assessed based on data obtained from the long term monitoring of groundwater.
Long Term Monitoring of water quality in groundwater monitoring wells and water supply wells will be performed to assess MNA performance, and confirm protectiveness of human health and the environment. Long Term Monitoring will be conducted at a frequency which is sufficient to maintain point-of-use treatment systems and to assess changes in groundwater chemistry.

The Site's Long Term Monitoring Plan (LTMP) will provide details of the wells to be sampled. It is considered a living, dynamic document, which will be revised periodically based on the results of the monitoring program. The initial LTMP will be developed by USACE with input from the Town, MEDEP, and other stakeholders. Future revisions will be similarly coordinated with those parties. If necessary, based on results from each groundwater sampling event, adjustments will be made to the long term monitoring (LTM) program to ensure that the remedy remains protective of human health and the environment.

An additional nested pair of bedrock monitoring wells will be included in the monitoring network. These new wells will be installed to serve as a boundary compliance well at a location southeast of the Site in accordance with methods developed by USACE with input from MEDEP. Additional wells will be installed, if deemed necessary.

An expanded network of residential well locations (in addition to the network of wells sampled more frequently) will be sampled every five years or if a significant change in water quality is observed to ensure that the conceptual site model of extent of contamination remains accurate. The first scheduled expanded network of residential wells is anticipated to be conducted during the first sampling event after this Decision Document is signed/approved (estimated to be in 2015).

Any new water supply well installed on Town of Glenburn property (Lot 45 or 46) or any property within Zone 2 or 3 (see below, "Land Use Controls" section) in the future will be tested and treated, if necessary, by USACE, and may also be added to the LTM program.

- Point of use treatment systems will be provided by USACE for those active water supplies that currently have, or historically had, TCE above the MCL of 5 μg/L and for those supplies where increasing concentration trends indicate the potential for a future MCL exceedance (USEPA, 2009). Other factors such as past TCE concentrations, TCE concentration trends, and proximity of the well to other TCE containing wells will also be considered in making a determination to add a point of use treatment system. If there is not enough data for a trend determination, the other factors (e.g., past TCE concentrations, proximity of the well to other TCE containing wells) will be used to determine whether to add a point of use treatment system. Details of criteria for

evaluating changes in concentrations are provided in Section 2.9.1 and also described in the Long Term Monitoring Plan.

- Indoor air monitoring of the municipal office building will be conducted every five years or if site conditions dictate (e.g., increase in groundwater concentrations, changes in building conditions) that the sampling frequency should be re-evaluated. The public safety building on Lot 46 will also be evaluated (USEPA, 2015a) to determine if it should be brought into the indoor air monitoring program. Indoor air monitoring specifics will be included in the Site LTMP.

  If a new municipal building is constructed on Lot 46, the Town of Glenburn is requested to notify USACE so that mathematical modeling can be conducted using current site conditions to determine if indoor air testing should be conducted (by USACE) immediately or can wait until the next five year review sampling period. The building should be constructed in accordance with State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building codes), resulting from residual DoD contamination in soil or groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD site contaminants pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

- Additionally, further soil investigation under the Municipal Building will be undertaken by USACE if the building is demolished. The purpose of the additional study is to ensure that there is no residual soil contamination under the structure that might pose an unacceptable risk.

- Land Use Controls include (see Figure 2 for Land Use Control Zone designations):

  Zone 1: The USACE will send notice letters on an annual basis to each Zone 1 property owner. Zone 1 property includes any property that is documented to contain TCE in groundwater at concentrations greater than the MCL, and/or where residual TCE may be present in soils. The only property meeting these criteria is the former GAT Facility Site (Lots 45) and Lot 46, which are owned by the Town of Glenburn (see Figure 2). The following items will be included in the annual notice letters for the Zone 1 property (Lots 45 and 46):

  - Provides notification to property owner that TCE is present in groundwater below the property, and an offer by USACE to test their water supply if a new well is drilled. A point of use treatment system will be installed and maintained on a drinking water well if MCLs are exceeded, or if concentrations are trending toward an MCL exceedance. The annual notices (with copies to MEDEP) will be sent by USACE to the owner-of-record (checked by USACE at the Town offices annually).

- States recommendation for notification to MEDEP and coordination with MEDEP prior to drilling a well on Lots 45 or 46. USACE will sample any new well installed on this property.

- Provides recommendation for notification to MEDEP and USACE of any planned excavations under the footprint of the existing municipal building, and use of appropriate measures acceptable to MEDEP to protect the health of the construction workers prior to and during the excavation.

The Town of Glenburn may choose to place an Environmental Covenant (EC) on the town property (see Section 2.9.1 for additional details). The USACE will continue to provide annual notifications until a condition of Unlimited Use and Unrestricted Exposure (UU/UE) is achieved at the town property. This condition is achieved when TCE is not detected above the MCL in any monitoring location for a period of three years.

Zone 2 and 3: Zone 2 includes properties outside of Zone 1 where data indicate the presence of TCE in groundwater. Zone 3 includes properties abutting to or adjacent to properties included in Zone 2. The following advisory land use controls will be implemented for properties where TCE is or may be (based upon the conceptual site model) present in groundwater, at concentrations below the MCL (Zones 2 and 3 on Figure 2):

- Annual notice letters will be provided by USACE to landowners in Zones 2 and 3 indicating the potential for TCE contamination in the groundwater below their property, and an offer by USACE to test their water supply if a new well is drilled. A point of use treatment system will be installed and maintained on a drinking water well if MCLs are exceeded, or if concentrations are trending toward an MCL exceedance. These notices (with copies to MEDEP) will be sent by USACE to the owner-of-record (checked by USACE at the Town offices annually).

Additionally, until the Site reaches a condition of Unlimited Use/Unrestricted Exposure, Five Year Reviews will be performed to evaluate whether the Selected Remedy continues to be protective of human health and the environment. The Human Health Risk Assessment (HHRA) was completed in June 2011. Later in 2011, the USEPA updated the TCE toxicity factors (USEPA, 2015c). These updated toxicity factors support the Selected Remedy and the Five Year Review process includes review of toxicity factors.

USACE will also perform a technology review on a five year interval basis concurrent with the Five Year Review to evaluate if there are any new technologies that may be applicable to this site to reduce the level of contamination or duration of the time for attainment of the Remedial Action Objectives (RAO) (see Section 2.7). The details of this technology review report are provided in Section 2.9.1. It will be provided to MEDEP and the Town for review. If a technology is identified during this review which shows significant promise of application to this site, a pilot testing program and/or amendment to the Decision Document will be considered.

1.5 STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the lead agency is to select remedies that: are protective of human health and the environment; comply with applicable or relevant and appropriate requirements (ARARs) – unless a statutory waiver is justified; are cost-effective; utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and satisfy the statutory preference for treatment as a principal element of the remedy. This section discusses how the Selected Remedy meets these statutory requirements.

Protectiveness of Human Health and the Environment

No unacceptable risks to human health under current conditions were identified in the HHRA (i.e., no Hazard Indices (HIs) greater than 1.0, and no excess lifetime cancer risks (ELCR) greater than the USEPA generally acceptable risk range of 10^{-4} to 10^{-6}). No unacceptable impacts to the environment were identified in the screening level ecological risk assessment. Although some toxicity factors have changed since the risk assessments were completed (see Section 2.6.1), no remedial action is required to protect human health and the environment under current conditions.

TCE is present in groundwater at levels that exceed the MCL at locations on the Site. The groundwater could pose a human health risk if new drinking water wells were drilled in those locations. Therefore, the Selected Remedy includes the requirement that USACE provide

notifications to property owners notifying them of the potential for TCE-contaminated groundwater on their property.

Although there are no unacceptable human health risks due to use of off-site drinking water wells, the Selected Remedy includes the requirement that USACE provide notifications to property owners notifying them of the potential for TCE-contaminated groundwater on their property. In addition, the Selected Remedy includes the requirement that point of use treatment be provided by USACE for off-site drinking water wells, if necessary, to ensure that human health is protected in the future.

Long term monitoring of groundwater monitoring wells, drinking water supply wells, and indoor air monitoring at the existing municipal building (or newly constructed municipal building) and assessment of the public safety building to determine if indoor air monitoring should be performed is also included in the Selected Remedy, and will be used to verify the continuation of stable or declining concentrations, and the continued lack of unacceptable risks to human health.

Compliance with ARARs

The only ARAR (Table 1) for the Selected Remedy is the National Primary Drinking Water Regulations that specifies chemical-specific MCLs (40 CFR Part 141) of acceptable chemical concentration levels for public drinking water systems. The MCL for TCE (the primary constituent of concern at the Site) of 5 µg/L is exceeded in groundwater under portions of the Site. TCE has never been detected in the existing Town Municipal Building water supply well, and the MCL for TCE has not been exceeded in any off-site drinking water wells since 2007 (one TCE MCL exceedance, 5.1 µg/L, was reported in one off-site well in 2007). The Selected Remedy is expected to achieve the MCL of 5 µg/L TCE in groundwater at the Site through natural attenuation processes (by dispersion). However, it is expected that these processes will take several decades to achieve this ARAR. Time-series data from the four on-site monitoring wells where TCE exceeds 5 µg/L is limited, as the wells were installed and/or

altered (liners installed) in 2008, so the future duration of MCL exceedances at the Site cannot be accurately predicted at this time. However, the time frame required to achieve this ARAR is expected to be on the order of decades.

The Selected Remedy is expected to achieve the chemical-specific ARAR for this site. There are no action specific or location-specific ARARs identified for the Selected Remedy at the Site. To be considered criteria for the evaluation of indoor air (for vapor intrusion investigations) and soil (for soil investigation under the GAT Facility building when it is demolished) are also listed in Table 1.

*Cost-effectiven*ess

In the lead agency's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent.

Utilization of Permanent Solutions and Alternative or Resource Recovery Technologies

USACE has determined that the Selected Remedy represents the maximum extent to which permanent solutions and alternative or resource recovery technologies can be utilized in a practicable manner at the Site. The implementation of MNA assessment, long term monitoring of groundwater, treatment of any impacted drinking water source, indoor air monitoring, and land use controls will provide a mechanism to ensure long term effectiveness and permanence of this remedy.

Statutory Preference for Treatment as a Principal Element of the Remedy

The Selected Remedy does not contain treatment as a principal element for the following reasons. Treatment *ex-situ* or *in-situ* is considered impracticable due to: 1) the fractured nature of the bedrock; 2) the existing hydrogeologic connections between potable water supply wells and the contaminated groundwater; and 3) the bedrock aquifer geochemistry. Treatment as a principal element would not be expected to result in a meaningful reduction in the remediation time frame (estimated as decades), as compared to the Selected Remedy. The concentrations of

contaminants in off-site water supply wells appear to be stable or decreasing since 2008 and there are no anticipated environmental conditions that would cause that to change over time; and there are currently no unacceptable human health or ecological risks that would warrant a much more costly, and potentially risky, treatment-based remedy.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Decision Document (Section 2.0). Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern and their respective concentrations (Section 2.4.5).
- Baseline risk represented by the chemicals of concern (Section 2.6).
- Cleanup levels established for chemicals of concern and the basis for these levels (Section 2.7).
- How source materials constituting principal threats are addressed (Section 2.10).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water (Sections 2.5 and 2.11).
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (Section 2.11).
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 2.9.2).
- Key factor(s) that led to selecting the remedy (i.e., a description of how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria (Section 2.11).

1.7 AUTHORIZING SIGNATURES

The Selected Remedy for the Site (Monitored Natural Attenuation, Long Term Monitoring of Groundwater, Point of Use Water Treatment (for impacted water supply wells),

Monitoring of Indoor Air, and Land Use Controls) is protective of human health and the environment, and is cost effective. The estimated cost of the selected remedy is $5.6M. The Selected Remedy does not satisfy the statutory preference for remedies that utilize treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances; however, the hazardous substances present at the Site pose no current unacceptable risk to human health and the environment.

15 Feb 2016
Date

Karen J. Baker
Chief, Environmental Division Directorate of Military Programs

2.0 THE DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

The former Ground to Air Transmitter (GAT) Facility property (the Site) is located at 144 Lakeview Road, in the Town of Glenburn, Piscataquis County, Maine (Figure 1). For purposes of this Decision Document, "on-site" includes the Formerly Used Defense Site (FUDS) (Lot 46 on Figure 2) and "off-site" refers to the surrounding area containing groundwater impacted by contaminants originating from the FUDS property (shown in blue as the approximate extent of TCE in groundwater on Figure 2). The former GAT Facility property is a Formerly Used Defense Site (D01ME0566 01). The Department of Defense (DoD) has the responsibility for cleaning up former DoD facilities under the FUDS Program; the USACE is the lead agency responsible for the former GAT Facility in Glenburn, Maine. The Maine Department of Environmental Protection (MEDEP) is the lead regulatory agency. MEDEP has participated in the Remedial Investigation, Feasibility Study, and remedy selection process. USACE seeks the involvement and concurrence of the state, but does not require it.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Site History

The former Glenburn GAT Facility was used by the United States Air Force (USAF) from 1958 to 1967. Historically the solvent Trichloroethene (TCE), also known as Trichloroethylene, was used by the USAF while they operated facilities at the Site. Prior to its purchase by the USAF, the property was used for agricultural purposes. In 1967, after the USAF no longer required the use of the facility, the approximately 9 acre property was transferred to the General Services Administration (GSA) for re-sale. The Town of Glenburn purchased the property in 1967 and now uses the building (originally built by the USAF) for Town municipal offices and for a variety of other municipal functions. The property currently contains: the Glenburn municipal, public safety, and salt storage buildings; a skateboard park (in process of renovation to basketball courts); sewage disposal systems for the buildings on the property; and a water supply well (GB-PW-01) which provides drinking water to the municipal building and public safety building (see Figure 3 for locations).

2.2.2 Prior Investigations and Studies

The Site was identified as a site eligible for the Defense Environmental Restoration Program (DERP) in 1998 following completion of an Inventory Project Report prepared for the USACE (USACE, 1998). A Preliminary Assessment and Site Inspection, which are usually performed under CERCLA, were not completed for this Site; however, other investigations performed by the USACE have served the same purpose – to determine if environmental conditions at the Site have been impacted by release(s) of hazardous substances. The DERP eligibility was based on the finding of groundwater contamination that likely resulted from USAF activities at the Site.

Environmental investigations performed at the Site are described in Table 2, along with their associated references. Refer to Figures 4 and 5 for well and sample locations referenced in Table 2.

2.2.3 Regulatory Background

The DoD has the responsibility to address contamination issues at certain former DoD facilities under DERP for FUDS and, therefore, is responsible for site investigation and remediation activities at the Site. USACE has been delegated the authority to be the executing agent for FUDS. The goal of the USACE is to reduce risk to human health and the environment though implementation of effective, legally compliant, and cost-effective response actions. FUDS program policy (USACE, 2004a) requires USACE to:

- Comply with the DERP Statute (10 USC 2701 *et seq.*) and CERCLA, Executive Orders 12580 and 13016, the NCP, DERP guidance, and Army policies for the FUDS program;
- Coordinate with, and obtain input from, the appropriate regulatory agency, which for this Site is the MEDEP;
- Conduct a remedial investigation with a baseline risk assessment to evaluate the need for remediation; and
- In a response action, attain standards and meet requirements that are consistent with CERCLA and NCP processes and criteria.

Site investigation and remediation activities must follow federal laws, guidance, and methods. Substantive requirements provided by the state may be considered ARARs. The MEDEP has participated by providing regulatory oversight of the FUDS investigation. USACE seeks the involvement and concurrence of the MEDEP, but does not require it. It is the policy of the USACE to uphold federal laws assuring that activities conducted at the Site are protective of human health and the environment, and meet other substantive requirements that are determined to be ARARs.

The Remedial Investigation (RI) and Feasibility Study (FS) were conducted between 2008 and 2012 under the DERP for FUDS**,** and completed in accordance with CERCLA and the NCP, including USEPA RI/FS Guidance (USEPA, 1988) and pursuant to USACE Engineer Regulation (ER) 200-3-1 (USACE, 2004a).

2.3 COMMUNITY PARTICIPATION

The Draft RI/FS report for the Site was initially developed in December 2009. Discussions with MEDEP and the Town of Glenburn representatives in a June 2010 meeting resulted in further investigations at the Site, including collection of additional soil, soil vapor and indoor air samples, and additional evaluation of *in-situ* remedial alternatives. Results of these investigations and evaluations were incorporated in the RI/FS report (JCO, 2012). A meeting was held with MEDEP and Town of Glenburn representatives in May 2011, to discuss the revisions to the report and the feasibility of several potential additional remedial alternatives to consider. An informal public meeting presenting a summary of the draft RI/FS was held in the Town of Glenburn Municipal Building in June 2011. The first draft of the Proposed Plan and the final version of the RI/FS (JCO, 2012) were developed in December 2012, and submitted to MEDEP and the Town of Glenburn representatives. Revisions to the Proposed Plan occurred during 2013 and 2014, with modifications made in response to comments from the Town of Glenburn and MEDEP, including those received during two meetings in August 2013 and April 2014. Additional discussions and communications, including responses to written comments, regarding the preferred remedy and Proposed Plan occurred during 2013 and 2014. The RI/FS

and Proposed Plan (JCO, 2014) can be found in the Administrative Record file in the Town of Glenburn Municipal Building.

A public comment period was held from August 4 to September 8, 2014. In addition, a public meeting was held on August 20, 2014 to present the Proposed Plan to the public. During the public meeting, USACE, their consultant, and MEDEP answered questions about the project and the preferred remedy. This meeting was also used to solicit comments and input regarding the Proposed Plan. Responses to the comments received during the public comment period and at the public meeting are included in the Responsiveness Summary provided in Section 3.0 of this Decision Document.

2.4 SITE CHARACTERISTICS

2.4.1 *Conceptual Site Model*

Historical DoD practices released liquids containing TCE into the environment in the vicinity of the GAT building more than 45 years ago when DoD utilized the Site. The liquids likely entered the subsurface geologic strata, which, starting at the ground surface, includes silty gravel and glacial till underlain by saprolite (weathered bedrock) over more competent bedrock. The liquids would then have migrated rapidly through the silty gravel, ponded in depressions in the till surface, and slowly infiltrated through fractures and bedding planes in the till and saprolite. TCE also likely diffused into the rock matrix. Conceptually, residual TCE still exists in the till, saprolite and/or rock in the form of isolated droplets or sorbed to the matrix. However, no source areas with soil contamination above Maine Soil Remedial Action Guidelines (RAGs), evidence of non-aqueous phase liquid (NAPL) or any other residual source areas were identified during any of the field investigations at the Site.

Bedrock aquifer groundwater becomes contaminated after contacting residual TCE. Contaminated groundwater can then flow preferentially along permeable bedding-related pathways towards the northeast and the southwest. Temporary changes in the direction of groundwater flow occur in response to the pumping of the nearby public water supply well GB-

PW-03, recharge events, and/or seasonal groundwater surface elevation (water table) changes. Dilution of the TCE concentration to levels below MCLs occurs within short distances of the location of the highest measured TCE concentration in groundwater (at GB-MW-01 near the salt shed – see Figure 6), due in part to the general high permeability of the bedrock, and in part to the frequent changes in head conditions and resulting reversing flow directions. The result is current concentrations less than MCLs in off-site water supplies.

There are limited available analytical data to evaluate the aquifer chemistry in terms of the likelihood of biodegradation of the TCE. However, the absence of daughter products (cis-1, 2-dichloroethene, for example) and co-metabolites, and the presence of oxidizing conditions, suggest that natural biodegradation is not a significant process causing the TCE attenuation at the Site. However, attenuation of TCE in groundwater appears to be occurring due primarily to dilution and dispersion.

2.4.2 Site Overview and Physical Setting

The Site occupies the southwest corner of a relatively flat, south-trending ridge between 230 and 245 feet elevation (North American Vertical Datum, NAVD88). The land surface in the area gently slopes down to the west and south. The topographic high point in the vicinity of the Site occurs at the Lakeview Cemetery, immediately northeast of the Site (Figure 1). Area topography is dominated by four prominent ridges merging into a flat hilltop with an elevation above 240 feet elevation NAVD88.

2.4.3 Surface Water and Wetlands

The Site does not contain permanent surface water or wetlands. One small ephemeral or seasonal drainage ditch begins near the southern boundary of the Site , and flows south through part of Homestead Estates (sample location GB-SW-03 on Figure 5). There are no discrete streams southwest of the Site but the area is very boggy due to groundwater discharge and poor draining soils, with seeps occurring in several places between the Site and Hollis Bog (see Hollis Bog and sample location GB-SW-04 on Figure 5). There are two small ponds located southwest

and southeast of the Site (labeled as West Pond and East Pond on Figure 5). West Pond is fed in part from a groundwater discharge area near its northern edge. Groundwater also discharges east and southeast of the Site. The southeast discharge creates an intermittent spring that feeds East Pond (shown on Figure 5).

Wetlands are present about 1/3 mile north of the Site, at the base of a steep bedrock cliff that drops off to the north (marked as wetlands at the top of Figure 5). These wetlands feed a small, unnamed stream that eventually discharges into Pushaw Lake. Evidence of wetlands was also observed near West Pond, East Pond, and Hollis Bog.

In summary, groundwater discharges to the surface as springs or seeps near the Site to the northeast, southeast, south, and southwest (see GB-SW- sample locations on Figure 5). Discharges to the south (GB-SW-03) and to the southeast at East Pond (GB-SW-02) are likely the result of perched groundwater surfacing at the contact where the upper sandy gravel ends and the underlying less permeable silt till is present at the ground surface. Natural springs to the southwest at West Pond (GB-SW-04), and to the east at GB-SW-01, are likely the result of discharges from the bedrock aquifer through more permeable features or due to the absence of the basal silt till and saprolite at those locations.

2.4.4 Geology and Hydrogeology

Overburden Geology

Overburden stratigraphy is characterized by one to eight feet of dry silty gravel fill and/or ablation till overlying approximately ten to twenty feet of dry, very dense, low permeability glacial basal silt till. The till, in turn, overlies dry, dense, low permeability, highly weathered bedrock (saprolite) (USACE, 2007 and JCO, 2008). The top-of-till surface below the Site is highest in the vicinity of GB-MW-01, GB-OB-18, and the salt shed (see Figures 3 and 6 for locations), and slopes down towards the southeast and southwest. There are anthropogenic basins cut into the till surface at the locations of the roof drain dry wells, the on-site septic system cesspool and leachfield, a former fuel oil underground storage tank, and a former debris

burial area between the municipal building and the salt shed. The till, which was uniformly dry during the 2008 and 2010 overburden investigations, likely acts as an aquitard, limiting infiltration, and creating temporary perched groundwater conditions above it during and immediately following precipitation and snow melt events. If liquid wastes were released above the till surface in the past, they would have likely migrated downwards through the overlying silty gravel, and then flowed laterally down the till surface slope until they ponded in low areas, and eventually infiltrated into the till (possibly through pore spaces or fractures in the till). Overburden groundwater at the Site is limited to short duration events in the sandy gravels perched upon the basal silt till. Flow in this perched aquifer is limited aerially, and occurs only during brief periods immediately following precipitation or snow melt events.

Bedrock Geology

The greywacke bedrock unit in and around the Site contains bedding that generally strikes northeast-southwest and dips (slopes) towards the northwest below the Site. Bedrock outcrops near the Site have highly porous veins, vugs (holes), and connected porous channels. The veins and chemically-dissolved carbonate bedding may provide the primary preferential route of contaminant transport in the bedrock aquifer. The bedrock surface forms a northeast/southwest trending ridge near the northern edge of the Site. Surface geophysical testing indicates zones of rock under the Site with high porosity, possibly due to fractures or to chemical weathering (ANL, 2006). Borehole geophysics of on-site and nearby wells show intense chemical weathering of the upper portion of the rock, including pervasive iron staining and large vugs (holes) (GAI, 2005 and JCO, 2009). This upper portion of the rock is called Unit A, and the lower, relatively unweathered portion of the bedrock, is called Unit B. Overlying Unit A at the Site is highly weathered saprolite. Saprolite is rock that has chemically weathered in place, leaving a soil-like consistency with bedding surfaces intact. Cores of the saprolite indicate that it has very low permeability, and is dry in its upper 2-3 feet. Some of the saprolite cores had relict bedding, primarily composed of biotite mica, and often at angles up to 70 degrees from horizontal (JCO, 2008), which may provide preferential pathways for downward migration of contamination into the underlying bedrock aquifer.

In summary, the Site is underlain by low permeability saprolite, the upper few feet of which act as an aquitard. Below the saprolite is the porous and permeable Unit A, which probably acts as the primary preferential flow path for contaminant migration in the bedrock aquifer. The lower portion of the bedrock, Unit B, has discrete transmissive fractures which also likely allow contaminant migration in the subsurface. The primary trend for fractures is northeast/southwest.

Bedrock Connectivity

Pumping test data indicate that several of the on-site bedrock monitoring wells are hydraulically connected to each other, as well as to an off-site public water supply well. Boreholes GB-MW-05 and GB-MW-06, both located near the southeast corner of the municipal building (see Figure 3), are hydraulically connected with nearby water supply well GB-PW-03 under ambient and stressed conditions. Monitoring well GB-MW-01 Ports 2 and 3 and GB-MW-05 (deep completion) are hydraulically connected to GB-MW-06. The shallow well completions at GB-MW-03 and GB-MW-05 are hydraulically connected to GB-MW-02 (before Flute™ liner installation). Monitoring well GB-MW-02 Ports 1 through 3 are hydraulically connected to the deep completion in GB-MW-04. No responses in the overburden wells to pump test-induced stresses in the bedrock wells were observed. Locations of these wells are shown in Figure 3.

Bedrock Hydrogeology

Groundwater flow through bedrock occurs predominantly in a northeast/southwest orientation through large zones, in some cases more than ten feet thick, of heavily fractured, weathered, and iron-stained bedrock (Unit A) as well as through individual discrete fractures in relatively competent bedrock (Unit B). The flow pathways vary laterally from being a single group of transmissive features to at least two groups of features separated by much less fractured bedrock. For example, GB-PW-01 is screened between two of the permeable zones and contains no TCE, while GB-MW-01 is screened within a permeable zone, is contaminated, and is

hydraulically connected along the strike to wells GB-MW-05, GB-MW-06, and ultimately GB-PW-03, the public water supply well located to the southwest (JCO, 2009).

2.4.5 Nature and Extent of Contamination

The nature and extent of contamination has been defined by decades of environmental studies and monitoring. The primary contaminant of concern is trichloroethene. This section summarizes the concentrations, and describes the lateral and vertical extent, of TCE in: soil; soil vapor and indoor air; and groundwater, seeps, and springs.

Soil

Multiple on-site investigations have been performed since 1995. During those investigations TCE was only detected in two out of a total of 188 soil samples collected from the Site suggesting that there is not a significant source of TCE in the soils at the Site. On-site soil test locations are shown on Figure 4. The two soil samples containing TCE are summarized below:

1) Soil collected in 2008 from 19 fbgs at soil boring OB-04, adjacent to and west of the salt shed and well GB-MW-01 (TCE = 16 µg/kg, estimated);

and

2) Soil collected in 2004 from GB-SB-04 collected from beneath the former GAT facility building between three and five feet below the slab (TCE = 1.1µg/kg, estimated).

Soil Vapor and Indoor Air

A passive soil vapor screening study, conducted in 2003, around the exterior of the former GAT facility detected TCE in soil vapor. Tests for TCE in soil vapor in the septic tank and cesspool area during the same study were all non-detect except at one location near the cesspool pipe inlet which contained TCE near the reporting limit (USACE, 2008b). The screening method for this 2003 screening study used activated carbon tubes which were left in the ground for a period of time then removed and analyzed. These data are presented as total

grams of TCE sorbed to the carbon, and are not directly comparable to regulatory or recommended risk-based values.

Eight sub-slab soil vapor samples were collected in 2004 from beneath the building slab at locations considered most likely to contain TCE based upon the former uses of the building, wastewater piping locations, and the prior soil vapor results. TCE was detected in seven of the eight sub-slab vapor samples, with a maximum of 150 micrograms per cubic meter ($\mu g/m^3$) in sample GB-SG-47b-3'-4' (USACE, 2008b). This concentration of TCE in soil gas gives a predicted indoor air concentration of 15 $\mu g/m^3$ using the current (version 3.4) of the USEPA Vapor Intrusion Screening Level (VISL) Calculator (USEPA, 2015b) and supports the decision to sample indoor air. In November 2010, eight sub-slab soil vapor samples were collected from the same locations. TCE was detected in all samples at concentrations ranging from 1.1 to 145 $\mu g/m^3$ (Woods Hole Group, 2011). The range of predicted indoor air concentrations using the current USEPA VISL calculator and the sub slab soil gas concentrations above is from 0.11 $\mu g/m^3$ to 14.5 $\mu g/m^3$ of TCE. These results also support the decision to sample indoor air at the GAT facility.

A Johnson-Ettinger (J&E) vapor intrusion model was run in 2009 as part of the human health risk assessment (included in the RI/FS report (JCO, 2012)) to estimate the partitioning of dissolved TCE in groundwater to soil vapor and to estimate the degree to which soil vapor concentrations migrate into the building. The results of the modeling indicate that the observed TCE in soil vapor is likely due to dissolved groundwater contamination rather than a TCE source in the subslab soils. The modeling also predicted an on-site indoor air TCE concentration of 1.25 $\mu g/m^3$ (0.23 ppbV) for an assumed groundwater TCE concentration of 60 µg/L (the maximum TCE concentration measured on the Site). Using the current version of the USEPA VISL calculator (USEPA, 2015b), the predicted indoor air concentration directly above groundwater with 60 µg/L of TCE is 24.2 $\mu g/m^3$ (i.e., using the default temperature of 25 degrees Celsius) and 14.7 $\mu g/m^3$ (i.e., using a more regionally appropriate temperature of 15 degrees Celsius), These

predicted indoor air concentrations are higher than the J&E modeled indoor air concentration from 2009. The predicted concentrations calculated in 2009 and in 2015 both warrant indoor air sampling.

Actual indoor air samples were collected from the former GAT Facility building in 2006 and 2010. The 2006 indoor air samples had no detections of TCE (USACE, 2008b). TCE was detected in two of four of the indoor air samples collected in 2010 at concentrations of 0.124μg/m^3 and 0.145 μg/m^3; below residential use USEPA Regional Screening Levels (RSLs), DoD Risk Based Concentrations (RBCs), and MEDEP Indoor Air Targets (IATs). No other chlorinated volatile organic compounds (CVOCs), including those detected in soil vapor, were detected at concentrations above commercial RSLs (USEPA, 2010), RBCs (DOD, 2009), or IATs (MEDEP, 2010). These data indicate there is no significant soil vapor intrusion into the building through the slab (Woods Hole Group, 2011). The screening levels used in the RI/FS (JCO, 2012) follow: the November 2010 version of USEPA Region 9 RSL (USEPA, 2010) which was 1.2 μg/m^3 of TCE for residential use; The DoD Vapor Intrusion Handbook by the Tri-Service Environmental Risk Assessment Workgroup dated January 2009 (DOD, 2009) which also gave a residential ELCR based concentration of 1.2 μg/m^3 for TCE and the MEDEP Vapor Intrusion Evaluation Guidance dated January 2010 (MEDEP, 2010) where the commercial IAT value for TCE is 6.13 μg/m^3 and the residential IAT value is 1.2 μg/m^3. All of these screening levels were based on cancer risk, before the non-cancer health effects were considered resulting in updated TCE toxicity values in September of 2011.

The actual indoor air concentrations measured in 2010 were re-evaluated using the USEPA VISL calculator (USEPA, 2015b) in 2015 to determine risk utilizing the most updated TCE toxicity values. The highest indoor air concentration of 0.145 μg/m^3 gives an ELCR of 4.8 x 10^{-8} and an HQ of 0.017. Using current toxicity values and a commercial exposure scenario, the calculated ELCR for TCE in indoor air is below 1.0 x 10^{-6} and a HQ of 1.0 indicating the risk is acceptable under CERCLA and does not warrant action. Indoor air and sub slab soil gas will be sampled every five years as part of the long term monitoring plan to confirm continued protectiveness of receptors from vapor intrusion.

A public safety building for emergency services (fire, ambulance, and law enforcement), constructed in approximately 1990, is located northeast of the town office building. This building will be evaluated (USEPA, 2015a) to determine if it should be brought into the indoor air monitoring program.

Groundwater, Seeps and Springs

TCE contamination is present in bedrock and overburden groundwater beneath the Site and downgradient of the Site. There is no evidence indicating the presence of dense non-aqueous phase liquids (DNAPL) at the Site. However, the longevity of the low level groundwater contamination may be the result of discrete droplets and/or diffused contamination trapped in the till, saprolite or rock matrix and/or fractures. Breakdown products of TCE have only been detected in groundwater at one location: low groundwater concentrations of cis-1,2-dichloroethene (*cis*-1,2-DCE) were detected at sampling location GB-SW-04 on three occasions (0.6 µg/L in May 2007, 0.3 µg/L in December 2009, and 0.1 µg/L in June 2010).

Although ephemeral in nature, overburden groundwater was tested in 2006, 2008, and during on-going monitoring through April 2014, from a total of nine locations. TCE was detected in seven of those locations with concentrations ranging from 0.15 (estimated) to 2.9 µg/L (see Figure 6 for sample locations). These data indicate low level (less than 3 µg/L) CVOC contamination is present in overburden groundwater at the Site.

Although there is no permanent surface water at the Site, groundwater seeps and springs have been tested, by collecting water immediately beneath the ground surface at the seeps and springs, generally on a semi-annual basis since 2007, at four locations near the Site: GB-SW-01, -02 (East Pond), -03, and -04 (West Pond). These four seep/spring sample locations are shown on Figure 7. TCE was detected in these seep/spring samples at concentrations up to 3.6 µg/L in GB-SW-04 and at concentrations up to 1.4 µg/L at GB-SW-01 (previously GB-DW-23), but not detected at GB-SW-02 or GB-SW-03. GB-SW-02 and GB-SW-03 were removed from the sampling program in 2013.

TCE concentrations in on-site bedrock groundwater at some locations currently exceed the MCL, with the highest historical concentration, 60 µg/L (in 2005), occurring within bedrock Unit A in well GB-MW-01(NGS, 2001; RAS, 2006; JCO, 2009; and Woods Hole Group, 2014). However, the on-site water supply well (GB-PW-01) has never had a TCE detection. The lack of contamination in GB-PW-01 is likely due to the sub-linear northeast/southwest orientation of the bedrock fractures and bedding, which have limited contaminant migration from the area of GB-MW-01 towards GB-PW-01. The maximum depth of reported TCE contamination at the Site is 200 feet below ground surface (fbgs) in GB-MW-02. The areal extent of detected TCE concentrations in bedrock groundwater is approximately 500 feet wide, and extending approximately 1,500 feet in both of the northeast and southwest directions from the Site (see Approximate Extents of TCE Contamination in Groundwater shaded blue on Figure 2).

Testing of nearby private and public water supplies for TCE has been on-going since the 1990s. Three public and 55 private water supply wells within one mile of the Former GAT Facility have been tested for VOCs (MEDEP, 2006b; USACE, 2008a and 2009; and Woods Hole Group, 2014). TCE has been detected in seven existing off-site private water supply wells. Two wells (GB-DW-01 and GB-DW-23), which had historical TCE detections, have been replaced with new wells. None of the reported TCE concentrations in off-site water supply wells have exceeded the 5 µg/L MCL except one sample from GB-DW-22 which was reported at a maximum of 5.1 µg/L TCE in 2007 (see Figures 5 and 8 for sample locations). TCE concentrations in subsequent GB-DW-22 samples collected in 2008 through April 2014 have all been below 5 µg/L. This location is currently equipped with a point of use granular activated carbon (GAC) filtration system.

The only public water supply wells to have documented TCE detections are the Homestead Estates wells (GB-PW-02 and GB-PW-03) located west-southwest of the Site (see Figure 8). The reported concentrations (up to a maximum of 3.7 µg/L measured in 1993) have all been below the MCL of 5 µg/L. The maximum reported TCE concentration in these wells since 2010 has been 0.39 µg/L (estimated).

The maximum probable areal extent of the bedrock aquifer containing concentrations of TCE greater than the 5 μg/L MCL is estimated to extend approximately 950 feet along a northeast-southwest axis approximately centered around GB-MW-01. However, due to variation in the fracture network and connectivity, there are many locations that do not exceed the TCE MCL that are less than 950 feet in the northeast/southwest direction. The extent of the exceedance of the TCE MCL perpendicular to the northeast-southwest axis is approximately 400 feet to the southeast of GB-MW-01, but less than 170 feet to the northeast, as the water supply well GB-PW-01, which is 170 feet northwest of GB-MW-01, has never had a detection of TCE.

Since May 2007, samples from all water supply wells have contained less than the MCL of 5 μg/L TCE. However, as a result of the likely discrete droplets and/or diffused contamination trapped in the till, saprolite, or rock matrix or fractures, concentrations in on-site monitoring wells GB-MW-01 and GB-MW-02 are likely to remain above the 5 μg/L MCL for decades to come.

2.5 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The current land use for the FUDS property is municipal services (see Figure 3). The Glenburn Municipal Building, Public Safety Building, and salt storage building are located on the property. The municipal offices are located in the former GAT facility building. The Town also maintains some recreation facilities on the property.

The land use in the vicinity of the Site has changed over the past four decades from predominantly agricultural to rural residential. The decline in agriculture has resulted in an increase in wooded land. Currently, open land is present between developed properties. Due to Glenburn's proximity to Bangor, Orono, and Old Town, this trend of suburbanization will likely continue into the future (Glenburn, 2000).

The Site is currently zoned Rural Residential with a minimum lot size of 1.75 acres (Glenburn, 2004b), but the Town subdivision regulations provide for cluster development with

smaller lot sizes (Glenburn, 2004a). The Homestead Estates Mobile Home Park to the south is an area of high density residential development (see Figures 2 and 5). Future expansion of this development will have to be in conformance with the Town's Mobile Home Park Ordinance (Glenburn, 1994). The Town does not provide municipal water or sewer services, but a public water supply well for on-site use is present on the property, and public and private wells are present in the study area as shown on Figure 5.

The Site does not contain significant natural or historic resources. Pushaw Lake is downgradient and approximately 0.8 mile east of the Site and Hollis Bog is downgradient and approximately 0.7 mile southwest of the Site (see Figure 5). The municipal complex now located on the Site provides space in the municipal building for community functions and recreational opportunities in the form of horseshoe pits and the skate park/basketball court. There are no historic resources listed on the National Register of Historic Places in Glenburn (Glenburn, 2000). The Lakeview Cemetery is located immediately northeast of the Site (see Figure 1).

2.6 SUMMARY OF POTENTIAL SITE RISKS

A Human Health Risk Assessment (HHRA) and Screening Level Ecological Risk Assessment (SLERA) were conducted for the Site in accordance with USEPA and MEDEP guidance. The risk assessment estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the Decision Document summarizes the results of the HHRA and SLERA. The risk assessment was completed in 2011 using data collected through 2010. Annual or semi-annual groundwater sampling (monitoring wells, residential wells, and seeps) has continued since that time, and the results from that monitoring indicate that the HHRA and SLERA conclusions are still accurate and applicable to the Site.

2.6.1 Human Health Risk Assessment

Chemical and Media Concern

Maximum detected chemical concentrations in each medium (soil, surface water (seeps/springs), groundwater, and indoor air) were compared against appropriate risk-based screening levels to determine the Chemicals of Potential Concern (COPCs). The HHRA evaluated all COPCs to determine the Chemicals of Concern (COCs) for which remedial management should be evaluated. A summary of the results of this process follows.

All of the maximum detected concentrations of constituents in soil were found to be lower than residential soil USEPA RSLs; therefore soil was not selected as a medium of concern.

Seep/spring water samples (collected from the shallow subsurface at sample locations GB-SW-01 through -04) were used to conservatively estimate possible concentrations in off-site ephemeral streams and surface water bodies. The maximum detected concentration in the seep/spring samples was less than USEPA RSLs for residential tap water (i.e., drinking water), so surface water was also not selected as a medium of concern.

Groundwater was selected as a medium of concern due to CVOC concentrations; however, TCE was identified as the only chemical of concern (COC) in groundwater since only TCE had bedrock groundwater concentrations in excess of the EPA RSLs for drinking water for the residential exposure scenario. Potential TCE dechlorination by-products, cis-1,2-DCE, and vinyl chloride, have not been detected at concentrations indicating an unacceptable risk to human health, and so were not identified as COCs in the RI/FS. However, they are included as analytes in the Long Term Monitoring Program. Attainment of MCLs for these by-products of TCE is included in the remedial action objectives for the site. The MCL for TCE was exceeded in samples from one or more intervals at four monitoring well locations on the Site. The only TCE detection above the MCL of 5 µg/L in private water supply wells was in one sample collected in 2007 from GB-DW-22 which contained 5.1 µg/L TCE. TCE concentrations in GB-DW-22 intermittently increased between 1995 and 2007, reaching its maximum of 5.1 µg/L in May 2007 (the only MCL exceedance). All samples collected from GB-DW-22 since October 2007, including samples collected through April 2014, have had TCE concentrations below the 5 µg/L

MCL (see Figure 8). This water supply well (GB-DW-22) is equipped with a point of use granular activated carbon (GAC) filtration device.

Indoor air was selected as a medium of concern due to groundwater concentrations of CVOC which could: 1) partition into soil vapor and migrate into buildings (vapor intrusion); and/or 2) volatilize into indoor air during showering. However, as with groundwater, TCE was considered the only COC for indoor air. Estimates of indoor air concentrations of TCE for the vapor intrusion pathway were calculated using the USEPA version of the Johnson and Ettinger model. Potential TCE concentrations in indoor air as a result of volatilization during showering were also estimated using a model developed by Foster and Chrostowski (1987).

Exposure Assessment

Based on the conceptual site model (CSM) described in Section 2.4.1, TCE in groundwater at the Site has migrated from the property toward private water supply wells to the northeast and southwest. The exposure assessment considered the potential future residential exposure pathways through soil vapor intrusion and residential use of groundwater. Exposure pathways included exposure to contaminants in groundwater by ingestion, dermal contact, and inhalation during showering. The inhalation exposure pathway also considered the contribution to indoor air concentrations from soil vapor intrusion resulting from contaminated groundwater.

Although exposure point concentrations (EPCs) used in a HHRA are typically an estimate of the average concentrations (i.e., to represent average exposures across the Site and over time), the HHRA for the Site conservatively used the maximum detected concentrations.

Potable water for the buildings on the FUDS property is provided by groundwater from the on-site water supply well GB-PW-01. This well has not had any detections of TCE since it was first tested in 1995; however, the maximum TCE concentrations reported in any on-site monitoring well and off-site water supply well were used as conservative values for evaluating exposure for a hypothetical future on-site residence, and for off-site residences, respectively.

These maximum TCE concentrations used in the HHRA were 5.1 µg/L for off-site residences, and 60 µg/L for a hypothetical future resident on the Site.

Toxicity Assessment

The toxicity assessment considered the toxicity of TCE, the probable exposure dose, and the health effects that could result from exposure to TCE. The HHRA conducted in 2011 evaluated both carcinogenic and non-carcinogenic effects of exposure, however, as there was no non-cancer oral toxicological reference dose available in 2011, non-cancer effects from ingestion of TCE were not considered in the risk assessment. Carcinogenic health effects were assumed to be cumulative over a lifetime of exposure, without a lower limit or threshold of effect. Non-carcinogenic health effects were assumed to be effective over the duration of exposure, with a lower limit or threshold below which the adverse effect is not expressed.

Carcinogenic health effects were assessed by evaluating the ELCR over a person's lifetime cancer risk that results from exposure to Site-related TCE in environmental media. Carcinogenic risk is a function of the dose and the cancer slope factor dose-response relationships for a particular compound (e.g., TCE). For the 2011 risk assessment, the California EPA 2008 carcinogenic dose-response values for the oral and inhalation routes (JCO, 2012, Appendix 5. Integrated Risk Information System (IRIS) Trichloroethylene) were used in accordance with a hierarchy of sources recommended by USEPA to quantify potential cancer risks from exposure to TCE. The potential total ELCR for each receptor was calculated assuming that cancer risks from each of the exposure pathways are additive (cumulative).

The USEPA has developed Reference Doses (RfDs) and Reference Concentrations (RfCs) for chronic and subchronic exposures to non-carcinogens. The RfD is intended to provide a reasonable estimate of the threshold at which human health effects are not expected to occur over time, up to a lifetime of exposure. Hazard quotients (HQs) are calculated for each COC in each exposure scenario of the risk assessment. HQs are simply ratios of the estimated average daily dose the receptor is exposed to, divided by either the RfD or RfC. Therefore, unlike cancer

risk estimates, HQs can only show whether the non-carcinogenic adverse health effect associated with the site-specific exposure to the COC is likely to or not likely to occur. Non-cancer dose-response values were selected from USEPA's Integrated Risk Information System (IRIS) and California EPA sources (JCO, 2012) in accordance with a hierarchy of sources recommended by USEPA (USEPA, 2003). A Hazard Index (HI) is the total of the HQs used to evaluate non-carcinogenic risks associated with potential exposure to COCs at the Site.

Risk Characterization

Risk characterization is the process by which the dose-response information is combined with quantitative estimates of human exposure. The result is a quantitative estimate of the likelihood that humans will experience any adverse health effects given the exposure assumptions made. Using the exposure assumptions and toxicity values available in June of 2011, all of the HIs were less than 1.0, which is considered by USEPA and MEDEP to present acceptable risk for non-carcinogenic effects.

The Risk Assessment findings described in the 2011 HHRA supporting the 2012 RI/FS (JCO, 2012) were current at the time of publication. The 2012 HHRA TCE ground water risk results were based on the maximum concentration of TCE in any well over time in each of the areas representing the off-site resident (i.e., 5.1 μg/L TCE) and hypothetical future on-site resident (i.e., 60 μg/L TCE). The use of these maximum concentrations provides very conservative risk estimates. Since that time, the USEPA updated the IRIS TCE cancer and non-cancer toxicity values.

Carcinogenic risks are probabilities that usually are expressed in scientific notation (e.g., $1x10^{-6}$). An ELCR of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure estimate over a lifetime has a one in 1,000,000 (one million) chance of developing cancer as a result of Site-related contaminant exposure. This is referred to as an "excess" lifetime cancer risk because it would be in addition to risks of cancer from other non-Site related causes such as smoking or exposure to too much sun. For Site-related exposures, the USEPA's target ELCR range is 10^{-4} to 10^{-6} (one in ten thousand to one in one million). The calculated ELCRs

were also compared to 10^{-5}, which has been set by MEDEP as the upper bound for an acceptable cancer risk level.

For the off-site resident (potentially exposed to 5.1 µg/L TCE in a potable water supply and to indoor air concentrations resulting from showering and vapor intrusion from groundwater), the calculated ELCR was $6.11x10^{-7}$; less than USEPA's target ELCR range of $1x10^{-4}$ to $1x10^{-6}$ and below MEDEP's upper bound cancer risk of 1x10-5. Although the non-cancer risk estimates in 2011 did not include an ingestion pathway, the HI inhalation risk was 0.000173, which is less than the USEPA and MEDEP target level of 1.0. The risk assessment is detailed in the site RI/FS (JCO, 2012).

Using updated TCE toxicity information (USEPA, 2015c) and exposure factors as provided in the 2015 EPA RSL calculator (USEPA, 2015d), with incorporation of the ingestion, dermal and inhalation exposure pathways, the potential increased cancer risk to the off-site resident was $1.04x10^{-5}$ (Appendix E, Table E-1). This is within USEPA's target ELCR range of $1x10^{-4}$ to 1x10-6 and approximately the same as MEDEP's upper bound cancer risk of $1x10^{-5}$. The non-cancer HI from off-site exposure to the child resident was 1.81 which is above the USEPA and MEDEP target level of 1.0.

The risks to a hypothetical future on-site resident were also evaluated, using the maximum historical TCE concentration in any on-site monitoring well (60 µg/L), and assuming that the contaminated water was used for drinking, showering, etc., for a life time. In the 2011 HHRA, the calculated ELCR for the on-site resident was $7.2x10^{-6}$ based upon the site-specific HHRA (JCO, 2012); within the USEPA's target ELCR range, and less than MEDEP's upper bound cancer risk level. Using the exposure assumptions and toxicity values available in 2011, the potential hazard index (HI) associated with dermal and inhalation exposure to the maximum concentration in groundwater was below the MEDEP and USEPA target HI level of 1.0 (HI is 0.00203 (JCO, 2012)).This is a hypothetical exposure scenario since the existing on-site water supply well has never contained any detectable TCE, and there are no residential buildings on the

property.

Using the updated TCE toxicity information (USEPA, 2015c) and exposure factors as provided in the 2015 EPA RSL calculator (USEPA, 2015d), with incorporation of the ingestion, dermal and inhalation exposure pathways, the potential increased cancer risk to the hypothetical future on-site resident is $1.22x10^{-4}$ (Appendix E, Table E-2),. This is close to USEPA's maximum target ELCR of $1x10^{-4}$ and an order of magnitude above MEDEP's upper bound cancer risk of $1x10^{-5}$. The non-cancer HI from on-site exposure to the child resident was 21, which is above the USEPA and MEDEP target level of 1.0. The potential risks for the hypothetical future residential exposure scenario will be addressed with land use controls as recommended by USACE and MEDEP.

It was assumed that the other on-site receptors, a site worker and a hypothetical day care child, could be exposed to vapors in indoor air arising from groundwater. For both the on-site worker and day care child, the ELCR (based on modelled indoor air concentrations using 60 µg/L TCE in groundwater) was less than USEPA's target threshold range, and below MEDEP's upper bound ELCR of 1x10-5. This statement remains true using the 2011 toxicity values. Actual indoor air sampling conducted at the former GAT facility in 2006 and 2010 did not report TCE in the indoor air except in 2 of 4 samples during the 2010 sampling which reported concentrations below residential safe levels as determined by USEPA RSLs (USEPA, 2010), DoD RBCs (DOD, 2009), and MEDEP IATs (MEDEP, 2010), and approximately an order of magnitude below the Site-specific risk based value of 12.2 µg/m3 (the maximum reported indoor air TCE concentration was less than 0.2 µg/m3). The actual indoor air concentrations measured in 2010 were re-evaluated using the USEPA VISL calculator (USEPA, 2015b) in 2015 to determine risk utilizing the most updated TCE toxicity values. The site's highest indoor air concentration of 0.145 µg/m3 gives a ELCR of 4.8 x 10-8 and an HQ of 0.017 (Appendix E, Table E-3). Using current toxicity values and a commercial exposure scenario, the calculated ELCR for TCE in indoor air is below 1.0×10^{-6} and a HQ of 1.0 (see Section 2.4.5).

Nevertheless, the RAOs based on MCLs for TCE (and its degradation by-products)

remain protective of human health in accordance with the NCP. MCLs are the primary drinking water standards which are legally enforceable standards applicable to public water systems.

Uncertainty is inherent in all risk estimates due to the combined uncertainties introduced by field sampling, laboratory measurements, toxicity studies (typically conducted with animals), derivation of toxicity values for humans, and assumptions made in the exposure assessment. However, the HHRA used conservative assumptions to over-predict exposures at the Site, therefore predicting risks that are likely higher than the actual risks at the Site.

2.6.2 Ecological Assessment

No environmentally sensitive areas or state or federally listed rare, threatened, or endangered species occur on the Site. No wetlands or surface water are present on the Site; however, small wetland areas are present in the vicinity of the Site that are not shown on the National Wetland Inventory maps. The SLERA performed for the Site indicates that adverse effects to ecological receptors at or near the Site are unlikely.

2.6.3 Basis for Action

The results of the risk assessments performed for the Site indicate that a response action is necessary to ensure that public health is protected in the future from potential risks posed by ingestion or inhalation of TCE that is present in the groundwater at the Site above the MCL, in the event an unacceptably contaminated well were used as a potable residential water source in the future.

2.7 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) consist of media-specific or operable unit-specific goals aimed at mitigating, restoring, and/or preventing existing and future potential threats to human health and the environment and complying with ARARs. RAOs for the Site were established in the FS, based upon the results of the HHRA and SLERA, and the ARARs for the Site. Results of the RI, HHRA, and SLERA, indicate there are no adverse impacts from TCE

contamination to surface water bodies, sediments, or wetland areas, or to human or ecological receptors in these areas. Accordingly, no RAOs were established for these media or receptors.

Results of the HHRA and SLERA also indicate no risk to human or ecological receptors from exposure to on-site soils. Therefore, no RAOs were developed for soil.

The results of indoor air sampling and the HHRA indicate no unacceptable risk to human health from exposure to TCE in indoor air. Therefore, no RAOs were established for this media or exposure pathway. Although there is currently no unacceptable risk due to TCE vapor intrusion, ongoing monitoring of indoor air quality is included in the Selected Remedy.

The RI indicates that TCE contamination is present in groundwater beneath the Site (on-site) and downgradient (off-site). Concentrations of TCE in off-site groundwater are currently below the MCL of 5 μg/L for TCE; however, TCE concentrations in some on-site groundwater currently exceed the MCL. Although the HHRA concluded that residential exposure to groundwater does not result in unacceptable risks that exceed USEPA's target ELCR range; because groundwater beneath the Site contains TCE greater than its MCL, and groundwater is a potential drinking water source, a RAO was established that prevents potential future use of untreated groundwater that exceeds the MCL. Accordingly, the following RAOs were determined to be appropriate for the protection of human health related to potential future use of TCE-contaminated groundwater:

Prevent ingestion of groundwater containing TCE concentrations (or degradation by-products) exceeding the Federal maximum contaminant level (MCL).

Attain the TCE MCL for all groundwater within the site.

2.8 DESCRIPTION OF ALTERNATIVES

Remedial alternatives are developed by assembling combinations of applicable technologies and other unit processes into a sequence of actions which address the specific media to which they would be applied and the RAOs that are developed for a Site. Accordingly,

remedial technology types and process options were identified and screened during the FS as the first step in the development of alternatives for the Site. The results of this option screening process are summarized below.

Containment

Two containment options, capping and vertical barriers, were evaluated, but both were screened out. While caps and vertical barriers above the bedrock are technically feasible, they would only be effective at isolating shallow source areas or contaminated soil in the overburden from human or ecological receptors. Since there are no identified source areas at the Site, and soil does not pose unacceptable risks, these containment options are not applicable.

Excavation

Excavation of discrete, isolated areas of TCE soil contamination on the Site was also considered to be technically implementable; however, the limited number of TCE detections in soil at relatively low concentrations (TCE only detected in two locations at estimated concentrations of 16 µg/kg and 1.1 µg/kg) does not pose an unacceptable risk to human health, and physical removal of soil would not significantly affect groundwater quality. Therefore, excavation was screened out as a process option.

Groundwater Extraction

Three groundwater extraction process options were evaluated: interception trenches/drains; hydraulic/pneumatic fracturing; and bedrock aquifer pumping and treatment. Interception trenches/drains to collect groundwater was screened out because of the lack of groundwater in the overburden soils and the infeasibility of this option in bedrock. Hydraulic/pneumatic fracturing was screened out because of the risk of causing contamination of existing clean water supply wells due to the highly fractured and interconnected bedrock. Pumping of bedrock groundwater (with *ex-situ* treatment) is technically feasible for localized source control but not for the entire groundwater plume. Hydraulic control of the entire 35 acre dissolved groundwater plume is not considered feasible as it would require multiple extraction

wells and a total pumping rate of 100-200 gpm, which would likely adversely affect the yield and water levels in existing private and public water supply wells in the area.

The groundwater extraction process option retained for the development of remedial alternatives is limited to localized pumping from an extraction well on the Site (for source control) and *ex-situ* treatment of the extracted groundwater (see below for discussion of treatment options).

Groundwater Treatment

Five *ex-situ* treatment process options were identified to be potentially applicable: air stripping; biological treatment; zero-valent iron; granular activated carbon; and oxidation. Most of these options are proven and effective technologies for treating TCE-contaminated groundwater (zero-valent iron is not, as described below). Two of the options, air stripping and biological treatment, typically have lower costs relative to other options. However, *ex-situ* biological treatment processes are sensitive to temperature (heating of the groundwater would likely be required), and require careful maintenance of anaerobic conditions. In addition, it would be difficult to maintain the necessary biomass in the process tank given the relatively dilute contaminant TCE concentration (which would likely become more dilute with groundwater pumping). Air stripping would also be inefficient due to dilute concentrations, and would potentially have operational challenges resulting from winter freezing conditions, iron fouling, and off-gas treatment. *Ex-situ* treatment using zero-valent iron is a somewhat less proven technology although it has been used for treating TCE-contaminated water *in-situ* (permeable reactive walls). It has the limitations of long contact time requirements, possible short circuiting of the bed, and incomplete reduction (resulting in more toxic compounds in the effluent (e.g., vinyl chloride). Granular activated carbon (GAC) adsorption systems are commercially available as "packaged" units in treatment capacities readily suited for potential application at the Site. Ultraviolet/chemical oxidation units are also commercially available and have the added advantage over GAC of destroying TCE (carbon adsorption extracts and concentrates the TCE which then must be removed from the carbon and disposed). However, ultraviolet/chemical oxidation would not be considered cost effective for the expected dilute

concentrations of contaminants when compared to GAC due to high power and chemical costs, and operational complexities. Therefore, only one *ex-situ* treatment process option was retained for the development of remedial alternatives: granular activated carbon. Granular activated carbon was also retained for point of use treatment systems for potable water supplies.

Treated Groundwater Disposal

Three discharge process options were identified for disposal of treated groundwater: discharge to a Publicly Owned Treatment Works (POTW); discharge to surface water; and re-injection. Neither a public sewer nor a surface water channel/body are accessible to the Site; therefore, the only discharge option retained was aquifer re-injection.

In-situ Groundwater Treatment

A number of potential *in-situ* treatment process options were identified; however, because of the complex geophysical and hydrogeological subsurface conditions at this Site, all of them were screened out on the basis of technical implementability. Due to the proximity and vulnerability of public water supply wells GB-PW-02 and GB-PW-03, injection of any treatment chemicals into the bedrock aquifer for the purposes of *in-situ* treatment is not recommended. Such treatment chemicals include oxidizers, nutrients, toluene, methane, metals and any other product that could potentially impact nearby water supplies directly (the injected chemical) or indirectly (chemically altered groundwater or chemical by-products).

Land Use Controls

Land use controls (also known as institutional controls) are administrative and/or legal instruments that help minimize the potential for human exposure to contamination by ensuring appropriate and/or restricting land or resource uses. Both CERCLA and the NCP support the use of land use controls as part of a remedial alternative if they are necessary to ensure the protection of human health (CERCLA 121(d); NCP 300.430(a); USEPA, 2009). Land use controls can be layered (i.e., using different types of controls at the same time to enhance protectiveness of the remedy), or implemented in series to ensure both the short-term and long-term effectiveness of the remedy.

The following land use (or institutional) controls were considered: groundwater reclassification, groundwater use restrictions, and zoning modifications. Groundwater reclassification was screened out since the groundwater is currently being used as a public and private water supply. Although both are potentially applicable, groundwater use restrictions was retained and zoning modifications was screened out because it is anticipated that the former could be implemented more easily than the latter (based upon informal discussions with the Town of Glenburn representatives and Town Manager).

Modification or Replacement of Water Supply Wells

Modification of wells (deepening) to improve water quality was screened out due to the presence of TCE as deep as 200 fbgs; therefore, deepening the well casing may not yield an improvement in water quality. Replacement of contaminated wells with new wells in an attempt to produce uncontaminated groundwater was also screened out. Given the location and size of the contaminant plume, drilling alternative wells on the same property is unlikely to be effective in most cases. Even if a portion of a property is believed to be outside of the plume, the plume definition is only approximated based on the available data. Also, it is possible that pumping on a new clean well near the plume could draw contaminated groundwater towards the new well.

Monitored Natural Attenuation

Monitored Natural Attenuation (MNA) is the reliance on natural attenuation processes (within the context of a carefully controlled and monitored clean-up approach) to achieve site-specific remedial objectives within a time frame that is reasonable compared to other alternatives. The 'natural attenuation processes' include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These attenuation processes can include microbial degradation, abiotic chemical and physical transformations, dispersion, and dilution. Although data do not indicate significant microbial degradation or abiotic transformations are occurring at the Site at a significant level, dispersion and dilution are expected to ultimately restore groundwater quality and achieve the RAO within a similar timeframe (decades) as compared to other remedial technologies. Therefore, MNA was

retained as a process option.

2.9 DESCRIPTION & COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives developed in the FS for the Site are presented this Section. The first alternative is the No Action alternative which is required by the NCP and used as a baseline for comparison to other alternatives. The remaining alternatives, Alternatives 2 and 3, provide increasingly aggressive options for remediation from limited to active response actions. The three remedial alternatives developed and evaluated in the FS are:

1. No Action. The No Action alternative is required under CERCLA as a baseline with which to compare other remedial alternatives. In a No Action alternative there are no institutional, administrative, monitoring, or remedial actions implemented at a site.

2. Monitored Natural Attenuation (by Dispersion). This alternative would rely on natural dispersion and dilution processes to achieve the RAO over time, and would also include: Long Term Monitoring of groundwater; Point of Use Water Treatment (for impacted water supply wells); Monitoring of Indoor Air, and Land Use Controls.

3. Groundwater Extraction and Treatment. This alternative would consist of installation of a groundwater extraction and treatment system to hydraulically control downgradient contaminant migration. As with Alternative 2, this alternative would also include: Long Term Monitoring of groundwater; Point of Use Water Treatment (for impacted water supply wells); Monitoring of Indoor Air, and Land Use Controls.

2.9.1 Remedial Alternative Descriptions

Detailed descriptions of the components of Alternatives 2 and 3 are provided below.

ALTERNATIVE 2: MONITORED NATURAL ATTENUATION BY DISPERSION

Monitored Natural Attenuation by dispersion will be assessed based on data obtained from the long term monitoring of groundwater, as described in the "Long Term Monitoring" section, below.

Long-Term Monitoring

Long term monitoring for Alternative 2 (and Alternative 3) includes groundwater and vapor intrusion sampling and analysis for VOCs. The specifics of the long term monitoring

(LTM) program will be described in a Long Term Monitoring Plan (LTMP).

The LTM program is anticipated to include sampling from bedrock monitoring wells, and water supply wells locations. The groundwater monitoring network will include a new nested pair of bedrock monitoring wells to be installed at a location southeast of the Site (GB-MW-07S and -07D) in accordance with methods developed by USACE with input from MEDEP. An expanded network of residential well locations (in addition to the network of wells sampled more frequently) will be sampled every five years to ensure that the conceptual site model and understanding of the extent of contamination remains accurate. Any new water supply well installed on Lot 45 or 46 in the future may also be added to the LTM Program. The water supply wells included in the monitoring program are those that have historically contained TCE in addition to wells located outside of, but proximate to, the known extent of TCE. Most of the properties within the known area of groundwater contamination already have a water supply that is currently being sampled on an on-going basis. Until RAOs are achieved, USACE will offer to test any new water supply well drilled within the limits of contamination and within the Land Use Control Zones 1, 2 and 3 shown on Figure 2.

To evaluate biodegradation as a component of natural attenuation, monitored natural attenuation (MNA) parameters in groundwater will initially be tested at locations which have detectable concentration of TCE (this may include nitrate, ferrous iron, sulfate, sulfide, total organic carbon, alkalinity, methane, ethane, and ethane). Testing of MNA parameters may become a regular component of the LTM sampling program if MNA parameter data suggest that biodegradation is occurring. However, natural attenuation at this site is expected to be occurring primary through the mechanism of dispersion rather than biodegradation.

Long Term Monitoring Plan (LTMP): The LTMP will be developed by USACE with input from the Town, MEDEP, and other stakeholders. The LTMP includes criteria for reducing or expanding the LTM program as appropriate. Details regarding the statistical methods used to determine increasing or decreasing TCE concentrations are summarized below and in the Long

Term Monitoring Plan. The following criteria are guidelines which will be used to add or delete monitoring locations, and point of use treatment, from the LTMP. These criteria may be adjusted when the LTMP is finalized or updated. In general, during the time period where the FUDS property (or any property impacted by migration of the contamination from the FUDS property) contains TCE levels greater than the MCL (expected to be decades), the LTMP will include a boundary of domestic wells (locations which have no detectable TCE, or concentration lower than the reporting limit (currently 0.5 ug/L) to ensure that the extent of contamination is not expanding. Domestic wells will be added or removed based on data obtained from the monitoring program. The following paragraphs describe the criteria which will be used to make adjustments to the LTMP.

- Adding Domestic Wells to the LTMP: Downgradient domestic wells will be added to the LTMP in response to increasing upgradient concentrations. If any monitoring wells or domestic wells have TCE concentrations equal to or greater than the MCL (or are increasing at a rate such that they are projected to exceed the MCL by the next sampling event), a downgradient boundary of domestic wells will be included in the LTMP. The boundary wells will have no detectable TCE or concentrations lower than the reporting limit (currently 0.5 ug/L). This will be used as a general guideline for determining if a domestic well should be considered for addition to the LTMP. Other factors such as past TCE concentrations, TCE concentration trends, and proximity of the well to other TCE containing wells will also be considered in making a final determination to add a well to the LTMP.

- Newly drilled domestic wells within Zone 1, 2, or 3 will be tested (and treated (if necessary)). New wells (within Zone 1, 2, or 3) will be sampled quarterly for two years. If TCE is detected above the MCL at any time during the two year period, a point of use treatment system will be installed. At the end of the two year sampling program (eight sampling events) the USACE will calculate the 95% upper confidence limit (UCL) of the mean for all eight events. If the 95% UCL of the mean is above the MCL, a point of use treatment system will be installed. If the 95% UCL of the mean is below MCL the well will be added to the long term sampling program and sampled based on the schedule outlined in other sections of this Decision Document and/or the LTMP. If after eight rounds of samples, TCE was not detected above the reporting limit, sampling at the location may be discontinued, or it may be retained in the LTMP to serve as a boundary location or to fulfill some other data need, as described below or in the LTMP. Other factors such as past TCE concentrations, TCE concentration trends, and proximity

of the well to other TCE containing wells will also be considered in making a final determination to add a well to the LTMP.

- Removing Domestic Wells from the LTMP: Domestic wells will be removed from the LTMP in response to decreasing upgradient concentrations. If any monitoring or domestic wells have TCE concentrations equal to or greater than the MCL, a boundary of additional water supply wells will be included in the LTMP, as stated above. Conversely, if the extent of contamination decreases, such that an upgradient location can serve to delineate the extent of TCE contamination, this will be used as a general guideline for determining if a downgradient domestic well should be considered for removal from the LTMP. Other factors such as past TCE concentrations, TCE concentration trends, and proximity of the well to other TCE containing wells will also be considered in making a final determination to remove a well from the LTMP.

- Removing Monitoring Wells from the LTMP: Monitoring wells will be removed from the LTMP if the well is deemed to serve no further purpose with respect to determining the extent of contamination or contaminant migration pathway. It is noted that monitoring wells are present on the Former GAT Facility property only, and domestic wells are used to assess the extent of Off-site contamination.

- Providing Point of Use Treatment Systems to Domestic Wells: Treatment systems may be required on domestic or public supply wells that have TCE concentrations that are either above the MCL or projected to be above the MCL based on historical data. If TCE concentrations either reach the MCL or increase at a rate such that they are projected to exceed the MCL by the next sampling event, then a point of use treatment system will be installed by USACE. Other factors such as past TCE concentrations, TCE concentration trends, and proximity of the well to other TCE containing wells will also be considered in making a determination to add a point of use treatment system. If there is not enough data for a trend determination, the other factors (e.g., past TCE concentrations, proximity of the well to other TCE containing wells) will be used to determine whether to add a point of use treatment system. Treatment system performance monitoring will then be implemented (influent and treated water sampling) on the new treatment system.

- Discontinuance of Domestic Well Point of Use Treatment Systems: When at least 8 measurements of TCE concentrations in a domestic water supply well demonstrate a downward trend (e.g. Mann-Kendall statistical method) of the 95% upper confidence limit of the mean that is less than the TCE MCL for at least 3 years (beginning at the date of the signed Decision Document for currently existing point of use treatment systems (i.e., GB-DW-22)), then the point of use treatment system will be recommended for removal at the earliest convenience.

Other factors such as past TCE concentrations, TCE concentration trends, and proximity of the well to other TCE containing wells will also be considered in making a final determination to discontinue point of use treatment.

- Expansion of Monitoring Network: The USACE does not anticipate installing any additional monitoring wells in the future (except for the additional bedrock monitoring well pair to be located south-southeast of existing well GB-MW-02) on the Former GAT Facility property, but will evaluate a larger set of existing available domestic wells in the area for potential inclusion into the program on a five year recurring basis. Every five years, most likely coinciding with the sampling survey immediately prior to the Five Year Review, the sampling of domestic wells will be expanded to include additional locations to ensure that the conceptual site model of the extent of contamination remains accurate.

Future revisions to the LTM Program will be coordinated with input from the Town, MEDEP, and other stakeholders. Monitoring and point of use treatment systems will continue until sufficient data are collected to confidently demonstrate that the RAO has been achieved. The specifics regarding the attainment of the Remedial Goal (RG) (TCE less than its MCL) is provided below:

- If the 95% Upper Confidence Level of the mean TCE concentration in each monitoring well in the LTM Program are lower than the TCE MCL and demonstrate a downward trend for at least 3 years, and all well concentrations are below the MCL, then this will be considered evidence that the RG has been achieved, and the LTM Program will be discontinued. This will meet the unrestricted use and unrestricted exposure (UU/UE) condition for the Site. At this point, monitoring and point of use treatments systems will be discontinued.

Monitoring of Indoor Air

Monitoring of indoor air of the Glenburn municipal building is also included in the Selected Remedy as part of Alternative 2 (and Alternative 3). The vapor intrusion investigation will include collection of indoor air and/or sub-slab soil vapor samples at the municipal building. Indoor air monitoring will be performed every five years, or when conditions change (e.g., an increase in groundwater contamination at the Site (Lot 46) is documented, or there is a change in the building conditions). The public safety building on Lot 46 will also be evaluated (USEPA, 2015a) to determine if it should be brought into the indoor air monitoring program.

If a new municipal building is constructed on Lot 46, the Town of Glenburn is requested to notify USACE so that mathematical modeling can be conducted using current site conditions to determine if indoor air testing should be conducted (by USACE) immediately or can wait until the next five year review sampling period. The building should be constructed in accordance with the State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building codes), resulting from residual DoD contamination in soil or groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD site contaminants pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

Testing of Soil Under Existing Municipal Building

Soil investigation under the Municipal Building will be undertaken by USACE if the building is demolished. The purpose of the additional study is to ensure that there is no residual soil contamination under the structure that might pose a risk.

Land Use Controls

A layered land use (or institutional) controls approach is included in Alternative 2 (and Alternative 3). CERCLA guidance encourages the use of layered institutional controls as a means of providing overlapping assurances of protection (USEPA, 2000).

Land use controls were developed for three areas or zones of concern based upon preferential northeast-southwest migration pathways in the bedrock structure, historical and recent groundwater quality monitoring results, and property boundaries. The estimated extent of contamination and property boundaries are shown on Figure 2.

Land Use Control - Zone 1: Land Use Control Zone 1 is the groundwater beneath Lots 45 and 46 which are owned by the Town of Glenburn (see Figure 2). Zone 1 encompasses the area where TCE concentrations currently may exceed the 5 µg/L RG/MCL. Zone 1 also includes areas where residual TCE may be present in soils, specifically below the former GAT building

and near the salt shed on Lot 46. The proposed land use controls for Zone 1 include the following:

Annual notice letter(s) will be sent to the Zone 1 property owner(s) by USACE. The following items will be included in the annual notice letters sent by USACE for the Zone 1 property (Lots 45 and 46).

- Provides notification to property owner that TCE is present in groundwater below the Site, and an offer by USACE to test their water supply if a new well is drilled. A point of use treatment system will be installed and maintained on a drinking water well if MCLs are exceeded, or if concentrations are trending toward an MCL exceedance. The annual notices (with copies to MEDEP) will be sent by USACE to the owner-of-record (checked by USACE at the Town offices annually).

- States recommendation for notification to MEDEP and coordination with MEDEP prior to drilling a well on Lot 45 or 46.

- Provides recommendation for notification to MEDEP and USACE of any planned excavations under the footprint of the existing municipal building, and use of appropriate measures acceptable to MEDEP to protect the health of the construction workers prior to and during the excavation.

A deed restriction, known as a "declaration of environmental covenant", may be placed on properties by the Town of Glenburn, which are documented to contain TCE in groundwater at concentrations greater than the MCL, and where residual TCE may be present in soils. The only property meeting these criteria are Lots 45 and 46, which are owned by the Town of Glenburn (see Figure 2). The environmental covenant (EC) should include the items shown above (to be included in the annual notice letters).

To implement a declaration of environmental covenant on public property (such as Lot 45 and 46 (shown as Zone 1 on Figure 2)), a town vote is required, and if approved by voters, the EC is filed at the registry of deeds. If the EC is not approved in the first town vote, the annual notice for Zone 1 will include the recommendation for a second town vote to implement the EC

on the Zone 1 property. It is noted that, if ultimately the EC is not placed on the property, under State of Maine law, a third party may place a deed notification affidavit for the Zone 1 property (however, USACE does not have the authority to place a deed notification affidavit).

Land Use Control Zones 2 and 3: The second land use control zone, Zone 2 is the groundwater in areas outside of Lots 45 and 46 where data indicate the presence of TCE. Zone 2 is shown by the blue area on Figure 2. Existing data indicate that TCE in groundwater in Zone 2 has been consistently below the 5 μg/L RG/MCL over the past seven years. Since it is not possible to know the precise location of the edge of the TCE contamination due to the spatial variation in the data (i.e., the locations of the wells), Zone 2 includes entire properties, whether they are impacted in part or in total. Properties included in Zone 2 are: Lots 3.04 through 3.07, Lot 3.13, Lots 48A through 48H, Lots 48M through 48U , Lot 33, Lot 34, Lot 35, Lot 42, Lot 43, Lot 44, Lot 47, and Lot 48. Note that Zone 2 properties may be adjusted over time dependent on the results obtained from the long term groundwater monitoring.

The third land use control zone, Zone 3, includes properties which are abutting or adjacent to properties included in Zone 2. Zone 3 is delineated by green lines on Figure 2. Zone 3 is included due to the indeterminate nature of the precise edge of the contamination, and the possibility that new wells installed in Zone 3 could potentially draw the contamination towards them during use. Properties included in Zone 3 are: Lot 3, Lot 3.01, Lot 3.02, Lot 3.03, Lot 3.10, Lot 3.12, Lot 3.14, Lots 48AA to 48 AH, Lots 48I through 48L, Lots 48V through 48Z, Lots 48AI through Lot 48AY, Lot 12, Lot 12.04, Lot 29, Lot 30, Lot 31, Lot 32, Lot 32.01, Lot 36, Lot 9, Lot 41, Lot 15, Lot 42.1, Lot 50, and Lot 51. Note that Zone 3 properties may be adjusted over time dependent on the results obtained from the long term groundwater monitoring.

The following items will be included in Land Use Controls for Zones 2 and 3:

- Annual notice letters will be provided by USACE to landowners indicating the potential for TCE contamination in the groundwater below their property, and an offer by USACE to test their water supply if a new well is drilled. A point of use

treatment system will be installed and maintained on a drinking water well if MCLs are exceeded, or if concentrations are trending toward an MCL exceedance. These notices (with copies to MEDEP) will be sent by USACE to the owner-of-record (checked by USACE at the Town offices annually).

Additionally, the Town's building permits will be checked semi-annually to determine if any new homes are planned to be constructed in Zones 1, 2, or 3. If so, a notification, as described above, will be provided to the building permit applicant.

Five-Year Site Reviews

Five-year Site reviews would be performed under Alternative 2 (and Alternative 3) by the USACE as the lead agency, with review and input from MEDEP. The reviews would evaluate whether human health and the environment continue to be protected by the Selected Remedy. If appropriate, additional actions may be implemented as a result of these reviews.

There are six components to the five-year review process: (1) community involvement and notification to ensure that all potentially interested parties are aware this review is being conducted; (2) review of documents including the Decision Document, RI/FS, risk assessment, remedial design and construction, and remedy performance to ensure that site conditions have not changed such that these documents are no longer applicable; (3) data review and analysis of sampling and monitoring plans, remedy performance data, Operation & Maintenance (O&M) data, and data from supplemental sampling, if necessary; (4) site inspection to visually confirm and document the conditions of the remedy; (5) interviews of the site manager, site personnel, and people who live or work near the site to compile information about the site's status and/or identify remedy issues; and (6) a determination of protectiveness in which the lead agency decides if the remedy is, or is expected to be, protective of human health and the environment. It is anticipated that data collected during the long term environmental monitoring program, which is included in Alternatives 2 and 3 as described above, would be sufficient for the purposes of the five-year reviews (i.e., additional data specifically collected for the five-year review would not be required).

Technology Reviews

Concurrent with each five year review cycle, USACE will perform a technology review to evaluate if there are any new technologies that may be applicable to this site to reduce the level of contamination, overall remediation cost, or duration of the time for attainment of the RAO. This technology review report will be provided to MEDEP and the Town for review. If a technology is identified during this review which is technically practicable, and reduces the cost and time to attain the RAO, then the CERCLA process will be followed to determine if the new technology can be implemented.

The technology review will include a review of technologies which may be applicable to the site contamination and conditions at the Glenburn FUDS. This review will be accomplished by checking published literature, and communication with USACE, USEPA, and/or MEDEP environmental professionals and specialists in environmental remedial technologies.

ALTERNATIVE 3: GROUNDWATER EXTRACTION AND TREATMENT

Alternative 3 includes groundwater extraction and *ex-situ* treatment for the purpose of localized hydraulic source control, but it also includes all of the features that are included in Alternative 2: water supply well treatment; long term environmental monitoring; land use controls; and five-year reviews. For a description of each of those features, which are unchanged for Alternative 3, see their respective descriptions under Alternative 2 above. The only difference between Alternatives 2 and 3 is the addition of groundwater extraction and *ex-situ* treatment that is described as follows.

Groundwater Extraction and Treatment With Hydraulic Containment.

As described in Section 2.4.5, TCE concentrations in off-site groundwater are currently below the 5 µg/L RG/MCL (although samples from GB-MW-03 to the west have had some TCE detections above the MCL). However, two on-site monitoring wells, GB-MW-01 and GB-MW-02, have fracture intervals which contain TCE at concentrations in the 20-60 µg/L range in the shallow "Unit A" bedrock aquifer (lower fractures in these wells are less contaminated).

Alternative 3 includes localized hydraulic containment through on-site pumping of

groundwater and *ex-situ* treatment. Extracting groundwater from the higher TCE concentration zone would help reduce downgradient migration of dissolved TCE. While on-site groundwater extraction and treatment is not expected to remove residual TCE droplets from the aquifer, it would remove dissolved contaminant mass. Therefore, implementation of this remedy may result in improved water quality on- and off-site.

As described in the FS, it is feasible to drill a new well 10-15 feet away from an existing well in the appropriate direction (east-northeast or west-southwest), and still encounter the same fracture zones with a high degree of certainty. Therefore, one pumping well is included in Alternative 3 which is assumed to be located about ten feet east-northeast or west-southwest of GB-MW-01, and completed such that it pumps water from transmissive features equivalent to the highest TCE concentrations detected in the Unit A rock aquifer in GB-MW-01. The pumping rate and re-injection location and depth would be designed to optimize the radius of influence while minimizing the risk of unintended downward migration of contaminants.

2.9.2 Alternatives Comparison

The NCP requires that the detailed analysis of remedial alternatives be conducted using nine criteria (40 CFR §430). The nine criteria, which encompass statutory requirements and technical, cost and institutional considerations, are divided into three categories: (1) threshold criteria (which must be satisfied for an alternative to be eligible for selection at the site remedy); (2) balancing criteria (the primary criteria upon which the comparative analysis of alternatives is based); and (3) modifying criteria (used to determine acceptability to the state or support agency and the public). The nine evaluation criteria are listed below.

Threshold Criteria:

- overall protection of human health and the environment
- compliance with ARARs

Balancing Criteria:

- long-term effectiveness and permanence
- reduction of toxicity, mobility, or volume through treatment
- short-term effectiveness
- implementability
- cost

Modifying Criteria:

- state acceptance
- community acceptance

A detailed comparison of the three alternatives based on an evaluation of these nine criteria is provided below (and summarized in Table 3).

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

There are currently no unacceptable risks to humans from ingestion or inhalation of, or dermal contact with, TCE. Also, there are no unacceptable risks to ecological receptors. Therefore, all of the alternatives are protective of human health and the environment. However, Alternatives 2 and 3 both include features that ensure that the protectiveness is not compromised in the future. Those features include: groundwater water quality monitoring; indoor air monitoring on Lot 46, advisories to the owners of contaminated or potentially contaminated private wells; point of use treatment systems for water supplies that exceed, or may exceed, MCLs; and land use controls (annual letters) provided to property owners within the vicinity (Zones 1, 2, and 3) of contaminated groundwater.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and Section 300.430(f)(1)(ii)(B) of the NCP require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations (collectively referred to as ARARs) unless such ARARs are waived under CERCLA Section 121(d)(4). "Applicable" requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. "Relevant and appropriate" requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a CERCLA site, they address problems or situations sufficiently similar to those encountered at the CERCLA site that their use may be considered relevant and appropriate.

The chemical-specific ARAR of 5 µg/L for TCE in drinking water (the MCL) is currently met in the off-site groundwater aquifer used for potable water supply (Table 1). On-site groundwater (Lot 46) and Lot 45 do not currently meet this ARAR, but Alternatives 2 and 3 include measures that would ensure the protectiveness of this remedy until the ARAR is achieved in the future. To be considered (TBC) criteria for the evaluation of indoor air (for vapor intrustion investigations) and soil (for soil investigation under the GAT Facility building when it is demolished) are also listed in Table 1.

The extensive amount of data collected and analyzed during the RI/FS strongly suggest that restoration of the on-site groundwater to the TCE MCL of 5 µg/L, whether by natural processes or active remediation, will likely take decades. This is due to the inaccessibility of the residual TCE contamination in the till, saprolite, and fractured bedrock beneath the Site which will continue to slowly release dissolved contamination to groundwater. Active *in-situ* remediation methods involving injection of additives is not recommended at the Site due to the

hydraulic connection between the contaminated wells on the property and existing nearby public water supply wells. However, the RI/FS has also demonstrated that the TCE-contaminated groundwater on-site has not impacted the on-site water supply well currently used for drinking water purposes, and is not currently causing unacceptable risks or MCL exceedances off-site. Therefore, plume containment or alternate water supplies are currently not required nor anticipated to be needed to prevent future migration and/or to protect public health.

No location-specific ARARs would be triggered by any of the alternatives since there are no sensitive areas such as wetlands, floodplains, or historic archaeological resources on or immediately adjacent to the Site. There are no action-specific ARARs for Alternative 2.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of a remedy to continue to be protective of human health and the environment over time. This criterion includes the consideration of residual risk that may remain following remediation and the adequacy and reliability of long term controls.

The RG (5 ug/L) for groundwater beyond the Site (Lot 46) and Lot 45 has already been met based upon available data (based on 95% upper confidence limit). Alternatives 2 and 3 include features designed to ensure protectiveness over time: continued use of the existing GAC treatment unit on GB-DW-22 (and others as needed); long-term monitoring; and land use controls such as warning advisories. As stated in the RI/FS, except for the no-action alternative, the other remedial actions are considered equally adequate and reliable in providing long-term effectiveness and permanence in protecting human health related to exposure to off-site groundwater.

Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Alternative 3 would reduce the volume of TCE in the aquifer through groundwater extraction and *ex-situ* treatment, and both Alternatives 2 and 3 would reduce TCE volume with the point of use GAC treatment systems. Treatment using GAC would produce residuals that would require off-site treatment or disposal of the spent carbon. If the spent carbon is regenerated, the TCE on the carbon would be destroyed by thermal processes.

Short-Term Effectiveness

Short-term effectiveness relates to adverse impacts to workers, the community and the environment that may result from implementation of the remedy. None of the alternatives would be expected to result in significant short-term impacts to the community, workers, or the environment. Minor impacts to the community could result from Alternative 3 due to increased vehicular traffic, and safety and health impacts to workers are possible during well installation and treatment system construction. These short-term impacts are manageable through the use of traffic control plans; and safety and health plans and protective equipment and clothing, etc., as required by the Occupational Safety and Health Administration (OSHA) CFR 1910.120. The work is expected to occur within the Town-owned properties and rights-of-way, and therefore would not be expected to expose the community to any Site-related risks.

Implementability

Implementability addresses the technical and administrative feasibility of implementing a remedy. Factors considered include availability of services and materials, administrative feasibility, and coordination with other governmental entities.

Alternatives 2 and 3 would involve continued operation and maintenance of the GAC unit on GB-DW-22 (and other wells as needed), long-term monitoring of the groundwater, monitoring of compliance with land use controls advisory notices to land owners, all of which

are implementable. GAC is a reliable and easily maintained technology. Groundwater monitoring utilizes commonly applied techniques with readily available equipment and services. Access to the domestic supply wells in the monitoring program, inspection of the Town properties, and confirmation of the property owner's contact information will be coordinated with property owners and/or the Town. The long-term monitoring and the five-year site reviews would be subject to regulatory review.

The groundwater extraction, *ex-situ* treatment, and re-injection included in Alternative 3 all utilize readily available equipment and materials that can be constructed, installed and operated without specialized expertise. Therefore, all of these features of Alternative 3 are considered implementable. The treatment system effluent would be monitored on a routine basis to evaluate the effectiveness of the treatment system and verify that reinjection criteria are achieved. Special maintenance of the extraction, treatment, and re-injection equipment may be required to prevent fouling caused by the expected high iron content in the groundwater. Prior to implementation, pre-design, pilot-scale studies, and/or treatability tests to determine basis for design would likely be required.

Cost

The cost estimates developed in the FS for implementing the remedial alternatives consist of two components: (1) capital costs; and (2) on-going operation and maintenance (O&M) and administrative costs. Capital costs consist of one-time direct and indirect costs associated with construction of the remedy. O&M and administrative costs refer to recurring expenditures associated with activities such as operation and maintenance of treatment systems, long-term environmental monitoring, and five-year reviews. Per CERCLA guidance, FS-level cost estimates are intended to be accurate within a range of -30 to +50 percent of the actual costs. For comparative purposes, the costs for each alternative were estimated in the FS for a 30-year time period, regardless of the actual time frames required to achieve the RAO (which may exceed 30 years).

The capital costs for Alternatives 2 and 3 include costs associated with initial implementation of the land use controls and installation of one new bedrock monitoring well (with a dual completion) for the LTM program (GB-MW-07, located south-southeast of the Site and GB-MW-04). Additional capital costs for Alternative 3 include the costs for construction of the groundwater extraction, treatment and re-injection system.

Recurring costs for Alternatives 2 and 3 include long term groundwater monitoring, indoor air monitoring on Lot 46, continued operation and maintenance of the GAC unit at GB-DW-22 (assumed to be required for the full 30-year time frame), and five-year site reviews. Additional recurring costs for Alternative 3 include expenditures associated with the operation and maintenance of the groundwater extraction, treatment, and re-injection system.

The estimated present worth costs presented in the Feasibility Study (at a 2 percent discount rate (OMB, 2011) for 30 years) for Alternatives 2 and 3 are approximately $1.2M and $2.1M, respectively. A summary of the primary components of these cost estimates is provided in Table 4. It is noted that using current costs, Alternative 2 is expected to be greater than $2 M. This does not impact the selection of Alterative 2 as the Selected Remedy.

State Agency Acceptance

The State has expressed its support for Alternative 2.

Community Acceptance

During the public comment period and the public meeting, the community expressed concerns regarding the frequency of long term monitoring of groundwater (annual versus semi-annual) and vapor intrusion testing should a new Town municipal building be constructed on the Town property. A Responsiveness Summary that provides USACE responses to comments received from the public during the public comment period is provided in Section 3.0.

2.10 PRINCIPAL THREAT WASTES

The "principal threat" concept is applied to the characterization of "source materials" at a site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, non-aqueous phase liquids (NAPLs) in the subsurface may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur.

There is no evidence indicating the presence of principal threat wastes at the Site. The longevity of the low level dissolved groundwater contamination may be the result of discrete DNAPL droplets and/or diffused contamination trapped in the till, saprolite or rock matrix and/or fractures; however, after extensive testing at the Site over many years, DNAPL has never been observed. That, and the few and low-concentration detections of TCE in soil, and the limited areal extent of dissolved TCE in groundwater above the MCL, support the conclusion that there is no principal threat waste at the Site.

2.11 SELECTED REMEDY

The Selected Remedy for this Site is Alternative 2: Monitored Natural Attenuation (by dispersion); including long term monitoring of groundwater, point of use treatment for water supplies (as needed), monitoring of indoor air, land use controls, and five year reviews to ensure the future protection of human health and the environment.

Off-site beneficial use of groundwater and unrestricted land uses are not adversely affected. Alternative 1: No Action, is insufficient to protect human health in the event that new water supplies are drilled on selected portions of the Town property, since the potential for well water containing TCE greater than the MCL is high in that area. Also, Alternative 1 does not include long term monitoring, point of use treatment, and land use controls that will ensure

protection of public health in the future. Alternative 3, which includes all the components of Alternative 2, plus localized groundwater extraction and treatment, is unlikely to significantly decrease the time frame needed to reach MCL concentrations on the Site as compared to Alternative 2 (see Section 1.5 for a discussion of cost-effectiveness, and Table 4 for a summary of the cost estimates).

2.12 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Proposed Plan (JCO, 2014) identified Monitored Natural Attenuation by Dispersion with long term monitoring of groundwater and indoor air, point of use treatment of drinking water wells, and land use controls (Alternative 2) as the Preferred Alternative for the Site. The Proposed Plan for the Site was released for public comment on August 4, 2014, and the USACE reviewed all comments received during the public comment period. It was determined that no significant changes to the Selected Remedy, as originally described in the Proposed Plan, were necessary or appropriate. One subject which was clarified after the public comment period was the issue of vapor intrusion mitigation should a new municipal building be constructed on the Town property, and it experiences vapor intrusion issues with unacceptable risk levels relating to DoD contamination.

3.0 RESPONSIVENESS SUMMARY

3.1 STAKEHOLDER ISSUES AND USACE RESPONSES

Verbal comments were offered by the stakeholders during the public meeting conducted by the U.S. Army Corps of Engineers (USACE) on August 20, 2014 to present the Glenburn GAT Facility Proposed Plan. Stakeholders in attendance at the meeting included community members (including Glenburn Town Council members and Town Manager), representatives from the MEDEP, and participants representing elected officials. Written comments were also received during the public meeting and during the public comment period. The public comment period was from August 4, 2014 through September 8, 2014.

3.2 TECHNICAL AND LEGAL ISSUES

The comments received predominantly focused on the issue of vapor intrusion mitigation, in the event a new building is constructed on the Town property to replace the existing municipal building. Additionally, several community members expressed interest in maintaining a semi-annual (twice per year) frequency of groundwater monitoring, and periodically monitoring an expanded monitoring well network. Specific comments and responses related to this and other issues are provided in Section 3.3 below.

Note that at the time of the Proposed Plan presentation, Zone 1 included the Former GAT Property only (Lot 46). During subsequent discussions with MEDEP and Town of Glenburn representatives, Lot 45 was added to the Zone 1 (moved from Zone 2).

3.3 COMMENT RESPONSES

Section 3.3.1 presents a compilation of verbal comments offered at the public meeting on August 20, 2014. Note that the specific syntax and format of the verbal comments are slightly paraphrased. Additionally, the response provided during the public meeting may be expanded and/or clarified from what was stated at the meeting. Section 3.3.2 presents written comments received during the public comment period from August 4, 2014 through September 8, 2014. Refer to Appendix C for copies of the written comments received. A transcript of the public

meeting will be available in the Administrative Record, and upon request. Comments are provided in normal font, with associated responses provided in *italics* font.

3.3.1 Verbal Comments and USACE Responses

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

[Referring to the technical slide presentation] What was the period of time that you took the 188 soil samples?

Most soil samples were collected between 2008 and 2010.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

[Referring to the technical slide presentation] The risk assessments (human health and ecological) occurred in 2008/2009, and nothing has been done since that time?

Most of the investigations were completed in the 2008/2009 time period. However, additional testing of soils, sub-slab vapors and indoor air quality was performed in 2010 in response to comments received from MEDEP and at a June 2010 meeting, involving MEDEP and representatives from the town of Glenburn. The risk assessments were up-dated in June 2011, and water supply and monitoring wells have been sampled since that time. There have been no increased concentrations in the water supply and monitoring wells which would change the protectiveness of the Selected Remedy.

Comment on August 20, 2014 (unidentified), representing the community

Are the water test results available to the residents?

Yes, a letter is sent to each resident whose well is sampled. Residents of Homestead Estates may not have received copies of the letter directly. That summary of results has been sent to the Homestead Estates property owner.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

Define "plume" for the public meeting audience.

The "plume" is the extent of contamination represented by the blue shading on the figure [Figure 5 of the Proposed Plan, Figure 2 of the Decision Document]. This is based on groundwater data, as well as site geology. Currently, the extent of impacted groundwater, to the best of our knowledge, is about 500 feet wide north-northeast to south-southeast and about 2000 feet long. The subject property is on top of a hill (the Air Force typically built their bases on the tops of hills). Groundwater goes in both directions from this location, to the northeast and to the

southwest, and that's why we have a plume centered on the source.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

When was the plume last updated?

The plume configuration in the Proposed Plan was updated based on 2013 data.

Comment on August 20, 2014 (unidentified), representing the community

Does any digging at any particular site distribute more of the contaminants into the air?

USACE has found no contaminant concentrations in the soil that if disturbed would result in any concern to human health. Contamination that has been encountered from testing underneath the building appears to be coming from the groundwater. So, in this case, there is no reason to believe that digging will distribute more contaminants into the air.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

Can you tell me in reading the documents, in a layman's definition, as much as you can about vapor contamination as a result of TCE? For example, if a new building were to be built on site, if a vapor contamination issue is found, would the TCE be causing the vapor contamination?

To use a simplified example, if you put a gasoline can outside, you would smell the gas, especially if it's an open container. The gas is going from a liquid state to a vapor or gaseous state. The situation with TCE is similar. With TCE in the groundwater, it is going from a liquid phase to a vapor phase, moving its way up through the soil where it could potentially enter the building (vapor intrusion). This is a simplified explanation of how TCE in groundwater could get into the building. There are many reasons why it happens, such as the presence of cracks or openings in the building slab, atmospheric barometric pressure changes, or pressure influences from the building itself (such as the building being shut tight, the air conditioner running, the heat running, air flow through the building, or even taking a shower). Mathematical modeling can be used to determine if vapor intrusion is likely to occur (based on contaminant concentration and site geology and hydrogeology). Testing of sub-slab vapor and indoor air can also determine whether there is a pathway from the groundwater to the indoor air of a building.

There are a number of potential sources of contaminant vapors in a building other than soil vapor, particularly a new building, including: paint, insulation (urea formaldahyde), glues, cleaning products, carpets and furniture (stain-guard treatments and new product off-gassing), on-site fuel oil tanks and boilers, and other similar commercial and house-hold products. Differentiation of these indoor sources from a groundwater source can be difficult, which is why sub-slab vapor samples are usually collected simultaneously with indoor air samples.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

If a new building is built, would the Army Corps test for vapor contamination, and would it be part of the Proposed Plan?

Yes, vapor intrusion testing on a new building built on the Town property (Lot 46) will occur and is part of the Proposed Plan.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

When you say long-term monitoring of groundwater and drinking water wells, is there a definition of what long-term monitoring is? Is that decades? And how often is the monitoring?

Long term monitoring will continue until the remedial action objective for the Site is attained (until it can be demonstrated that groundwater has been restored to safe levels, below the U.S. Environmental Protection Agency Maximum Contaminant Levels (MCL) for drinking water). This is expected to take decades in the case of the Glenburn site. Long term monitoring can include many options for sample frequency (e.g., semi-annual, annual, biennial). The optimal sample frequency is determined through evaluation and trend analysis of groundwater data.

Comment on August 20, 2014 (unidentified), representing the Town Council and the community

Could the Air Force have buried a big container with that cleaner in it and put it under the ground and buried it? And then as the years go by, it rusts and lets out more?

In an effort to find buried drums, multiple exploratory test pits were dug in the vicinity of the former base. The soil was tested, and no significant levels of TCE were found in the soil. The subsurface was also investigated with a magnetometer and a ground-penetrating radar to find any buried drums or metal tanks. None were found.

Comment on August 20, 2014 (unidentified), representing the community

What if we shut down that well from Homestead Estates and put a new well in 200 or 300 feet out of the polluted area? Would that correct the problem?

Given the relatively high rate of use of the Homestead Estates wells which serve multiple families, installing and using a new well could result in drawing the contamination towards that well, which would exacerbate, rather than solve the problem. It is noted that the Homestead Estate well is safe to drink, as the contaminant concentrations are below the MCLs.

Comment on August 20, 2014 (unidentified), representing the community

What concentration is technically safe to ingest for an individual with a compromised immune system?

The Safe Drinking Water Act regulations specify a Maximum Contaminant Level for TCE of 5 parts per billion, which is considered safe to drink.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

With regard to putting a treatment system on a residence that is showing an upward trend, but may not be above the MCL, over what period of time do you consider a trend?

This answer is dependent on the specific data. USACE will look at the results in conjunction with MEDEP, the Town, and/or the property owner to evaluate the level of concern that the concentration may exceed the MCL, based on an analysis of the data trend.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

My concern is that in some of the information that I've read, the monitoring may be changed to once per year versus every six months.

The Proposed Plan includes reference to a long term monitoring plan. We currently sample twice per year. That frequency will continue at the start of the long term monitoring. The long term monitoring plan will be dynamic. It may change based upon new data collected each year. It is intended to be dynamic because if a well concentration is trending upwards, more focus will be put on monitoring that location, rather than at a location which is of less concern. The long term monitoring plan is intended to be a cooperative approach with MEDEP. USACE will continue to work with the Town, as well.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

So the monitoring frequency would be a recommendation from USACE to MEDEP?

USACE would seek input and concurrence from MEDEP regarding any changes to the monitoring frequency, and that information would be shared with the Town.

Comment on August 20, 2014 from Carol H. Woodcock, representing Senator Susan M. Collins's office

Would the monitoring continue in perpetuity/forever?

The monitoring will continue for as long as the groundwater concentration of TCE remains above the MCL of 5 parts per billion.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

And that commitment for long term monitoring is not limited by any physical or monetary or

budgetary constraints of the USACE?

The commitment is not limited by any physical constraints. Once the Decision Document is finalized, by law USACE is required to implement the remedy, and ensure that it remains protective. Though it is not possible to predict what the federal budget is in the future, based on what we know today, it will be funded. We know at this point that the Formerly Used Defense Sites (FUDS) program is fully funded for the next five years.

Comment on August 20, 2014 from Carol H. Woodcock, representing Senator Susan M. Collins's office

What if it appears as though for a given period of time (for example four or five years) everything seems to be fine and then there's a change for an unknown reason, is there any problem getting USACE to come back?

For any FUDS property nationwide, if information that we have today turns out to be different, for example ten years from today, and the contamination that is found ten years from now is related to previous Department of Defense (DoD) activities, then USACE is required to come back and do what needs to be done to remedy the situation. Also, every five years, a review will be performed (the Five Year Review) to evaluate the protectiveness (to human health and the environment) of the remedy. If the Selected Remedy is determined not to be protective, USACE will change the remedy to ensure protectiveness to human health and the environment.

Comment on August 20, 2014 from Michael Crooker, Glenburn Town Manager, representing the community

Will there be funds available going forward? Right now I'm assuming there are funds available for this Glenburn site. If it's determined later that more work is needed, will there be a process for getting funds re-committed to the site?

Yes, there is a process for attaining funding, depending on the severity and nature of the situation; it could be cause for an immediate response under certain circumstances, or a long-term process. The process USACE is following at this time is the long-term process. If the problem calls for immediate action, the FUDS program maintains a contingency fund to address situations that are immediately dangerous to life and health. It is doubtful that will occur at this site given what we know today.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

If USACE walks away because the TCE concentration is below the MCL, how would the Town residents know that the issue still exists if no testing is being performed?

If contamination decreases to levels less than the MCL, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) USACE wouldn't have the authority to continue sampling since there would be no risk. However, USACE will continue to sample for a

period of time after the concentration drops below the MCL (likely one to five years) to ensure that the contamination continues to be less than the MCL before discontinuing sampling permanently. If someone were to sample their well privately after long term monitoring were discontinued, and report that the concentration of a DoD-related contaminant is greater than the MCL, then USACE will re-engage efforts on the Site to remedy the situation. The amount of time that we will continue to sample after the MCL level is attained will be specified in the Site Long Term Monitoring Plan (LTMP), which will be reviewed by the MEDEP and the Town.

Comment on August 20, 2014 (unidentified), representing the community

What criteria were used to determine that Alternative 2 was the best option rather than Alternative 3 (Groundwater Extraction and Treatment) in the Feasibility Study? It seems like Alternative 3 is better for the citizens of the Town.

Alternative 3 is not considered to be the preferred alternative because USACE believes that installation of a pumping system would not reduce the size or longevity of the plume. Pumping groundwater would not remove the source of the TCE, which is likely sorbed deep into the rock fractures. The plume is currently maintained by natural processes, and is not expanding (based on many years of data from the site). Typically, a pumping system is placed in the subsurface to prevent the plume from expanding. We have a stable plume at the Glenburn Site, so USACE doesn't believe that remedy would be effective or provide any advantage, under the circumstances.

Comment on August 20, 2014 (unidentified), representing the community

Do you have a filter on the contaminated domestic well now?

A filter (point of use granulated carbon treatment system) has been installed on one residence in Glenburn. USACE will install filtration systems on any drinking water system that is above the MCL, or trending upward and approaching levels above the MCL.

Comment on August 20, 2014 from Ron Woolhiser, representing the community

You mention that the plume is not increasing, yet on the map provided at this meeting, you show a green line around many properties, with an indication that it's an area of concern. If the plume is not expanding, why is there a large area of concern presented on the map?

Due to the nature of the contamination and the Site geology (fractured bedrock with preferential migration pathways), it's hard to predict the exact edge of the plume, and where the contamination may migrate if a new well is drilled and used. If your property is within Zone 1, 2, or 3 [Figure 5 of the Proposed Plan, Figure 2 of the Decision Document]) USACE will test any new well installed to determine if it contains TCE.

Comment on August 20, 2014 from Ron Woolhiser, representing the community

I have an existing well within the green line boundary shown on the map. There is currently no testing being performed. The last time it was tested was approximately 2005. How can we be assured that there is no contamination currently in my well?

A component of the Proposed Plan is that the monitoring well network will be expanded every five years to verify that these drinking water sources are not contaminated. Currently, we don't have any reason to believe (due to plume stability) that these wells are contaminated. Homes within the areas identified in Zone 2 and 3 will likely to included in the expanded monitoring well network (to be sampled every five years).

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

Is that (i.e., expanding the sampling network to include the Zone 3 properties) included in the Proposed Plan?

The provision for the possible expansion of the monitoring program as part of each five year review is described in the Proposed Plan. The initial locations to be sampled will be specifically defined in the Long Term Monitoring Plan. USACE plans on including all locations shown in the Proposed Plan within Land Use Control Zones 1, 2, and 3 in the Long Term Monitoring Plan sampling network.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

Is the Long Term Monitoring Plan part of the Decision Document?

The LTMP comes after the Decision Document. In general, the framework of the remedy is presented in the Proposed Plan (summarized in this presentation), and formalized in the Decision Document. However, the specific details of the long term monitoring will not be specifically detailed in the Proposed Plan or Decision Document because the program will be dynamic, and may change over time based on analytical results, and input from the MEDEP and the Town. The LTMP will be assessed at a regular frequency (after every sampling event) to incorporate any changes that are deemed appropriate based on the current conditions and circumstances.

Comment on August 20, 2014 (unidentified), representing the community

As citizens we want you to respond to things as well, and dynamic is a great word, but again being politically correct, some of us have some reservations about the bureaucracy of some of this, and so some of us would really like to see the specifics nailed down and then for it to be dynamic in terms of being able to change the specifics.

USACE can generate the draft Long Term Monitoring Plan between the timeframe of the

Proposed Plan and the Decision Document, and finalize it after the finalization of the Decision Document. Many of the details of the LTMP are currently in the documents that USACE has been providing to the MEDEP and the Town. These documents outline the current monitoring program. USACE does not envision that the LTMP would be significantly different than the current monitoring program.

Comment on August 20, 2014 from Michael Crooker, Glenburn Town Manager, representing the community

What is the sense of having a Proposed Plan and Decision Document if it doesn't commit USACE to anything? The specifics that USACE currently indicates will be in the LTMP are what really matters to the Town.

The Proposed Plan is intended to be an outline of the remedy, and the specifics of the remedy will be in the Decision Document. Beyond that, the LTMP will be the only document that provides additional details specifically relating to the groundwater sampling details. The LTMP will change over time. It is intended to be fluid and dynamic. The Decision Document will give USACE the authority to have this dynamic plan and make those changes which make sense as we move forward.

Comment on August 20, 2014 from Michael Crooker, Glenburn Town Manager, representing the community

Is it traditional on other USACE sites that the plan is developed after the Decision Document? Is there still an opportunity to comment on the LTMP by the Town after the Decision Document is finalized?

Yes, the traditional approach is to finalize the Decision Document before the LTMP is finalized. Yes, the Town will have a chance to comment on the LTMP.

Comment on August 20, 2014 from Bill Shook, representing the Town Office and the community

We at the town are concerned that other priorities may impact the funding that is spent on the Glenburn site. We have heard rumors that the sampling may be reduced to once per year, and believe that it is too early to reduce the sampling frequency. Originally, the genesis of the sampling program was to sample when the water table is high and again when the water table is low. How would that be accomplished if USACE only samples one time per year?

USACE understands your concerns with the possible frequency reduction to annual sampling. Annual sampling is a possible recommendation in the future, but it has not been finalized. USACE will take your concerns into consideration, and work with MEDEP and the Town to develop the LTMP.

In response to the comment about cost dictating fitting the sampling at Glenburn into the annual budget, that is not how USACE makes decisions, especially on sampling, and definitely not on

implementation of the remedy. Cost is a factor when we choose the remedy in the Feasibility Study report based on the evaluation criteria. But, with respect to sampling, it's based on technical evaluation, and based on what needs to be done. So, the budget fits the program needs, and not the other way around.

Comment on August 20, 2014 from Bill Shook, representing the Town Office and the community

Does USACE maintain some type of contingency for other issues, such as emergency considerations?

USACE Headquarters has a budget for emergencies, such as imminent threats. If there is a need to respond immediately, USACE Headquarters typically provides the funding. With on-going sites, like the Glenburn Site, USACE looks annually at what is needed for funding from a technical perspective, and it is typically provided based on that need.

Comment on August 20, 2014 from Carol H. Woodcock, representing Senator Susan M. Collins's office

From what I am hearing, it sounds like the biggest concern from the Town perspective is with respect to what the ultimate recorded decision for the site will be. It would be helpful if after all comments are recorded, based on the multiple concerns expressed at this meeting, these comments can be addressed and an update provided to the Town to specify the direction that USACE is moving forward with. This interim step toward the final Decision Document, would be helpful to inform the Town with a higher level of confidence about the specifics of the remedy.

Part of the CERCLA process with respect to the Proposed Plan is to provide a responsiveness summary. This is a detailed response to all comments provided at the public meeting or during the public comment period. The Draft Decision Document with the responsiveness summary was provided to MEDEP and Town representatives and now will be finalized.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

What happens if the Town is not satisfied with the contents of the Final Decision Document?

Public acceptance is one of the nine criteria that are evaluated when a remedy is considered. If the Town or MEDEP identify specific issues that they don't agree with, USACE can elevate those concerns to a higher level within the Department of the Army for resolution. USACE would strongly prefer to put forth a remedy to USACE Headquarters that already has public and regulatory (MEDEP) concurrence.

Comment on August 20, 2014 (unidentified), representing the community

Why does this process take so long?

USACE has worked with the Town and MEDEP over the past three to four years to get to this point. There have been many discussions between the USACE, MEDEP, and the Town to come to agreement on several issues within the Proposed Plan.

Comment on August 20, 2014 (unidentified), representing the community

There are some new homes on Midway Lane. Will those homes be added to the sampling program?

Situations such as this (new homes) may warrant testing. This is an example of why the monitoring program needs to be dynamic, to deal with changes in properties such as this. USACE will review tax records, perform periodic site assessments, and contact local town officials to identify any changes to the area which may necessitate changes or additions to the monitoring program.

[Note: Currently, upon checking tax records and with town officials, there are no additional homes on Midway Lane that have not been considered in the monitoring program.]

Comment on August 20, 2014 from Michael Crooker, Glenburn Town Manager, representing the community

If a new building is constructed on the town property, would the government be responsible for buying the indoor air mitigation system which would be responsible for mitigation of radon and TCE?

Specifically, the process will be: If a new municipal building is constructed on this property (Lot 46), the Town of Glenburn is requested to notify USACE, so that mathematical modeling can be conducted using current site conditions to determine if indoor air sampling should be conducted (by USACE) immediately or if it can wait until the next five year review sampling period. The building should be constructed in accordance with the State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building codes), resulting from residual DoD contamination in soil or groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD contamination pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

[Note: At the time of the Proposed Plan presentation, it was not known if USACE could commit to implementation of additional mitigation action, due to guidance cited in the DoD Defense Environmental Restoration Program (DERP) Manual, dated March 2012. Since that time, this issue has been elevated to USACE Headquarters and clarified, as stated above.]

Comment on August 20, 2014 from Carol H. Woodcock, representing Senator Susan M. Collins's office

Can you send the copy of the DoD DERP Manual to me?

The DoD DERP Manual was sent to Carol H. Woodcock; and also to Christopher R. Winstead (representing Congressman Michael Michaud's office) in September 2014.

Comment on August 20, 2014 (unidentified), representing the community

How many other contaminated sites are there in Penobscot County, Maine? Are there other towns dealing with the same issues? How can the Town get access to information about similar sites?

There are numerous Formerly Used Defense Sites (FUDS) in Maine. The Former Dow Air Force Base in Bangor, Maine (currently operating as the Bangor International Airport) is an active FUDS project in Penobscot County. Another FUDS project with similar TCE groundwater contamination issues in Maine (Washington County) is the Former Bucks Harbor Air Force Radar Tracking Station Site in Machiasport Maine. Additionally, there are two CERCLA/Superfund sites (Loring Air Force Base and Brunswick Navy Station) with TCE/groundwater contamination issues. USACE can provide more information, if it is requested, by contacting USACE. There is a repository of all documents related to the Glenburn Site at the Glenburn Municipal Building, and there is a repository for all FUDS projects in New England at the USACE office in Concord, MA, or at other information repositories close to the project locations.

Comment on August 20, 2014 from Bill Shook, representing the Town Office and the community

Regarding the air mitigation system, it is understood that USACE guidance is for the property owner to install a vapor mitigation system with the intent to mitigate radon vapors, which are an act of God. However, the presence of TCE is not an act of God.

The Proposed Plan states that any new public building requires an air mitigation system in accordance with Maine Building codes. The intent is to mitigate radon vapors, but the same process also serves to mitigate TCE vapors.

Comment on August 20, 2014 from Michael Crooker, Glenburn Town Manager, representing the community

[Question directed to MEDEP] Is a radon air mitigation system the same as a TCE mitigation system?

Yes, it is the same type of mitigation system.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

Who is financially responsible for sending annual notifications to homeowners within Land Use Control Zones 2 and 3? Is this stated in the Proposed Plan?

USACE is responsible for sending annual notification letters, as stated in the Proposed Plan, and that responsibility will be further clarified in the Decision Document.

Comment on August 20, 2014 from Dennis Casey, representing the Town Council and the community

If the town doesn't agree with the Environmental Covenant on the town property (Zone 1), is there an alternative?

If the town wide vote does not approve the Environmental Covenant on the property, there will be no deed notification. However, annual notices (as identified for Land Use Control Zones 2 and 3) will be sent to the Town (as the owner of the Zone 1 property). Additionally, the property will remain in the LTMP.

Comment on August 20, 2014 from Michael Crooker, Glenburn Town Manager, representing the community

The Proposed Plan states that a third party could file a deed affidavit which indicates that there is contamination on the site. It is understood that MEDEP could do this with or without the consent of the Town.

That is correct. In the State of Maine, a deed affidavit can be filed by a third party. It should be noted that USACE does not have the authority to file a deed affidavit.

Comment on August 20, 2014 from Ron Woolhiser, representing the community

When will testing at Zone 3 properties occur?

After the Decision Document is finalized, the expanded sampling program will be initiated in the first year. This is expected to be in 2016.

Comment on August 20, 2014 (unidentified), representing the community

Why are the zones set up by property boundaries rather than a radius around the plume? It appears that there may be additional properties that should be in Zone 3 due to their proximity to the plume.

USACE will look more closely at the properties proximal to the extent of contamination to verify that Zone 3 was accurately represented on the figure (to ensure that the appropriate parties receive annual notification letters).

[Note: Upon further evaluation, the entire area of the property identified as Lot 3.10 was added to Zone 3, and an updated figure is included in the Decision Document (Figure 2 of the Decision Document).]

Comment on August 20, 2014 from Ron Woolhiser [comment verbally transmitted to stenographer after the public meeting]

I live at 19 Midway Lane (property 3.02 on the map) in the Zone 3 area. I'm concerned about TCE vapors coming into my building. Can there be any testing done in that regard? It is important to me that my well be tested for TCE, since I'm within Zone 3, as soon as feasible, because it has not been tested since 2005. It has only been tested once since we have lived there. My home was purchased in December 2004. I'm concerned because my home has been identified as area of concern Zone 3.

Testing at all properties within Zones 2 and 3 will occur after the Decision Document is finalized, likely in 2016. It is noted that groundwater at this residence was subsequently sampled (in May 2015) with non-detect results. Therefore, vapor intrusion testing is not deemed to be necessary.

3.3.2 Written comments and USACE responses

Comment letter dated August 15, 2014 from David Wright, representing the MEDEP

The Department has been closely monitoring the investigation and review of alternative clean-up approaches that are outlined in the 2012 Feasibility Study for the Glenburn GAT facility. At this point, but subject to new information from the public that is received during the public comment period, the Department concurs with most aspects of the Proposed Plan for the site as presented by the above referenced document. The elements with which we concur include:

1. Groundwater: Monitored Natural Attenuation (MNA) by Dispersion as the preferred remedy alternative, including long term monitoring, point of use water treatment as needed and land use controls (also known as Institutional Controls). Elements of the Proposed Plan consist of multiple measures to ensure that the cleanup approach continues to be protective of human health and the environment. These measures are:
    a. Continued point-of-use treatment of impacted drinking water supplies with Granular Activated Carbon, as needed;
    b. Long-term monitoring of the remaining contaminants in groundwater;
    c. An environmental deed restriction on Zone 1, Lot 46, which is the Glenburn Municipal Building property. The deed restriction should:
        (1) require Department approval before installing a new well, so that the well can be located, tested and if necessary treated to protect public health,
        (2) ensure access for monitoring and oversight, and
        (3) prohibit activities that interfere with the remedy and monitoring equipment on-site;
    d. annual notice letters to owners of property where trichloroethylene (also known as "TCE") could potentially be present in groundwater, namely Zones 2 and 3 as shown in the proposed plan; and
    e. Five-Year Reviews of site conditions to ensure that the cleanup approach remains effective. During each review Army Corps will perform a technology review to evaluate if there are any new technologies that may be applicable to this site to reduce either the level of contamination, overall remediation cost, or length of the time to reach the cleanup goal. If the review indicates that this remedy is no longer protective,

or a new technology is available, then the process outline in the Superfund laws will be followed to incorporate this new information into the site clean-up strategy.

2. Soil Vapor: The Department notes that the Proposed Plan does not recommend action for surface water or soil vapor. However, soil vapor and indoor air in the Municipal Building will be monitored every five years or when site conditions change. Examples of changes in site conditions would be increasing concentrations in groundwater or changes in building conditions. Further, soil investigation under the Municipal Building will be undertaken by the Army Corps if the building is demolished. The purpose of the additional study is to ensure that there is no residual soil contamination under the structure that might pose a risk.

Comment acknowledged and appreciated. USACE strongly seeks concurrence from MEDEP regarding the Selected Remedy.

The one area of the Proposed Plan that the Department believes needs improvement in the final Decision Document regards follow-up to a vapor intrusion problem in a new building. If a new building is constructed on Lot 46, the owner will need to build it to Maine building codes, which include provisions for sub-slab systems to maintain healthy indoor air. These standards are focused on radon mitigation, but should also address any vapor intrusion of solvents from historic Department of Defense operations at the site. The Army Corps will test indoor in a new building to verify that no vapor intrusion issues are occurring. If vapor intrusion poses an unacceptable risk due to a historic Department of Defense release, we recommend that the Decision Document include a provision for the Army Corps to conduct appropriate response actions in the existing building. The proposed plan only includes provisions for additional monitoring, which may be insufficient.

[Note: at the time of the Proposed Plan presentation, it was not known if USACE could commit to implementation of additional mitigation action, due to guidance cited in the DoD Defense Environmental Restoration Program (DERP) Manual, dated March 2012. Since that time, this issue has been elevated to USACE Headquarters and clarified, as stated below.]

If a new municipal building is constructed on this property (Lot 46), the Town of Glenburn is requested to notify USACE, so that mathematical modeling can be conducted using current site conditions to determine if indoor air sampling should be conducted (by USACE) immediately or if it can wait until the next five year review sampling period. The building should be constructed in accordance with the State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building code), resulting from residual DoD contamination in soil or groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD contamination pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

Comment letter dated September 4, 2014 from Michael R. Crooker, Glenburn Town Manager, representing the Glenburn Town Council and community

WELL MONITORING/SAMPLING

How often will residential wells be sampled?

Long term monitoring will continue until the remedial action objective for the Site is attained (until it can be demonstrated that groundwater has been restored to safe levels, below the MCL). This is expected to take decades in the case of the Glenburn Site. Long term monitoring can include many options for sample frequency (e.g., semi-annual, annual, biennial). The optimal sample frequency is determined through evaluation and trend analysis of groundwater data. USACE does not envision that the initial LTMP would be significantly different than the current monitoring program, which includes semi-annual monitoring.

Will there be a plan in place that will increase the frequency of well tests as well as the number of wells that will be tested if the results of the well samples show increased levels of detectable TCE in the water supplies EVEN if the levels do not exceed federal and state guidelines?

The LTMP will include all well locations of concern, based on current and historical TCE concentrations, even if the contaminant level does not exceed the MCL. Changes in monitoring locations and frequency will be determined on a case-by-case basis by adjusting the dynamic LTMP, with the opportunity for MEDEP, and the Town to propose changes, and review and provide comments on the LTMP. Additionally, any changes to the monitoring program will be communicated to impacted property owners.

What does it mean when it indicates in the plan; "This monitoring plan will be optimized in the future in a Long Term Monitoring Plan."?

The LTMP will be developed using current and historical Site data, and periodically adjusted (optimized) based upon future data (with the opportunity for MEDEP and the Town to provide comments and suggestions). The sampling strategy and approach will be adjusted to focus on the most critical sample collection points, to maximize use of the data for the protection of human health given current and future property use.

Will adjustments be made to the monitoring program after each monitoring event if the results of the ground water sampling event indicate that there are significant changes in the level of TCE concentrations that could result in the monitoring program not being protective of human health and the environment?

Adjustments will be made to the sampling program if the current monitoring program is deemed to not be protective of human health and the environment. This is a critical component of the remedy, which would immediately be addressed if encountered.

We believe that it is premature to reduce the residential well water sampling protocol to once a year from twice a year. This misses the continued opportunity to tie the results to the

fluctuation of the water table and the likelihood TCE from concentrated areas such as ledge pockets is being "skimmed off' into the ground water. We believe that twice-a-year sampling, once in the spring and once in late summer or in fall should continue. Sampling once a year, in our minds, would make it difficult to pinpoint the best time of year to take that lone sample. One would then logically wonder if the sampler had missed an unacceptable spike in TCE concentration by a couple of weeks or months. The USACE indicated in the plan as well as during the presentation at the public meeting that the data shows that there are several spikes or variations in the TCE concentrations that can not be easily explained. This is further evidence of the need to continue twice a year sampling.

If any adjustments to the sampling frequency are made, considerations such as the impact of the water level will be considered. All data will be carefully evaluated to ensure that any potential spikes in concentration are not missed by a reduction in sample frequency. MEDEP and the Town will have the opportunity to provide comments and suggestions. USACE does not envision that the initial LTMP would be significantly different than the current monitoring program, which includes semi-annual monitoring.

Gary Morin mentioned to Marie Wojtas during the public meeting that the expanded residential well sampling proposed for every five years in the plan would start with year one once the Decision Document had been approved rather than waiting five years to conduct the first round of expanded residential well samples. Can you please confirm when the first round of expanded well testing will occur?

The first round of expanded residential sampling is expected to occur in the Spring of 2016.

Do you intend to do expanded residential well testing every five (5) years after the first round occurs or will expanded testing be performed more often than every five (5) years?

After the data from the first expanded residential sample event occurs, it will be determined, based on the data, if it should occur more often than every five years.

It was mentioned during the public meeting that the USACE could withdraw from the site if it got to the point where no wells exceed the 5 parts per billion (or micrograms per liter, µg/L) contamination level for TCE. Is this the only criteria that will be used to determine the attainment of the clean up goal?

Yes, this is the only criteria that will be used to determine the attainment of the clean up goal. However, sampling will continue for a statistically determined amount of time to ensure that the clean up goal is permanently attained.

Can you provide a statistical basis for the establishment of a reasonable period of time to verify that the 5 ppb goal is attained?

The statistical method for attainment of the clean up goal will be cited in the LTMP. The attainment of the clean up goal will be carefully evaluated before closure of the project.

If the USACE leaves the site but unsafe levels of TCE appear again in the future, will the USACE be required to come back to the site? If so, how long would it take before the USACE could start remedial action again on the Glenburn FUDS site?

Yes, USACE will return to the Glenburn FUDS Site if it is determined that there is a need to do so. Re-engagement of USACE would occur immediately, if this condition arises.

If the USACE leaves the Glenburn FUDS site because it has determined that it has attained the clean up goal, will the USACE do any periodic follow up tests at the site to ensure that the problem has been remediated permanently?

Before Site closure, the USACE will require a high level of certainty that the clean up goal is permanently attained. It is not expected that any follow-up testing would be required. If circumstances warrant follow-up testing, it will be performed.

Is the Town's well water that supplies the Glenburn Town Office and Fire Station, safe to drink?

The Town well water (Lot 46) is safe to drink based on Volatile Organic Compound (VOC) analysis results to date. There have been no detections of TCE in the Glenburn Municipal Building water supply.

<u>NEW MUNICIPAL BUILDING & VAPOR MITIGATION</u>

Assuming the Town builds a new Town Office that complies with state building codes, will the USACE perform air quality tests before the Town occupies the new building?

The approach for air quality testing for a new Town Office building on Lot 46 is as follows:

If a new municipal building is constructed on this property (Lot 46), the Town of Glenburn is requested to notify USACE, so that mathematical modeling can be conducted using current site conditions to determine if indoor air sampling should be conducted (by USACE) immediately or if it can wait until the next five year review sampling period. The building should be constructed in accordance with the State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building codes), resulting from residual DoD contamination in soil or groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD contamination pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

If vapor contamination is found in a newly constructed building, will the Army Corps of Engineers be required to install a vapor removal or mitigation system after the building has been built?

See response to comment above.

Are there other alternatives to a vapor removal or mitigation system that the USACE could consider imposing on the Town such as limited habitation of the new building; i.e. requiring the Town to limit the number of hours that the new building could be open?

The first alternative that would be considered for mitigation of any vapor intrusion issues will be to enhance the vapor mitigation system to an active system. It is not foreseen that limited access in a new building would be necessary. That situation more likely arises with existing buildings on contaminated land parcels.

If the Town builds a new building then is the Town solely responsible (financially & legally) for including some type of system to address any vapor intrusion of solvents from historic Department of Defense operations at the site?

The Town is responsible for construction of a new building in accordance with State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building codes), resulting from residual DoD contamination in soil or groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD contamination pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

Will the Town be required to demolish the existing town office if a new town office is built?

There is no requirement for the Town to demolish the existing Town municipal building. USACE would conduct soil testing beneath the existing structure if and when it is demolished to verify that there is no unacceptable residual soil contamination under the building footprint.

It is our understanding from what is indicated in the plan and what we have been told by representatives of the USACE that if contamination is found in a new well that is drilled that the United States Army Corps of Engineers will install a treatment system on the well. If unacceptable levels of contaminates are found in the air inside a new municipal building then why will the USACE not be obligated to provide a vapor removal or mitigation system? Is over exposure to unhealthy levels of TCE in the air any less harmful than those that are in the water?

At the time of the Proposed Plan presentation, it was not known if USACE could commit to implementation of additional mitigation action, due to guidance cited in the DoD Defense Environmental Restoration Program (DERP) Manual, dated March 2012. Since that time, this issue has been elevated to USACE Headquarters and clarified, as stated below:

If a new municipal building is constructed on this property (Lot 46), the Town of Glenburn is requested to notify USACE, so that mathematical modeling can be conducted using current site conditions to determine if indoor air sampling should be conducted (by USACE) immediately or if it can wait until the next five year review sampling period. The building should be constructed in accordance with the State of Maine building codes which are in effect at the time of construction. If vapor intrusion issues exist (after installation of any vapor mitigation system required by the building codes), resulting from residual DoD contamination in soil or

groundwater under the structure, continued vapor intrusion monitoring will be performed. If indoor air concentrations due to DoD contamination pose an unacceptable risk, action will be taken by USACE to mitigate the issue.

If TCE is found in the air in a new building will the USACE take responsibility for the TCE in the air or will it be attributed to new carpets or other factors associated with the new building? How will the USACE determine responsibility for TCE contamination in the air in a new building, if it occurs?

Vapor intrusion investigations will be performed for both sub-slab vapor and indoor air media. This will determine if there is a pathway between the groundwater contamination to sub-slab vapors, and ultimately to the indoor air. This is the method which will be used to determine if indoor air contaminants are from the groundwater versus internal new building sources (e.g., carpets, paint, etc.).

If a vapor mitigation system is needed to protect the health of Town employees and the public when a new municipal building is constructed, it should be the responsibility of the USACE to install and maintain a vapor removal system. The USACE cites the Maine State Building Code requirements and owner responsibility for Radon removal. For reasons that have previously been stated, the two situations are not the same. We differ with the Maine DEP's comment on this, as stated in the letter from Mr. Wright to Ms. Wojtas on August 15th. We do not think that the statement on taking "appropriate response actions" in the event of vapor intrusion at an unacceptable level is strong and specific enough.

See responses to comments above. USACE understands the Town's position on this issue. Due to the conceptual nature of this issue, it is difficult to make specific statements about the actions which would be taken, as it is dependent on the circumstances. USACE believes that the approach cited in comment responses above will maintain the safety of new building occupants.

<u>LAND USE CONTROLS:</u>

Can the USACE or the MDEP require the Town to implement deed restrictions (a Declaration of Restrictive Covenant) on the Town's property?

USACE or MEDEP cannot require the town to implement deed restrictions. However, it is recommended by both parties.

Will the USACE or the DEP place a deed notification affidavit on the Town's property if the Town does not approve of a Declaration of Restrictive Covenant?

USACE does not have the authority to place a deed notification affidavit on the Town's property. MEDEP may elect to place a deed notification affidavit on the Town's property.

What criteria did the USACE use to classify zones 1, 2 and 3?

The following is the criteria used to classify Land Use Control Zones 1, 2, and 3:

Zone 1: This area includes locations where TCE concentrations currently exceed the MCL in groundwater and/or where residual TCE may be present in soil (beneath the existing Town Municipal Building).

Zone 2: This area includes locations where TCE has been detected (historical or current), or is in the zone represented by the approximate extent of groundwater contamination (see Figure 5 of the Proposed Plan).

Zone 3: This area includes locations abutting or adjacent to Zone 1 or 2 properties.

Has a procedure been proposed to reclassify properties, if needed? If so, what is that process?

The Land Use Control Zones will be re-assessed based on data obtained during the LTM program. Adjustments will be made based on the zone classifications described in the response above.

Why were the zones set up by property boundaries rather than by proximity to the plume?

The zones are set up by proximity to the plume. The property boundaries are used to determine where notification letters will be sent.

Will the Town be responsible for paying for the annual notice letters to private property owners or any other methods of Land Use Controls for zones 1, 2 and 3?

USACE will be responsible for sending the annual notification letters.

<u>DECISION DOCUMENT & LONG TERM MONITORING PLAN:</u>

Could you please clarify for the Town what the purpose of the Decision Document is for the Glenburn FUDS site?

The Decision Document is prepared following completion of the Proposed Plan to identify the remedial alternative chosen for implementation based on information from the Remedial Investigation/Feasibility Study (RI/FS) and consideration of public comments and community concerns. The remedy selected must be protective of human health and the environment, attain all State and Federal Applicable or Relevant and Appropriate Requirements (ARARs), be cost-effective, and use permanent solutions and use alternative treatment or recovery technologies to the maximum extent practicable. The Decision Document certifies that the remedy selection process was carried out in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). It describes the technical parameters of the remedy, specifying the methods selected to protect human health and the environment, including treatment, engineering, and institutional control components, as well as cleanup levels. The Decision Document provides the public with a consolidated summary of information about the Site and the rationale for selection of the chosen remedy. It is the legal document which represents the framework for implementation of the Selected Remedy. The Decision Document is

used during the Five Year Review to determine if the remedy has been implemented as specified in the Decision Document and remains protective of human health and the environment.

Can you tell us what the USACE intends to include in the Decision Document?

The Decision Document will include the technical details for implementation of the remedy summarized in the Proposed Plan. See the response to the above comment for more details. A draft version of the document will be provided to MEDEP and the Town prior to finalization.

Will the Decision Document include specific guidelines that will outline the responsibilities of the USACE and the processes that will be used at the Glenburn FUDS Site?

Yes, the Decision Document will specify the processes that will be used to implement the remedy at the Glenburn FUDS.

What role, if any, will the Town of Glenburn play in the creation and approval of the final Decision Document and the Long Term Monitoring Plan (LTMP)?

The Town will be provided a copy of the Draft Decision Document and Draft LTMP, and be given an opportunity to comment on the documents.

What happens if the Town is not satisfied with the contents of the final Decision Document or Long Term Monitoring Plan?

The Town comments on the Draft Decision Document and the Draft LTMP will be addressed to the extent possible and practicable. Open communication between USACE and the Town is expected to continue during the process of generating these documents.

Will the Town be able to prevent the Decision Document and Long Term Monitoring Plan from being approved and implemented, if the Town is not satisfied with the content of the Decision Document and Long Term Monitoring Plan?

It is not a legal requirement that the Town approve the Decision Document or the LTMP prior to finalization. However, USACE strongly seeks concurrence from the Town with respect to these documents, and is confident that agreement can be reached.

Does the USACE intend to prepare a draft of the LTMP for any interested parties and do you have an idea when that plan would be available for review by the Town?

The Draft Decision Document and Draft LTMP were made available in April/May 2015.

Will the Town have input into the final contents of the Long Term Monitoring Plan?

USACE plans to prepare a draft LTMP, and the Town will be provided an opportunity to comment on it

Can you define what "dynamic" means?

The term "dynamic" with respect to the LTMP means that the sampling plan (e.g., locations and frequency) may change over time, based on site data.

GENERAL QUESTIONS:

What is the clean-up goal (Remedial Action Objectives, or RAOs) for the Glenburn site? Please tell us what the RAOs are for the Glenburn FUDS Site.

The RAOs for the site are:

Prevent ingestion of groundwater containing TCE concentrations (or degradation by-products) exceeding the Federal maximum contaminant levels (MCL).

Attain the TCE MCL for all groundwater within the site.

What is the USACE definition for the attainment of the RAO clean-up goal?

The attainment of the RAO will be met when the clean up goal is achieved, with statistical assurance.

What is the statistical or scientific basis for the establishment of a reasonable period of time to verify that the RAO clean-up goal is attained?

The statistical method for assurance that the cleanup goal is attained will be specified in the Decision Document and the LTMP. It is anticipated that a period of one to five years will be used to verify that the cleanup level is attained (e.g., if TCE is not detected above the MCL in any monitoring location for a period of three years, this will be considered evidence that the remedial action objective has been achieved).

Can you provide us with a copy of what the current Applicable or Relevant and Appropriate Regulations (ARARs) apply to the Glenburn FUDS site?

Table 5-1 of the RI/FS Report summarizes all of the preliminary ARARs for the Glenburn Site. The only ARAR is the Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR Part 141.11 and 141.61. Additionally, ARARs are summarized in Table 1 of the Decision Document.

Will the United States Army Corps of Engineers (USACE) provide assistance and services to address the concerns of the Town of Glenburn beyond those that the USACE are required to provide by state and federal law i.e., the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA)?

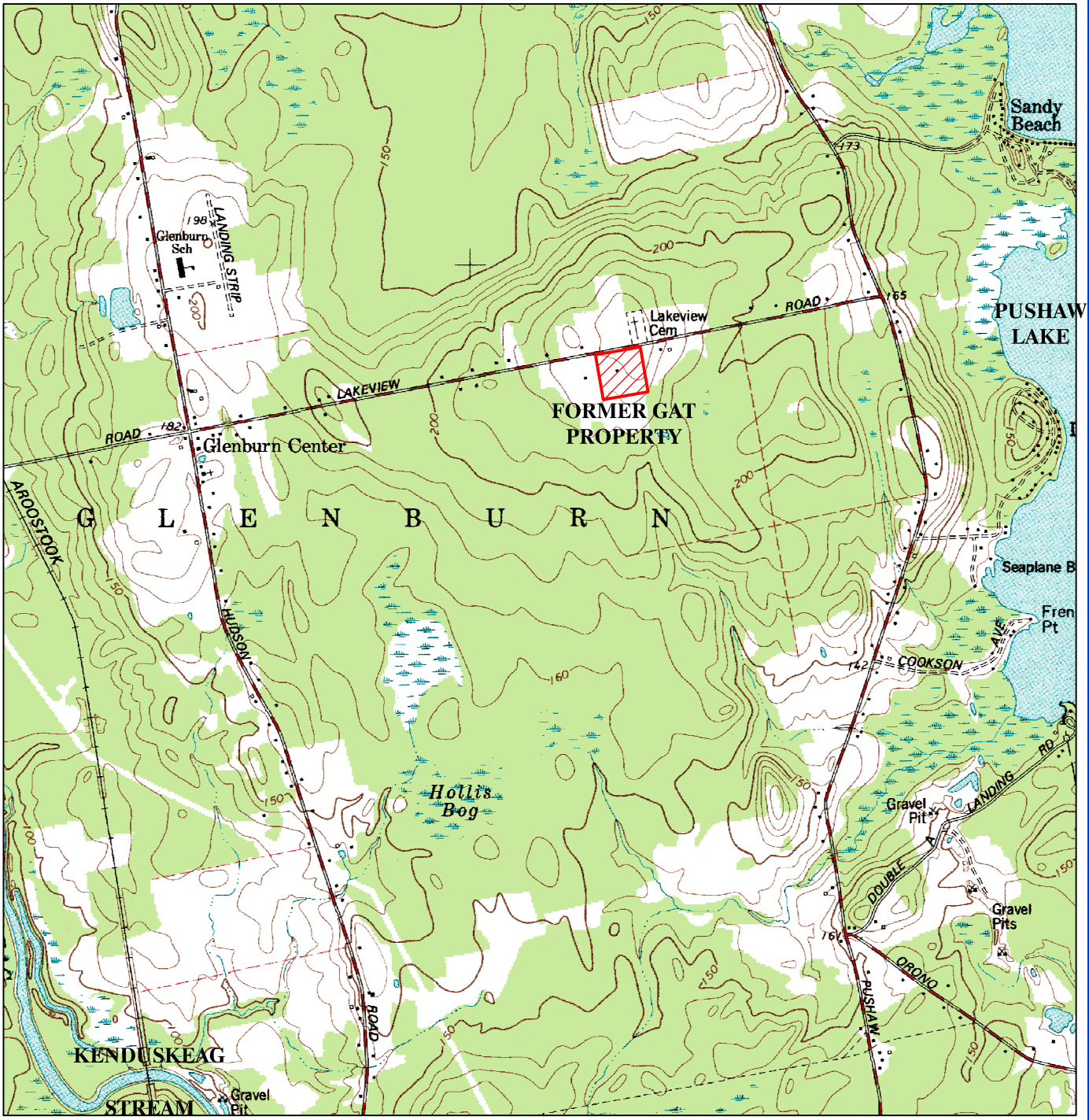
USACE must follow CERCLA and the NCP in the selection of the remedy and will use CERCLA guidance, as appropriate, in implementing the remedy for FUDS project.

What can the United States Army Corps of Engineers unequivocally commit to regarding future remedial activities at the Glenburn site?

The Glenburn Site remedy, which the USACE will be committed to implement, will be described in detail in the Decision Document, and follow the general criteria that are outlined in the Proposed Plan.

FIGURES

Location Map.dwg



N

1 0.5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000

FEET

CONTOUR INTERVAL 10 FEET

ME

LOCATION

BASE MAP: USGS 7.5 Minute Topographic Quadrangle PUSHAW LAKE, ME

FIGURE 1: GENERAL SITE LOCATION
FORMER GAT FACILITY
GLENBURN, MAINE

NOTES: CONTENTS FROM USACE TEC 2004;
PROPERTY LINES FROM GLENBURN TAX MAPS.
TCE = TRICHLOROETHENE

N

TRUE NORTH

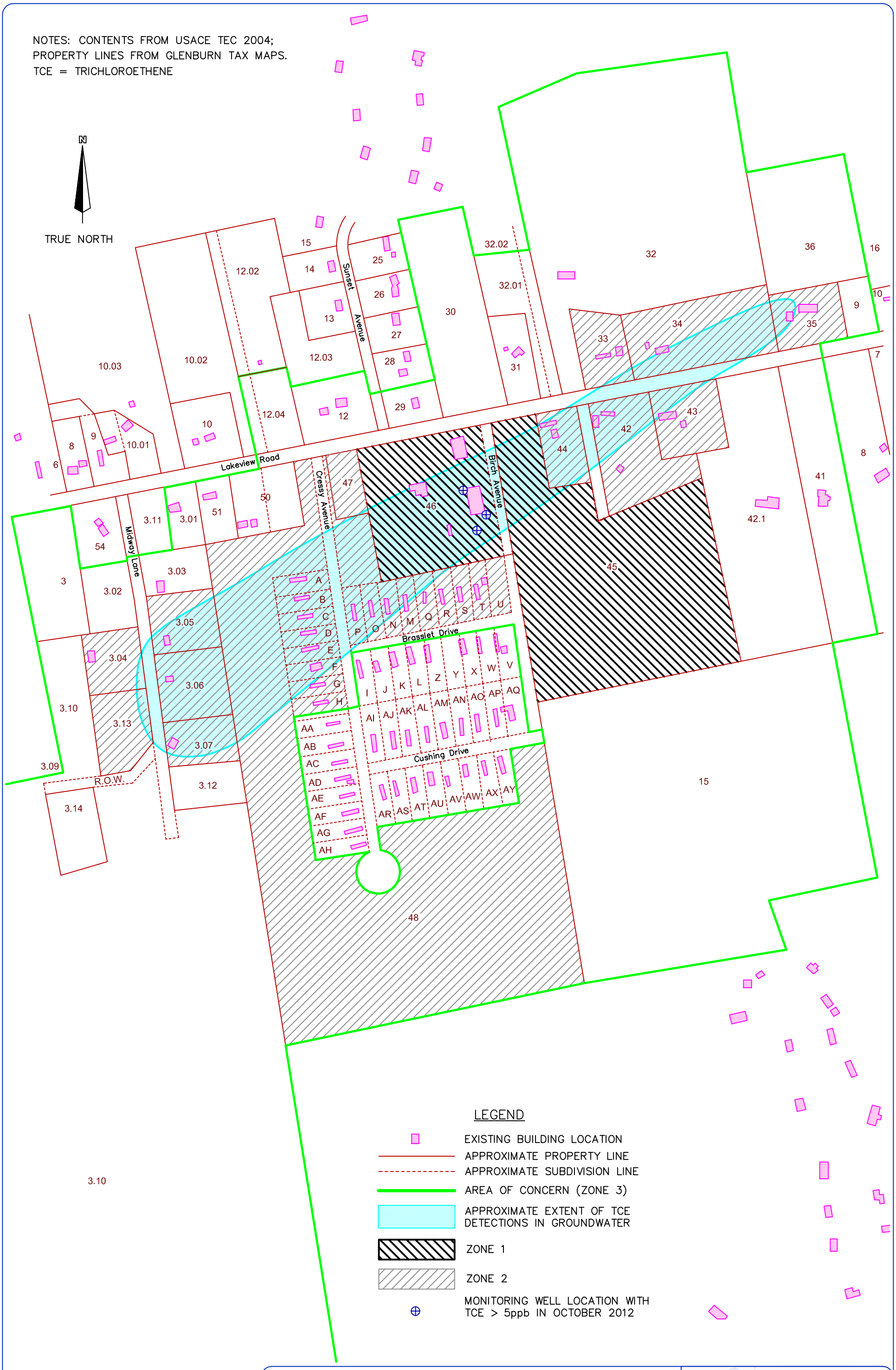


FIGURE 2
PROPERTY MAP WITH AREA OF CONCERN
FORMER GAT STUDY AREA
GLENBURN, MAINE

0 100 200 400
SCALE IN FEET

REVISED 09/09/15 TJK
REVISED 03/24/15 TJK
REVISED 12/15/14 TJK
K:\1-2128-9\CAD\Sample Locations 2014.dwg

N

TRUE NORTH

CRESSY ROAD

LAKEVIEW ROAD

10" CMP

SOURCES

ref. USACE NED 2003 SURVEY.

SITE PLAN, GLENBURN PUBLIC SAFETY BUILDING BY CARPENTER ASSOCIATES SEPTEMBER 1994.

DRAFT CONCEPTUAL SITE MODEL, FORMER GAT FACILITY, GLENBURN ME BY USACE AUGUST 2007.

SUB-METER TRIMBLE GPS DATA BY THE JOHNSON COMPANY, INC. NOVEMBER 2007.

SURVEY BY THE JOHNSON CO. ON 8/29/08.

SURVEY BY THE JOHNSON CO. ON 11/22/08.

SURVEY BY THE JOHNSON CO. ON 08/04/10.

GLENBURN TAX MAPS

LEGEND

- UTILITY POLE W/GUY WIRE
- ROOF DRAIN LOCATION
- FLOOR DRAIN LOCATION
- TEST PIT SOIL SAMPLE LOCATION
- (D) DRY WELL LOCATION
- (W) WATER SUPPLY WELL LOCATION
- (M) MONITORING WELL LOCATION
- (O) OBSERVATION WELL LOCATION
- 1' GROUND SURFACE CONTOUR
- PROPANE TANK LOCATION
- LIGHT POLE LOCATION
- CB STORM DRAIN LOCATIOIN
- APPROX. PROPERTY LINE
- P PROPANE SUPPLY LINE
- E OVERHEAD ELECTRIC LINE
- E UNDGERGROUND ELECTRIC LINE
- W APPROX. UNDERGROUND WATER MAIN
- D UNDERGROUND DRAIN LINE
- S UNDERGROUND SANITARY SEWER LINE
- FORMER FENCELINE
- CULVERT
- ST SEPTIC TANK OR CESSPOOL

240 240 240 245 245 245 240 235 235 235 240 240

14" APPLE

22" MAPLE

26" OAK

4" MAPLE

6' C.L.F.

SKATEBOARD PARK

16" CMP

12" CMP

12" CMP

GRASS AREA

GRASS AREA

PAVED AREA

BOULDER (TYP.) (VEHICLE BARRIER)

HORSE SHOE PITS

FLAGPOLE

GB-PW-01

FIREHOUSE

BM

PAVED AREA

GRASS AREA

BM

PROPANE TANK

BIRCH AVE.

PAVED AREA

PAVED AREA

GRASS AREA

PAVED DIRT

BM

GB-MW-03S & D

TOWN HALL

Former #2 Fuel Oil UST

GBTP01-1

GBTP02-2

GBTP01-2

GAS SHED

GB-MW-03S & D

GB-MW-06

GB-MW-01

GRASS AREA

CESSPOOL COVER

TOWERS

Cesspool

Tree Line (Typical)

PW-03

24" APPLE

20" APPLE

18" APPLE

20" APPLE

22" APPLE

GBTP03-1

GBTP04-1

GBTP03-2

GBTP04-2

SALT STORAGE (QUONSET HUT)

GB-MW-02

12" CPP

Former Septic Tank

GB-MW-04S & D

0 15 30 60

SCALE IN FEET (APPROXIMATE)

FIGURE 3
SITE PLAN
FORMER GAT STUDY AREA
GLENBURN, MAINE

K:\1-2128-9\CAD\GB.dwg

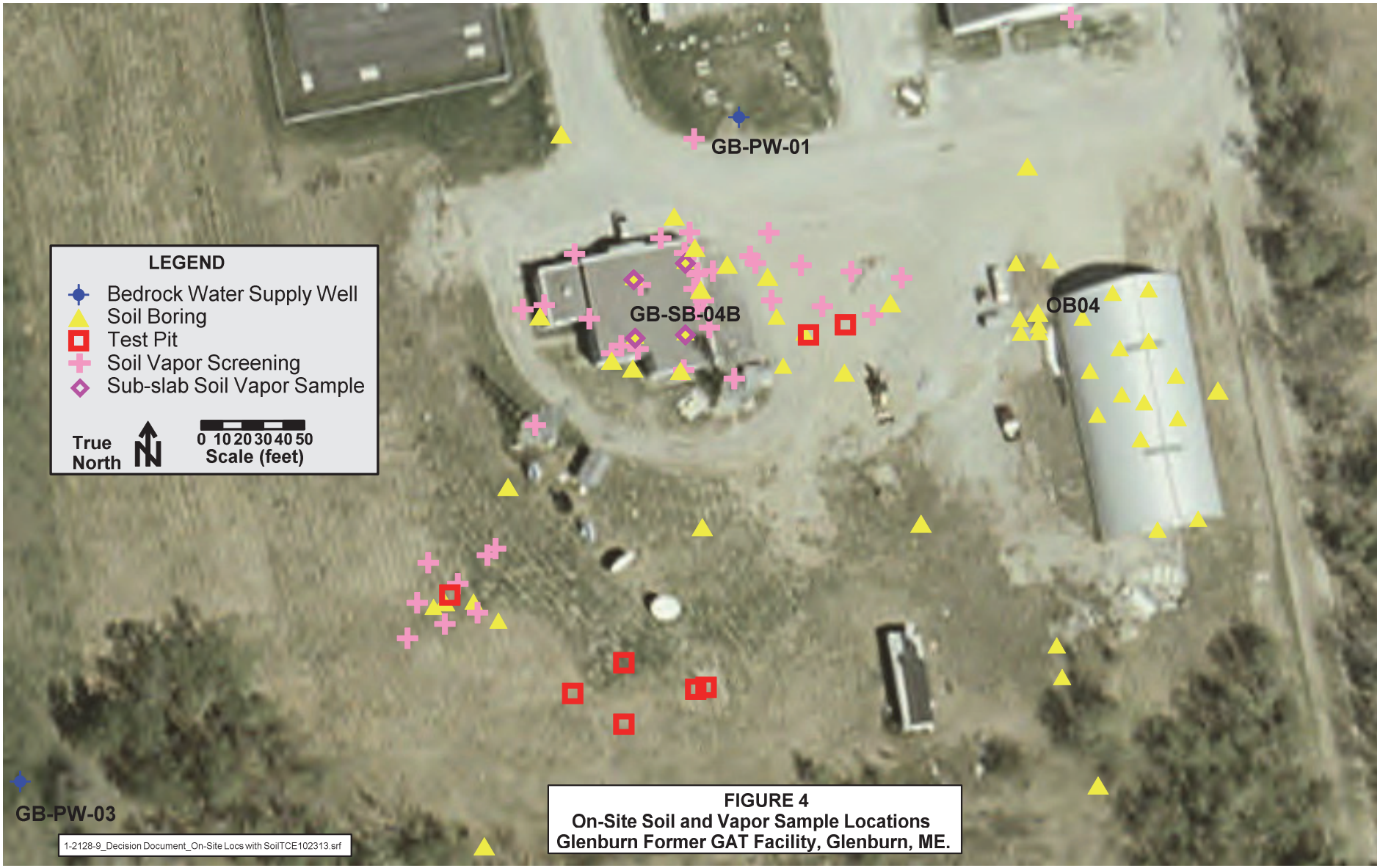
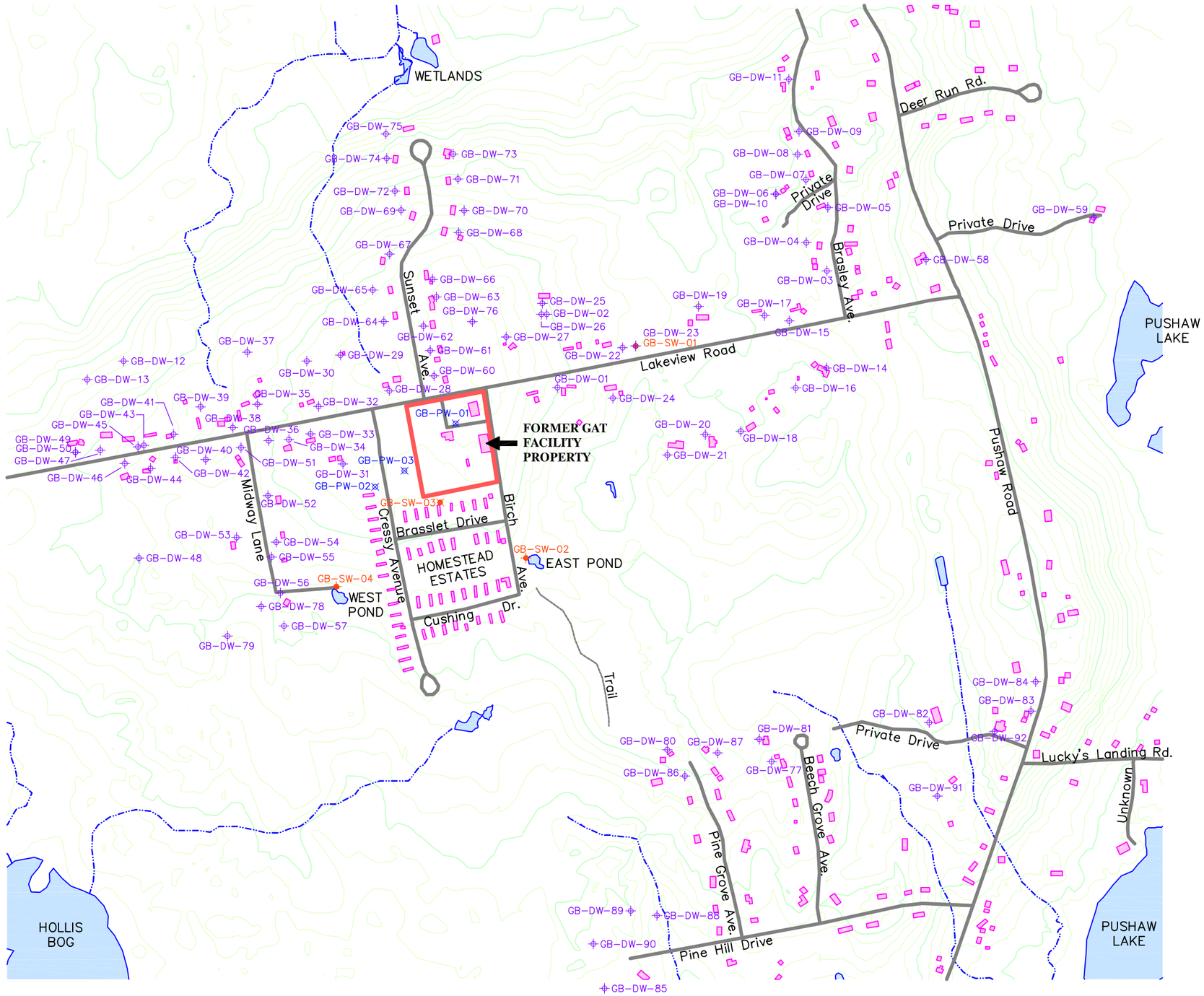


FIGURE 4
On-Site Soil and Vapor Sample Locations
Glenburn Former GAT Facility, Glenburn, ME.



LEGEND

- ON–SITE GROUNDWATER SAMPLING LOCATION
- OFF–SITE GROUNDWATER SAMPLING LOCATION
- ON–SITE PORE WATER SAMPLLING LOCATION
- OFF–SITE PORE WATER SAMPLLING LOCATION
- EXISTING BUILDING LOCATION
- SURFACE WATER BODY
- SURFACE WATER / DRAINAGE
- 5' GROUND SURFACE CONTOUR (FT NAD83)
- 25' GROUND SURFACE CONTOUR (FT NAD83)
- ROAD
- APPROXIMATE PROPERTY LINE

NOTES: CONTENTS FROM USACE TEC 2004
PROPERTY LINES FROM GLENBURN TAX MAPS.

N

TRUE NORTH

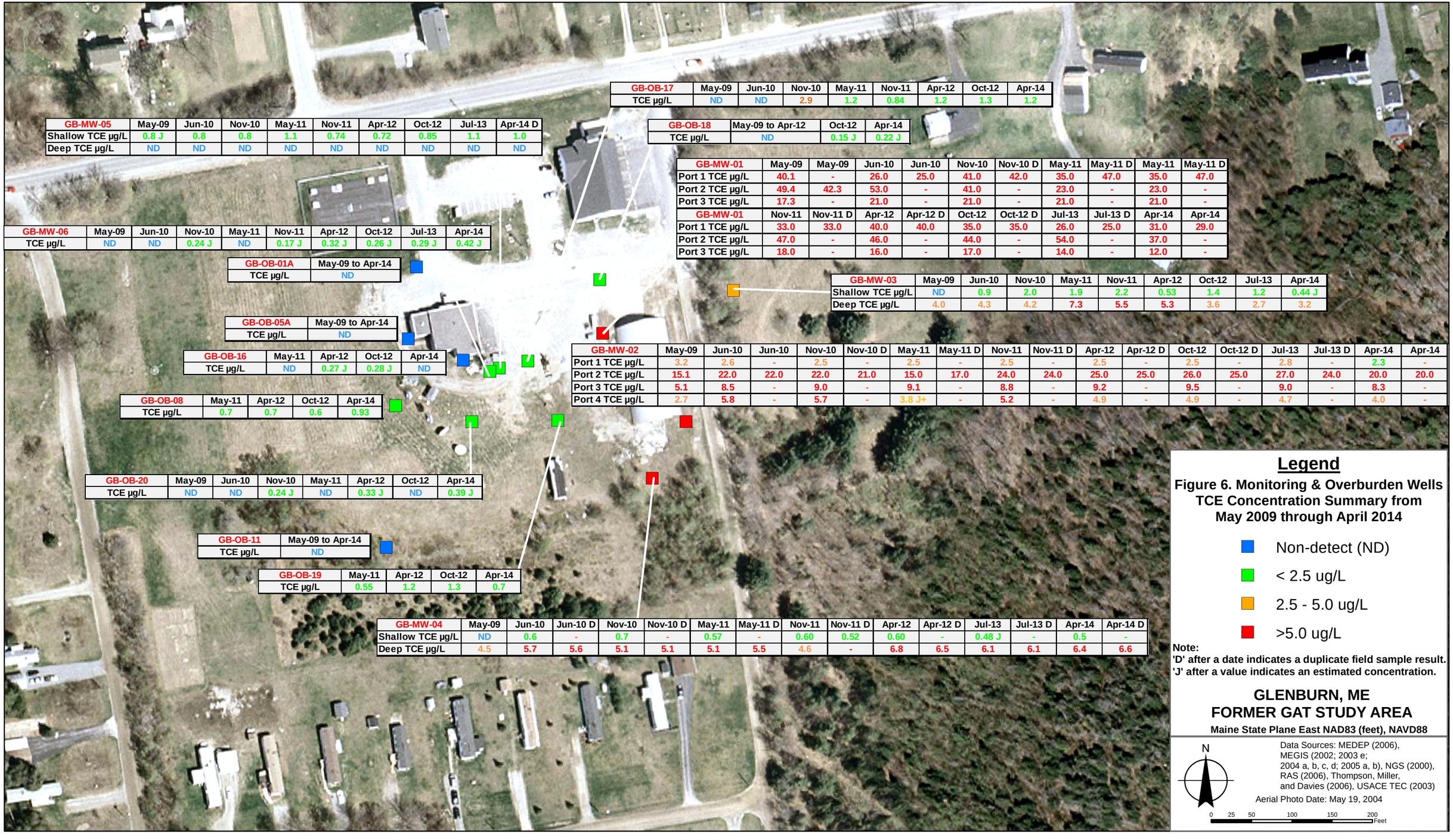
0 250 500 750

SCALE IN FEET

Sample Locations.dwg

Revised 08/21/15

FIGURE 5: WATER SUPPLY AND PORE WATER SAMPLE LOCATIONS FORMER GAT STUDY AREA GLENBURN, MAINE



GB-MW-05	May-09	Jun-10	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Jul-13	Apr-14 D
Shallow TCE µg/L	0.8 J	0.8	0.8	1.1	0.74	0.72	0.85	1.1	1.0
Deep TCE µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND

GB-MW-06	May-09	Jun-10	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Jul-13	Apr-14
TCE µg/L	ND	ND	0.24 J	ND	0.17 J	0.32 J	0.26 J	0.29 J	0.42 J

GB-OB-01A	May-09 to Apr-14
TCE µg/L	ND

GB-OB-05A	May-09 to Apr-14
TCE µg/L	ND

GB-OB-16	May-11	Apr-12	Oct-12	Apr-14
TCE µg/L	ND	0.27 J	0.28 J	ND

GB-OB-08	May-11	Apr-12	Oct-12	Apr-14
TCE µg/L	0.7	0.7	0.6	0.93

GB-OB-20	May-09	Jun-10	Nov-10	May-11	Apr-12	Oct-12	Apr-14
TCE µg/L	ND	ND	0.24 J	ND	0.33 J	ND	0.39 J

GB-OB-11	May-09 to Apr-14
TCE µg/L	ND

GB-OB-19	May-11	Apr-12	Oct-12	Apr-14
TCE µg/L	0.55	1.2	1.3	0.7

GB-OB-17	May-09	Jun-10	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Apr-14
TCE µg/L	ND	ND	2.9	1.2	0.84	1.2	1.3	1.2

GB-OB-18	May-09 to Apr-12	Oct-12	Apr-14
TCE µg/L	ND	0.15 J	0.22 J

GB-MW-01	May-09	May-09	Jun-10	Jun-10	Nov-10	Nov-10 D	May-11	May-11 D	May-11	May-11 D
Port 1 TCE µg/L	40.1	-	26.0	25.0	41.0	42.0	35.0	47.0	35.0	47.0
Port 2 TCE µg/L	49.4	42.3	53.0	-	41.0	-	23.0	-	23.0	-
Port 3 TCE µg/L	17.3	-	21.0	-	21.0	-	21.0	-	21.0	-
GB-MW-01	**Nov-11**	**Nov-11 D**	**Apr-12**	**Apr-12 D**	**Oct-12**	**Oct-12 D**	**Jul-13**	**Jul-13 D**	**Apr-14**	**Apr-14**
Port 1 TCE µg/L	33.0	33.0	40.0	40.0	35.0	35.0	26.0	25.0	31.0	29.0
Port 2 TCE µg/L	47.0	-	46.0	-	44.0	-	54.0	-	37.0	-
Port 3 TCE µg/L	18.0	-	16.0	-	17.0	-	14.0	-	12.0	-

GB-MW-03	May-09	Jun-10	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Jul-13	Apr-14
Shallow TCE µg/L	ND	0.9	2.0	1.9	2.2	0.53	1.4	1.2	0.44 J
Deep TCE µg/L	4.0	4.3	4.2	7.3	5.5	5.3	3.6	2.7	3.2

GB-MW-02	May-09	Jun-10	Jun-10	Nov-10	Nov-10 D	May-11	May-11 D	Nov-11	Nov-11 D	Apr-12	Apr-12 D	Oct-12	Oct-12 D	Jul-13	Jul-13 D	Apr-14	Apr-14
Port 1 TCE µg/L	3.2	2.6	-	2.5	-	2.5	-	2.5	-	2.5	-	2.5	-	2.8	-	2.3	-
Port 2 TCE µg/L	15.1	22.0	22.0	22.0	21.0	15.0	17.0	24.0	24.0	25.0	25.0	26.0	25.0	27.0	24.0	20.0	20.0
Port 3 TCE µg/L	5.1	8.5	-	9.0	-	9.1	-	8.8	-	9.2	-	9.5	-	9.0	-	8.3	-
Port 4 TCE µg/L	2.7	5.8	-	5.7	-	3.8 J+	-	5.2	-	4.9	-	4.9	-	4.7	-	4.0	-

GB-MW-04	May-09	Jun-10	Jun-10 D	Nov-10	Nov-10 D	May-11	May-11 D	Nov-11	Nov-11 D	Apr-12	Apr-12 D	Jul-13	Jul-13 D	Apr-14	Apr-14 D
Shallow TCE µg/L	ND	0.6	-	0.7	-	0.57	-	0.60	0.52	0.60	-	0.48 J	-	0.5	-
Deep TCE µg/L	4.5	5.7	5.6	5.1	5.1	5.1	5.5	4.6	-	6.8	6.5	6.1	6.1	6.4	6.6

Legend

Figure 6. Monitoring & Overburden Wells TCE Concentration Summary from May 2009 through April 2014

- Non-detect (ND)
- < 2.5 ug/L
- 2.5 - 5.0 ug/L
- >5.0 ug/L

Note:
'D' after a date indicates a duplicate field sample result.
'J' after a value indicates an estimated concentration.

GLENBURN, ME
FORMER GAT STUDY AREA
Maine State Plane East NAD83 (feet), NAVD88

N

Data Sources: MEDEP (2006), MEGIS (2002; 2003 e; 2004 a, b, c, d; 2005 a, b), NGS (2000), RAS (2006), Thompson, Miller, and Davies (2006), USACE TEC (2003)

Aerial Photo Date: May 19, 2004

0 25 50 100 150 200 Feet

GB-SW-01	May-07	Oct-07	Apr-08	Oct-08	May-09	May-09 D	Dec-09	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Jul-13	Apr-14
TCE µg/L	1.4	ND	0.9	1.2	1.0	1.0	1.1	0.82	0.58	0.94	1	1.1	0.63	.48 J

SW-01

Lakeview Rd

GB-SW-04	May-07	Oct-07	Apr-08	Oct-08	May-09	Dec-09	Jun-10	Jun-10 D	Nov-10	Nov-10 D	May-11	May-11 D	Nov-11	Nov-11 D	Apr-12	Apr-12 D	Oct-12	Oct-12 D	Jul-13	Apr-14
TCE µg/L	2.6	ND	3.6	3.5	3.6	3.5	0.78	0.75	0.46 J	0.43 J	1.2	1.3	1.4	1.5	2.3	2.2	0.56	0.56	1.5	ND

Midway Ln

SW-04

SW-03

GB-SW-03	Oct-08 to Oct-12
TCE µg/L	ND

SW-02

GB-SW-02	May-07 to Oct-12
TCE µg/L	ND

LEGEND

Figure 7. Surface Water / Seep TCE Concentration Summary from May 2007 through April 2014

- Non-detect (ND)
- < 2.5 ug/L
- 2.5 - 5.0 ug/L

Notes:
'D' after the date indicates a duplicate field sample.
'J' after the value indicates an estimated concentration.

GLENBURN, ME
FORMER GAT STUDY AREA

Maine State Plane East NAD83 (feet), NAVD88

N

Data Sources: MEDEP (2006), MEGIS (2002; 2003 e; 2004 a, b, c, d; 2005 a, b), NGS (2000), RAS (2006), Thompson, Miller, and Davies (2006), USACE TEC (2003)

Aerial Photo Date: May 19, 2004

0 100 200 400 600 Feet

GB-DW-22	May-07	Oct-07	Apr-08	Oct-08	May-09	May-09	Dec-09	Jun-10	Jun-10	Nov-10	Nov-10 D	May-11	May-11 D	Nov-11	Nov-11 D	Apr-12	Apr-12 D	Oct-12	Oct-12 D	Jul-13	Jul-13 D	Apr-14	Apr-14 D
TCE µg/L	5.1	3.0	3.8	3.3	4.1	4.1	4.0	2.8	2.8	2.2	2.2	3.4	3.0	1.9	1.9	2.4	2.3	2.0	2.0	2.0	2.0	1.3	1.5

GB-DW-08	May-07 to Apr-14
TCE µg/L	ND

GB-DW-05	May-07 to Apr-14
TCE µg/L	ND

GB-DW-04	Apr-08 to Oct-12
TCE µg/L	ND

GB-DW-17	May-07 to Apr-14
TCE µg/L	ND

GB-DW-03	May-07 to Apr-14
TCE µg/L	ND

GB-DW-02	May-07 to Apr-14
TCE µg/L	ND

GB-DW-15	May-07 to Apr-14
TCE µg/L	ND

GB-DW-60	May-07 to Apr-14
TCE µg/L	ND

GB-DW-24	May-07 to Apr-14
TCE µg/L	ND

GB-DW-31	May-07 to Jul-13
TCE µg/L	ND

GB-PW-01	May-07 to Apr-14
TCE µg/L	ND

GB-DW-19	May-07 to May-11	Nov-11	Apr-12	Oct-12	Jul-13	Jul-13	Apr-14
TCE µg/L	ND	0.16 J	0.16 J	0.15 J	0.30 J	0.30 J	ND

GB-PW-03	May-07	Oct-07	Apr-08	Oct-08	May-09	Dec-09	Jun-10	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Apr-14
TCE µg/L	ND	2.2	ND	ND	ND	ND	ND	0.39 J	ND	ND	ND	ND	ND

GB-DW-52	May-07 to Apr-14
TCE µg/L	ND

GB-PW-02	May-07	Oct-07	Apr-08	Oct-08	May-09	Dec-09	Jun-10	Nov-10	May-11	Nov-11	Nov-11 D	Apr-12	Apr-12 D	Oct-12	Oct-12 D	Apr-14
TCE µg/L	ND	1.0	ND	ND	ND	0.1 J	ND	ND	ND	0.19 J	0.19 J	ND	ND	0.12 J	ND	ND

GB-DW-54	May-07	Oct-07	Apr-08	Oct-08	May-09	Dec-09	Dec-09	Jun-10	Nov-10	May-11	Nov-11	Apr-12	Oct-12	Jul-13	Apr-14
TCE µg/L	1.2	ND	1.4	ND	0.9	0.8	0.9	ND	ND	0.66	ND	0.27 J	0.56	0.26 J	ND

GB-DW-53	May-07 to Apr-14
TCE µg/L	ND

GB-DW-55	May-07	Oct-07	Apr-08	Oct-08	May-09	Dec-09	Jun-10	Jun-10 D	Nov-10	Nov-10 D	May-11
TCE µg/L	ND	1.3	1.6	0.6	1.1	1.2	0.62	0.63	0.57	0.61	0.88
GB-DW-55	May-11 D	Nov-11	Nov-11 D	Apr-12	Apr-12 D	Oct-12	Oct-12 D	Jul-13	Jul-13 D	Apr-14	Apr-14
TCE µg/L	0.80	0.56	0.55	1	0.96	0.91	0.94	0.83	0.92	0.64	0.69

GB-DW-78	May-07 to Apr-14
TCE µg/L	ND

GB-DW-56	May-07	Oct-07 to Apr-14
TCE µg/L	2.1	ND

GB-DW-57	May-07 to Apr-14
TCE µg/L	ND

GB-DW-94	Jul-13 to Apr-14
TCE µg/L	ND

GB-DW-80	May-07 to Jul-13
TCE µg/L	ND

GB-DW-85	May-07 to Apr-14
TCE µg/L	ND

DW-08 DW-05 DW-04 DW-03 DW-02 DW-19 DW-17 DW-22 DW-15 DW-60 DW-24 PW-01 DW-31 PW-03 DW-52 PW-02 DW-53 DW-54 DW-55 DW-56 DW-78 DW-57 DW-94 DW-80 DW-85

Pushaw Lake

Brackett Ave

Lakeview Rd.

Midway Dr

LEGEND

Figure 8. Domestic and Public Well TCE Concentration Summary from May 2007 through April 2014

Residential Wells

- Non-detect (ND)
- < 2.5 ug/L
- 2.5 - 5.0 ug/L
- > 5.0 ug/L

Public Wells

- Non-detect (ND)

Notes:
'D' after the date indicates a duplicate field sample.
'J' after the value indicates an estimated concentration.

GLENBURN, ME
FORMER GAT STUDY AREA
Maine State Plane East NAD83 (feet), NAVD88

N

Data Sources: MEDEP (2006), MEGIS (2002; 2003 e; 2004 a, b, c, d; 2005 a, b), NGS (2000), RAS (2006), Thompson, Miller, and Davies (2006), USACE TEC (2003)
Aerial Photo Date: May 19, 2004

0 250 500 1,000 Feet

TABLES

Table 1
Summary of ARAR/TBC Evaluation
Glenburn (ME) GAT Facility

Jurisdiction	Media	Requirement	Status	Description	Applicability Alternative 2 Monitored Natural Attenuation with Wellhead Treatment, Long-Term Monitoring, Institutional Controls
Chemical-Specific ARARs/TBCs					
Federal	Groundwater	Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) 40 CFR Part 141.11-141.16; and 141.60 - 141.66	Relevant and Appropriate	MCLs regulate the concentrations of contaminants in public drinking water supplies. The MCL was used as the basis for developing a RAO for site groundwater that prevents the ingestion of groundwater that exceeds the MCL of 5 ppb for TCE.	Alternative 2 would not immediately comply with this ARAR for on-site groundwater. TCE concentrations will be reduced over a period of decades via natural attenuation mechanisms. Institutional controls and point of entry treatment systems would prevent use of on-site groundwater as drinking water.
Federal	Air	USEPA OSWER Pulblication 9200.2-154 Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor to Indoor Air June 2015 (or most current)	To Be Considered	Technical reommendations by USEPA based on current understanding of vapor intrusion into indoor air from subsurace vapor sources.	Alternative 2 includes on-going monitoring of vapor intrusion in the GAT Facility Building (currently the Glenburn Municipal Building), and evaluation of the public saftety building for possible VI impacts.
Federal	Air and Soil	Regional Screening Levels for Chemical Contamination at Superfund Sites, June 2015 (or most current). www.epa.gov/region9/superfund/prg/	To Be Considered	The Region 9 PRGs have been harmonized with similar risk-based screening levels used by Regions 3 and 6 into a single table: "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites." These updated screening levels, along with a detailed user's guide and supplementary tables, can be accessed directly on-line or downloaded to a computer. The web site contains a Screening Level Calculator to assist in calculating site-specific screening levels.	Alternative 2 includes on-going monitoring of vapor intrusion in the GAT Facility Building (currently the Glenburn Municipal Building), and evaluation of the public saftety building for possible VI impacts. Alternative 2 includes investigation of soil under the GAT Facility Building if it is demolished.
State	Soil and Indoor Air	Maine Remedial Action Guidelines for Sites Contaminated with Hazardous Substances May 8, 2013 (or most current)	To Be Considered	These guidelines provide an appoach that is generally acceptable to MEDEP for determining contaminant specific cleanup goals for soil (i.e., from direct contact or from leaching from soil to groundwater) that is contaminated with hazardous substances, and inhalation of indoor air.	Alternative 2 includes investigation of soil under the GAT Facility Building if it is demolished. Alternative 2 includes on-going monitoring of vapor intrusion in the GAT Facility Building (currently the Glenburn Municipal Building), and evaluation of the public saftety building for possible VI impacts.
Location-Specific ARARS/TBCs - there are no Location-Specific ARARS/TBCs					
Action-Specific ARARs/TBCs - there are no Action-Specific ARARs/TBCs					

Table 2 Site Investigations		
Date (s)	**Investigation Description**	**Reference(s)**
Mid - 1980s	Prior to construction of the Town's covered salt storage shed in 1986, MEDEP investigated dissolved road salt contamination of well water likely originating from the uncontained salt piles kept near the Former GAT facility by the Town of Glenburn.	MEDEP, 1996.
1987 & 1989	The Town, under the direction of MEDEP, removed the USAF-installed 1,000-gallon gasoline underground storage tank (UST) in 1987, and a 10,000-gallon Number 2 diesel fuel oil UST in 1989. MEDEP reported that both tanks showed no evidence of leaking.	MEDEP, 1996
1991	The University of Maine at Orono had two bedrock wells installed adjacent to the sand/salt shed to monitor salt contamination in the groundwater. Samples collected from wells GB-MW-01 (formerly UMO-1) and GB-MW-02 (formerly UMO-2) contained high salt levels. Trichloroethene (TCE) was also reported present in both wells at levels above MCLs.	MEDEP, 1996
1994	The Maine Department of Health and Human Services reported TCE detections (below MCLs) in the two Homestead Estates Mobile Home Park public water supply wells located adjacent to and west of the Property (GB-PW-02 and GB-PW-03).	MEDEP, 1996
1995	In response to the TCE detections in the Homestead Estates public water supply wells, several nearby residential wells were sampled by MEDEP.	MEDEP, 2006b
1995	As part of MEDEP's investigation of potential sources of TCE detected in individual residential and Homestead Estates public supply wells, MEDEP investigated the GAT Facility cesspool area.	MEDEP, 1996
2000	The residential wells tested previously were tested again, along with additional residential wells along Midway Lane, Sunset Avenue, Lakeview Avenue, and the Pine Grove/Beach Grove areas.	MEDEP, 2006b
2000	MEDEP performed limited borehole geophysics on four bedrock wells. Packer samples were collected based on the results of caliper and single point resistance logs and analyzed for volatile organic compounds (VOCs).	NGS, 2001
2002	Twenty-eight residential wells were sampled by USACE in cooperation with the Town and analyzed for VOCs.	USACE, 2008a
2002-2014	Residential wells continued to be sampled at various times from 2002-2014. One residential well was equipped with a granulated activated carbon point-of-use treatment system. A sampling plan for residential wells was developed by the USACE for residential well sampling, generally in the spring and fall of each year, which was initiated in 2007. The most recent monitoring round with data available was completed in April 2014.	USACE, various dates; Woods Hole Group, 2014
2002-2014	The Homestead Estates wells (GB-PW-02 and GB-PW-03) have generally been sampled by the USACE semi-annually since 2002.	Woods Hole Group, 2014
2003, 2004, 2007	USACE and the Town conducted a well location survey in 2003 and 2004 for properties within 1,000 feet of the former GAT Facility to determine the locations of active and inactive wells; and information related to well drilling, well construction, and water use. Similar information was requested from the Maine Geological Survey (MGS), the agency responsible for incorporating data filed by Maine drilling companies. The data were augmented in 2007 for new wells completed on southern Midway Lane and the Pine Hill area.	USACE, 2008a

Table 2 Site Investigations		
Date (s)	**Investigation Description**	**Reference(s)**
2003	USACE ERDC Topographic Engineering Center prepared a photogeologic fracture trace analysis.	USACE TEC, 2003
2004	US Army Engineer Research and Development Center, in conjunction with the Topographic Engineering Center, conducted a GIS-based analysis of historical photos of the Site.	USACE TEC, 2004
2003-2014	USACE began manual monitoring of water levels in accessible wells in July 2003 and continued manual monitoring through 2014, adding automated pressure transducers in some monitoring wells over time.	USACE, 2008a and Woods Hole Group, 2014
2003	USACE conducted a passive soil gas screening survey around the exterior of the former GAT Facility to identify potential source areas.	USACE, 2004b
2005-2006	Geophysical Applications Incorporated (GAI), and RAS, Inc., conducted comprehensive borehole geophysics logging and testing.	GAI, 2005; RAS, 2006
2003-2005	USACE conducted an extensive surface geophysics investigation from 2003 to 2005 to evaluate the presence, location, and extent of potential waste burial sites.	ANL, 2006
2004	Eight soil gas samples and eight soil samples were collected through holes cored in the Former GAT Facility floor by USACE and the United States Army Center for Health Promotion and Preventive Medicine.	USACE, 2008b
2006	USACE conducted an indoor air sampling event in the former GAT facility building.	USACE, 2008b
2006	MEDEP oversaw the removal of two municipally-owned septic tanks located southwest of the salt storage building, and soil samples collected in the areas of the tanks had no detections of any VOCs.	MEDEP, 2006a
2006	USACE excavated two geophysical anomalies using intersecting test trenches, and excavated a test pit down slope of the former GAT Facility's cesspool.	USACE, 2007
2008-2012	USACE contracted the performance of a Remedial Investigation and Feasibility Study. The investigation included: testing and evaluation of on-Property soils and overburden groundwater; completion of a search for an on-Property source of TCE; evaluation of bedrock hydraulic gradients and hydrogeologic properties; assessment of the on-Property and off-Property nature and extent of contamination; and evaluation of potential risks to humans and ecological receptors. The Feasibility Study developed Remedial Action Objectives, identified and evaluated remedial alternatives, and presented a detailed comparative analysis of the remedial alternatives.	JCO, 2012
2010	USACE contracted the collection of additional sub-slab soil vapor and indoor air samples from the former GAT facility.	Woods Hole Group, 2011

Table 3
Comparative Analysis of Alternatives Summary
Former GAT Facility, Glenburn Maine

Criteria and Associated Factors	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation with Wellhead Treatment, Long-term Monitoring, Institutional Controls	Alternative 3 Groundwater Extraction & Ex-Situ Treatment; Wellhead Treatment, Long-term Monitoring, Institutional Controls
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT			
- Human Health Protection			
- Direct Contact/Inhalation (Soil & Groundwater)	No current risk from direct contact/inhalation.	No current risk from direct contact/inhalation.	No current risk from direct contact/inhalation.
- Groundwater Ingestion for Current Users	No current groundwater ingestion risk.	No current groundwater ingestion risk.	No current groundwater ingestion risk.
- Groundwater Ingestion for Potential Future Users	No potential future risk to users of off-site groundwater therefore this alternative would be protective of human health. A potential future risk exists to users of on-site groundwater drawn from new water supply wells that tap into contaminated bedrock fracture zones where groundwater currently exceeds the MCL for TCE.	Non-enforceable, informational institutional controls (annual letter notification advisories) and continued O&M of one domestic well GAC unit would provide an added level of protection for users of off-site groundwater. Annual notification letters to property owner of the existing on-site water supply well (and possible declaraton of enviornmental covenant invocation on property by Town vote) to request notification of any new water supply wells on-site would be protective of human health. A Contingency Plan including additional GAC treatment of water supplies will be implemented if needed.	See Alternative 2 for protection of users of off-site groundwater. Groundwater extraction and treatment would remove TCE mass and limit migration of TCE off-site. However, because of the likely presence of TCE in the complex bedrock fracture zones, these remedial actions aren't anticipated to reduce the time frame to achieve the GAO/MCL for TCE. Accordingly, institutional controls would be needed for the protection of human health during this period.
- Environmental Protection	No current risk to ecological receptors.	No current risk to ecological receptors	No current risk to ecological receptors

Table 3
Comparative Analysis of Alternatives Summary
Former GAT Facility, Glenburn Maine

Criteria and Associated Factors	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation with Wellhead Treatment, Long-term Monitoring, Institutional Controls	Alternative 3 Groundwater Extraction & Ex-Situ Treatment; Wellhead Treatment, Long-term Monitoring, Institutional Controls
COMPLIANCE WITH ARARS			
- Chemical Specific ARARS (TCE MCL of 5 ug/L)	Would be achieved immediately for off-site groundwater. May be achieved through natural attenuation processes for on-site groundwater but not within a reasonable period of time.	Would be achieved immediately for off-site groundwater. Will be achieved through natural attenuation processes for on-site groundwater after a period of decades.	Would be achieved immediately for off-site groundwater. May be achieved through groundwater extraction and treatment, and natural attenuation processes for on-site groundwater after a period of decades.
- Location-Specific ARARs	No location-specific ARARs.	No location-specific ARARs.	Construction and operation of the groundwater extraction and treatment system would be conducted within the property boundaries of the Site. Furthermore, there are no on-site sensitive areas such as wetlands and floodplains, so no adverse impact to natural resources is expected.
- Action-Specific ARARS	No action-specific ARARs.	No action-specific ARARs.	Would be designed to comply with any action-specific ARARS that may be triggered.
LONG-TERM EFFECTIVENESS AND PERMANENCE			
- Magnitude of Residual Risk			
- Direct Contact/Inhalation (Soil & Groundwater)	No current risk from direct contact/inhalation.	No current risk from direct contact/inhalation.	No current risk from direct contact/inhalation.
- Groundwater Ingestion for Current Users	No current groundwater ingestion risk.	No current groundwater ingestion risk.	No current groundwater ingestion risk.
- Groundwater Ingestion for Potential Future Users	No potential future risk to users of off-site groundwater. TCE concentrations in existing water supplies are currently below the MCL and meet the RAO.	Non-enforcable land use controls (annual notification letter advisories) and continued O&M of one domestic well GAC unit would provide an added level of protection for users of off-site groundwater.	See Alternative 2 for protection of users of off-site groundwater.
	A potential future risk exists to users of on-site groundwater drawn from new water supply wells that tap into contaminated bedrock fracture zones where groundwater currently exceeds the MCL for TCE. Natural attenuation processes may reduce TCE concentrations to below the MCL but not within a reasonable time frame. Institutional controls would not be implemented to prevent groundwater use during that time.	Land use controls would request notification of installation of new on-site groundwater wells, thereby providing long-term effectiveness and permanence until natural attenuation processes reduced TCE concentrations to below the RAO/MCL.	On-site groundwater extraction and treatment isn't anticipated to significantly reduce the magnitude of residual risk to potential future users of on-site groundwater. Land Use Controls would provide long-term effectiveness and permanence.
- Adequacy and Reliability of Controls	No controls proposed.	Continued GAC treatment for one domestic well (DW-22) and institutional controls would provide adequate and reliable long-term effectiveness if continually monitored and enforced.	The adequacy and reliability of land use controls for both off-site and on-site groundwater are expected to be high provide they are continually monitored and enforced. The reliability of extracting and treating groundwater is dependent on a thorough understanding of surface hydrogeologic and geochemical conditions. Pre-design and pilot studies may be conducted to optimize effectiveness of this system.

Table 3
Comparative Analysis of Alternatives Summary
Former GAT Facility, Glenburn Maine

Criteria and Associated Factors	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation with Wellhead Treatment, Long-term Monitoring, Institutional Controls	Alternative 3 Groundwater Extraction & Ex-Situ Treatment; Wellhead Treatment, Long-term Monitoring, Institutional Controls
REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT			
- Treatment Process Used	None.	None.	Extraction and ex-situ treatment using carbon adsorption followed by reinjection of the treated groundwater.
- Amount Destroyed or Treated	None, except by natural attenuation processes.	None, except by natural attenuation processes.	The amount of TCE destroyed or treated via groundwater extraction and ex-situ treatment is dependent on subsurface conditions and the effectiveness of the extraction system.
REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT continued			
- Reduction of Toxicity, Mobility, or Volume Through Treatment	None, except by natural attenuation processes.	None, except by natural attenuation processes.	Groundwater extraction and ex-situ treatment would provide some reduction in the toxicity, mobility and volume of TCE in the on-site groundwater.
- Degree to Which Treatment is Irreversible	None, except by natural attenuation processes.	None, except by natural attenuation processes.	Treatment of TCE-contaminated groundwater with carbon adsorption and subsequent regeneration of carbon is also irreversible.
- Type and Quantity of Residuals Remaining After Treatment	No treatment proposed.	No treatment proposed.	Treatment of groundwater using activated carbon would produce treatment residuals that would require regeneration and/or disposal at a licensed facility.
- Degree to Which Treatment Reduces Principle Threats	No treatment proposed.	No treatment is proposed.	Groundwater extraction/ex-situ treatment would provide a limited reduction in the threat of migration of TCE to downgradient groundwater.
SHORT-TERM EFFECTIVENESS			
- Protection of Community During Remedial Action	Not applicable - no remedial actions.	No construction activities would be implemented.	Vehicular traffic may increase during well and system installation activities but it is of limited duration. Perimeter monitoring of fugitive air emissions and corrective actions if necessary would be implemented.
- Protection of Workers During Remedial Action	Not applicable - no remedial actions.	Training and use of personal protective equipment may be required for workers conducting environmental sampling or O&M of the one domestic well GAC unit.	Adherence to health safety plans, use of protective equipment and trained personnel should prevent any short-term impacts caused by remedial activities.
- Environmental Impacts	Not applicable - no remedial actions.	No construction activities would be implemented.	Groundwater extraction, treatment and reinjection would be conducted within the boundaries of the Site property.
- Time Until Remedial Action Objectives Are Achieved	Decades	Decades	Decades

Table 3
Comparative Analysis of Alternatives Summary
Former GAT Facility, Glenburn Maine

Criteria and Associated Factors	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation with Wellhead Treatment, Long-term Monitoring, Institutional Controls	Alternative 3 Groundwater Extraction & Ex-Situ Treatment; Wellhead Treatment, Long-term Monitoring, Institutional Controls
IMPLEMENTABILITY			
- Ability to Construct and Operate	No construction or O&M.	No construction activities but continued operation and maintenance of one domestic well GAC unit.	Construction and operation of groundwater extraction, treatment and reinjection systems would require pre-design and bench-scale and/or pilot scale studies to evaluate optimum operating parameters.
- Ease of Doing More If Needed	Would not limit further actions.	Would not limit further actions.	Should not limit further actions.
- Ability to Monitor Effectiveness	No long-term monitoring to establish the effectiveness of No Action.	Long-term environmental monitoring would effectively monitor TCE distribution and concentrations in the groundwater.	Environmental monitoring to evaluate short- and long-term effectiveness of the alternative would be simple to implement.
- Ability to Obtain Approvals and Coordinate with Other Agencies	No approvals necessary.	Coordination among appropriate legal services, ME DEP, Town of Glenburn and property owners, would be required to implement institutional controls.	Coordination of construction and implementation of institutional controls will require coordination with state and local authorities.
- Availability of Equipment, Materials, Specialists, and Off-site Support Services	None required.	Equipment, materials and specialists to conduct O&M of the one domestic GAC unit and to conduct environmental sampling are readily available.	Equipment, materials, specialists, and off-site support services required to implement all components of this alternative are readily available.
- Availability of Technologies	None required.	GAC technology (including replacement parts and carbon cartridges) is readily available.	Groundwater extraction technology is a proven and readily available technology; GAC is a proven technology for treating TCE in groundwater and are readily available as packaged systems.
COST (values rounded up to nearest $1,000)			
- Capital Cost	$ -	$ 136,000	$ 245,000
- Annual O&M Cost (including system monitoring)	$ -	$ 3,000	$ 40,000
- Annual Long-term Monitoring Cost	$ -	$ 45,000	$ 45,000
- Present Net Worth - Five-Year Reviews	$ -	Included with annual monitoring costs	Included with annual monitoring costs
- Total Present Net Worth Cost	$ -	$ 1,206,000	$ 2,139,000
STATE ACCEPTANCE	USACE will seek state concurrence on the ROD.	Same as Alternative 1	Same as Alternative 1
COMMUNITY ACCEPTANCE	Comments received during the public comment period will be incorporated into the ROD in a responsiveness summary.	Same as Alternative 1	Same as Alternative 1

Prepared by The Johnson Company **Project Name: Glenburn Feasibility Study Cost Estimate**

Submitted to the USACE New England District **Contract No: W912WJ-05-D-0006 RFP #9**

LABOR CATEGORY	Ave. 2008 RATE $/hr	NO ACTION RA #1	MNA and IC RA #2 1st Year	MNA and IC RA #2 Annual	Pump & Treat Installation RA#3	Pump & Treat O&M Annual RA#3
Program Manager	$57.00		$855	$228	$228	$228
Senior Project Manager	$43.00		$645	$430	$344	$344
Senior Hydrogeologist	$44.00		$1,760	$440	$6,160	$176
Mid Hydrogeologist	$32.00		$6,400	$2,880	$6,400	$5,600
Sr. Env. Engineer	$32.00		$0	$0	$0	$0
Jr. Scientist	$20.00		$3,200	$1,800	$4,000	$0
Sr. Technician	$21.00		$0	$1,890	$4,200	$1,680
Contract Administrator	$35.00		$210	$70	$420	$0
Sr. Comp/CADD Operator	$32.00		$320	$320	$256	$0
Word Processor	$18.00		$360	$180	$288	$288
SUBTOTAL			$13,750	$8,238	$22,296	$8,316
OVERHEAD ON DIRECT LABOR @	40.0%		$5,500	$3,295	$8,918	$3,326
G & A OH @	135%		$18,563	$11,121	$30,100	$11,227
TOTAL LABOR + ODL + G&A OH		**$0**	**$37,813**	**$22,655**	**$61,314**	**$22,869**
DIRECT EXPENSES						
Equipment and Direct Expenses			$8,192	$4,410	$14,150	$3,873
TRAVEL			$6,551	$7,198	$4,521	$2,277
TOTAL DIRECT EXPENSES		**$0**	**$14,743**	**$11,608**	**$18,671**	**$6,150**
SUBCONTRACTOR COSTS						
Long Term Monitoring (including $57,000 for new well pair)			$72,000	$7,200		
Pump & Treat Installation					$20,373	
Operation and Maintenance				$3,000		$4,900
TOTAL SUBCONTRACTOR		**$0**	**$72,000**	**$10,200**	**$20,373**	**$4,900**
TOTAL LABOR, ODL, G&A OH, Subcontractors and Direct Expenses	---------		$124,556	$44,462	$100,358	$33,919
FEE (excluding travel) @	**9.00%**		$10,620	$3,354	$8,625	$2,848
TOTAL COST & FEES		**$0**	**$135,176**	**$47,816**	**$108,983**	**$36,767**
		None	**1st Year**	**Annual**	**One-time**	**Annual**

TOTALS	**RA #1**	**RA #2**	**RA #3**
Annual Costs (2011 $)	**$0**	**$47,816**	**$84,583**
One-Time 1st Year Costs (2011 $)	**$0**	**$135,176**	**$244,159**
Total 30-year Costs Present Worth (MNA monitoring 1st year only)	**$0**	**$1,206,258**	**$2,138,827**

2% interest P/A, 30 yrs = 22.4

2% interest from OMB Circular (A-94) updated 12/2011

REMEDIAL ALTERNATIVES

RA #1: NO ACTION

RA #2: MONITORED NATURAL ATTENUATION (MNA), DW-22 CARBON SYSTEM O&M, INSTITUTIONAL CONTROLS

RA #3: PUMP-AND-TREAT PLUS RA#2

Prepared by The Johnson Company
Submitted to the USACE New England District

Project Name: Glenburn Feasibility Study Cost
Contract No: W912WJ-05-D-0006 RFP #9

LABOR DETAIL BY TASK

		RA #1: No Action		RA #2: MNA and Institutional Controls Initial Costs		RA #2: MNA and Institutional Controls Annual Costs		RA #3 Pump and Treat Installation		RA #3 Pump and Treat O&M Annual Costs	
LABOR CATEGORY	**Average 2008**	**HRS**	**TOTAL $**	**HRS**	**TOTAL $**	**HRS**	**TOTAL $**	**HRS**	**TOTAL $**	**HRS**	**TOTAL $**
Program Manager	$57.00		$0	15	$855	4	$228	4	$228	4	$228
Senior Project Mgr	$43.00		$0	15	$645	10	$430	8	$344	8	$344
Senior Hydrogeologist	$44.00		$0	40	$1,760	10	$440	140	$6,160	4	$176
Mid Hydrogeologist	$32.00		$0	200	$6,400	90	$2,880	200	$6,400	175	$5,600
Sr. Env. Engineer	$32.00		$0		$0		$0		$0		$0
Jr. Scientist	$20.00		$0	160	$3,200	90	$1,800	200	$4,000		$0
Sr. Technician	$21.00		$0	0	$0	90	$1,890	200	$4,200	80	$1,680
Contract Admin.	$35.00		$0	6	$210	2	$70	12	$420		$0
Sr. CADD Operator	$32.00		$0	10	$320	10	$320	8	$256	0	$0
Word Processor	$18.00		$0	20	$360	10	$180	16	$288	16	$288
SUBTOTAL LABOR		0	$0	466	$13,750	316	$8,238	788	$22,296	287	$8,316
OH on DL @	40.0%		$0		$5,500		$3,295		$8,918		$3,326
G & A OH @	135%		$0		$18,563		$11,121		$30,100		$11,227
TOTAL LABOR + ODL + G&A OH			**$0**		**$37,813**		**$22,655**		**$61,314**		**$22,869**
			None		**One Time**		**Annual**		**One Time**		**Annual**
Assumptions		No monitoring or reporting		Five events of MNA sampling in GB-MW-01 and GB-MW-02 in first year and Institutional Controls Implementation		Institutional Controls Confirmation and 5-year reporting extrapolated over 30 years, one LTM event annually = 3 people-five 12-hr days on-site, 2 travel days, one report/yr		2 people, on-site 12 days, 6 days travel, pump test, design and reporting		four events/year, 2 people, total 4 days on-site, 4 days travel, 4 reports/yr	

Prepared by The Johnson Company **Project Name: Glenburn Feasibility Study Cost Estimate**

Submitted to the USACE New England District **Contract No: W912WJ-05-D-0006 RFP #9**

Item	RA #1 Cost	Natural Attenuation - first year monitoring (5 events) and Institutional Controls Implementation	Natural Attenuation and Long Term Monitoring RA #2 and #3 Annual Costs	Pump and Treat RA #3 Installation	Pump and Treat RA #3 O&M Annual Costs	Total	Billing Rate/Unit	Units
Telephone / Fax /cell phone		$567	$340	$920	$343		1.5% of labor cost	
Reprod. (prelim, draft & final rpts)		$1,500	$150	$500	$200		Allowance	
Support Truck		$750	$300	$900	$300		$300	weeks
Support Van			$150	$300			$150	weeks
Support Van mob/demob			$650	$650			$650	event
Autolevel-survey equipment				$100			$100	days
Trimble Sub-meter GPS				$150			$150	days
Distilled water		$50	$80	$20			$2	gallons
carbon drums, filters &disposal				$1,500			$1,500	drums
Generator (includes gas)		$500	$175	$350			$175	weeks
Grundfoss Redi-Flo2 pump		$500	$320	$320			$320	weeks
Pump, Wire and Plumbing				$3,000	$500		Allowance	
PPE, & decon. supplies		$350	$525	$840	$280		$35	man-days
Electric Power Drop & Inspection				$2,000			Allowance	
Perstaltic pump			$350				$175	weeks
Sample tubing (silicon)			$20				$2.50	feet
Steam Cleaner & water tank				$400			$200	weeks
OVM PID		$500	$200	$600	$400		$200	weeks
MNA kits/probes FIVE EVENTS		$2,500		$350	$700		50 samples	
YSI, WL marker, Turbidometer		$525	$700	$350	$700		$350	weeks
Waste rolloff + disposal (non-haz)				$600			$200	weeks
Shipping (samples & reports)		$450	$450	$300	$450		$75	coolers
Subtotal	**$0**	**$8,192**	**$4,410**	**$14,150**	**$3,873**	**$0**		
		One Time	**Annual**	**One Time**	**Annual**			

Prepared by The Johnson Company **Project Name: Glenburn Feasibility Study Cost Estimate**
Submitted to the USACE New England District **Contract No: W912WJ-05-D-0006 RFP #9**

TRAVEL AND RELATED EXPENSES - from Montpelier, VT

Task	No. of People	No. of Trips	No. of Miles Round Trip	Mileage[1]	Lodging		Meals and Incidental Expenses		Total	Assumptions
					Days	Expense[2]	Days	Expense[3]		
RA #1	0	0	520	$0	0	$0	0.0	$0	$0	
Monitored Natural Attenuation and Institutional Controls Implementation (RA #2) (1st YEAR ONLY)	2	5	520	$1,326	20	$3,080	25.0	$2,145	$6,551	2 people, on-site 5 days sampling five events, plus 10 days travel
MNA + Monitoring RA #2 and #3 (ANNUAL COST)	3	2	520	$530	18	$4,158	20	$2,510	$7,198	once/year 3 people-five 12-hr days on-site, travel-lodging - 2 travel days
Pump and Treat RA #3 (ONE TIME)	2	3	520	$796	15	$2,310	16.5	$1,416	$4,521	2 people, on-site 4 days drilling/geophysics, 4 days pump test, 4 days system installation plus 6 days travel
Pump and Treat RA #3 (ANNUAL COST)	2	4	520	$1,061	4	$616	7	$601	$2,277	four events/year, 2 people, total 4 days on-site, 4 days travel

[1] $/mile: $0.510
[2] $/day $70.00 plus taxes
[3] $/day $39.00 plus taxes

Note: Lodging and M & IE rates from: www.gsa.gov/Portal/gsa/ep/home.do?tabId=0
75% times the day rate for M & IE applies for the 1st and last days

Prepared by The Johnson Company **Project Name: Glenburn Feasibility Study Cost Estimate**
Submitted to the USACE New England District **Contract No: W912WJ-05-D-0006 RFP #9**
Costs in 2011 dollars

NOTE: RA #3 COSTS ALSO INCLUDE RA #2 COSTS

LONG TERM MONITORING ANALYTICAL COSTS Water Supply & Monitoring Wells - Once per year

Item	RA #1	RA #2	RA #3	
Water VOC 524.2 (Annual)		$7,200	$7,200	90 samples/event at $80/sample (includes QA/QC) One event/yr for RAO #2 and #3
Water MNA parameters - Nitrate/nitrite 353.2, Sulfite 376.1, Sulfate 375.4, Total phosphorous 365.2, Methane/ethane RSK-175, Ammonia 315.1 and 315.2 (Year 1 only)		$15,000	$15,000	FIRST YEAR ONLY Assume 10 samples per event, for five events TOTAL at $300/sample. DO, Temperature, ORP, SC, turbidity, PID, alkalinity, CO2, ferrous iron and pH by Field Measurement
Subtotal Analysis	**$0**	**$15,000**	**$15,000**	**First Year (RA #2 & #3)**
Subtotal Analysis	**$0**	**$7,200**	**$7,200**	**Annual (RA #2 & #3)**

Costs for Pump and Treat System GB-MW-06 used for re-injection

Item	RA #1	RA #2	RA #3	
Drilling			$1,125	75 feet @ $15/ft
Steel Casing			$148	50 feet @ $17/ft
Drilling Supplies			$500	$500/well
OSHA H&S and and Decon. Time			$1,600	8 hours @ $200/hr
Water VOC 524.2			$800	ten samples at $80/sample (includes QA/QC)
Borehole geophysics			$10,000	One well
Electrician (including misc.supplies)			$3,000	
Excavator for pipe and electrical lines			$3,200	Drilling waste disposal with excavation soils
Subtotal Drilling	**$0**	**$0**	**$20,373**	**One-time Event - RA #3**

Operations and Maintenance (annual cost)

Item	RA #1	RA #2	RA #3	
Point-of-Use Treatment System		$3,000		Carbon change out, one cannister - annual
Pump and Treat system			$1,500	Carbon change-out 1 drums/year - annual
Water VOC 524.2			$1,600	Analysis of 20 samples for pump-and-treat O & M at $80/sample
Electric Power for Pump			$1,800	20,000 KWH at $0.09/KW
Subtotal O & M	**$0**	**$3,000**	**$4,900**	**Annual Cost - RA #3**

APPENDIX A

MAINE DEP LETTER OF CONCURRENCE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

AVERY T. DAY
ACTING COMMISSIONER

December 10, 2015

Ms. Marie Wojtas
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2721

Re: Decision Document, November 2015, Former Ground Air Transmitter (GAT) Facility, Glenburn, ME

Dear Ms. Wojtas,

The Maine Department of Environmental Protection (MEDEP) has reviewed and concurs with the November 2015 Record of Decision (ROD) for Former Ground Air Transmitter (GAT) Facility, Glenburn, ME. The selected remedy in the ROD includes, among other things, long term monitoring of groundwater, point of use treatment for water supplies (as needed), monitoring of indoor air, land use controls, and five year reviews to ensure the future protection of human health and the environment.

The State's concurrence of the selected decision, as described above, should not be construed as the State's concurrence with any conclusion of law or finding of fact, which may be set forth in the ROD or supporting documents for the site listed above. The State reserves any and all rights to challenge any such finding of fact or conclusion of law in any other context.

This concurrence is based on the State's understanding that the Army Corp of Engineers will continue to solicit MEDEP's review and concurrence with implementing the remedy described above.

MEDEP looks forward to working with the Army Corp of Engineers to resolve the environmental issues remaining at the former GAT Facility in Glenburn ME.

If you have any questions or comments related to this letter please contact Naji Akladiss at naji.n.akladiss@maine.gov or call: 207-287-7709.

Sincerely,

David Wright

David Wright, Director
Division of Remediation, BRWM

pc: Naji Akladiss, MEDEP
Chris Swain, MEDEP

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website: www.maine.gov/dep

APPENDIX B

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APPENDIX C

WRITTEN COMMENTS RECEIVED ON THE PROPOSED PLAN

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

August 15, 2014

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

RE: Proposed Plan dated July 30, 2014 to address contamination at the former Ground to Air Transmitter facility in Glenburn, Maine

Dear Ms. Wojtas:

The Department has been closely monitoring the investigation and review of alternative clean-up approaches that are outlined in the 2012 Feasibility Study for the Glenburn GAT facility. At this point, but subject to new information from the public that is received during the public comment period, the Department concurs with most aspects of the Proposed Plan for the site as presented by the above referenced document. The elements with which we concur include:

1. Groundwater: Monitored Natural Attenuation (MNA) by Dispersion as the preferred remedy alternative, including long term monitoring, point of use water treatment as needed and land use controls (also known as Institutional Controls). Elements of the Proposed Plan consist of multiple measures to ensure that the cleanup approach continues to be protective of human health and the environment. These measures are:
    a. Continued point-of-use treatment of impacted drinking water supplies with Granular Activated Carbon, as needed;
    b. Long-term monitoring of the remaining contaminants in groundwater;
    c. An environmental deed restriction on Zone 1, Lot 46, which is the Glenburn Municipal Building property. The deed restriction should:
        (1) require Department approval before installing a new well, so that the well can be located, tested and if necessary treated to protect public health,
        (2) ensure access for monitoring and oversight, and
        (3) prohibit activities that interfere with the remedy and monitoring equipment on-site;
    d. annual notice letters to owners of property where trichloroethylene (also known as “TCE”) could potentially be present in groundwater, namely Zones 2 and 3 as shown in the proposed plan; and
    e. Five-Year Reviews of site conditions to ensure that the cleanup approach remains effective. During each review Army Corps will perform a technology

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AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
RAY BLDG., HOSPITAL ST.

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106 HOGAN ROAD, SUITE 6
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(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04679-2094
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

review to evaluate if there are any new technologies that may be applicable to this site to reduce either the level of contamination, overall remediation cost, or length of the time to reach the cleanup goal. If the review indicates that this remedy is no longer protective, or a new technology is available, then the process outline in the Superfund laws will be followed to incorporate this new information into the site clean-up strategy.

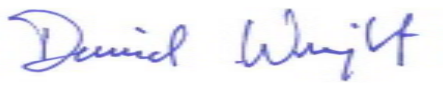
2. Soil Vapor: The Department notes that the Proposed Plan does not recommend action for surface water or soil vapor. However, soil vapor and indoor air in the Municipal Building will be monitored every five years or when site conditions change. Examples of changes in site conditions would be increasing concentrations in groundwater or changes in building conditions. Further, soil investigation under the Municipal Building will be undertaken by the Army Corps if the building is demolished. The purpose of the additional study is to ensure that there is no residual soil contamination under the structure that might pose a risk.

The one area of the Proposed Plan that the Department believes needs improvement in the final Decision Document regards follow-up to a vapor intrusion problem in a new building. If a new building is constructed on Lot 46, the owner will need to build it to Maine building codes, which include provisions for sub-slab systems to maintain healthy indoor air. These standards are focused on radon mitigation, but should also address any vapor intrusion of solvents from historic Department of Defense operations at the site. The Army Corps will test indoor in a new building to verify that no vapor intrusion issues are occurring. If vapor intrusion poses an unacceptable risk due to a historic Department of Defense release, we recommend that the Decision Document include a provision for the Army Corps to conduct appropriate response actions in the existing building. The proposed plan only includes provisions for additional monitoring, which may be insufficient.

If you require further clarification on our comments, do not hesitate to contact either me at 207-446-4366 / David.W.Wright@maine.gov, or the DEP project manager, Naji Akladiss at 207-287-2651 / Naji.N.Akladiss@maine.gov.

Sincerely,

David Wright, Director



Division of Remediation
Bureau of Remediation and Waste Management

CC Naji Akladiss, DEP

Town of Glenburn
144 Lakeview Road
Glenburn, ME 04401

TOWN MANAGER
Michael R Crooker

Telephone: 942-2905
Fax: 990-2953

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

September 4, 2014

Dear Ms. Wojtas:

The attached document contains the formal comments and questions from the Town of Glenburn regarding the US Army Corps of Engineers proposed Remediation Plan for groundwater contamination at the site of the former Ground to Air Transmitter Facility in Glenburn, Maine. The Town of Glenburn is forwarding to you these comments as part of the official comment period on the proposed plan. We also ask that these questions and comments be included and retained as part of the official record of public comments on the plan.

We look forward to your response to our questions and comments. Please do not hesitate to contact me at the Glenburn Town Office at (207) 942-2905 if you have any questions regarding our comments or if you would like additional information to support our comments.

Sincerely,

Michael R. Crooker
Glenburn Town Manager

Town of Glenburn
144 Lakeview Road
Glenburn, ME 04401

TOWN COUNCIL
Mark Lagasse, Chairperson
Dennis Casey, Deputy Chairperson
John Caruso
Richard Cookson
Rhonda Curtis-Doughty

TOWN MANAGER
Michael R Crooker

Telephone: 942-2905
Fax: 990-2953

Formal Comments on the USACE Proposed Remedial Action Plan for the former Glenburn GAT Site in Glenburn, Maine.

WELL MONITORING/SAMPLING:

How often will residential wells be sampled?

Will there be a plan in place that will increase the frequency of well tests as well as the number of wells that will be tested if the results of the well samples show increased levels of detectable TCE in the water supplies EVEN if the levels do not exceed federal and state guidelines?

What does it mean when it indicates in the plan; "This monitoring plan will be ***optimized*** in the future in a Long Term Monitoring Plan." ?

Will adjustments be made to the monitoring program after each monitoring event if the results of the ground water sampling event indicate that there are significant changes in the level of TCE concentrations that could result in the monitoring program not being protective of human health and the environment?

We believe that it is premature to reduce the residential well water sampling protocol to once a year from twice a year. This misses the continued opportunity to tie the results to the fluctuation of the water table and the likelihood TCE from concentrated areas such as ledge pockets is being "skimmed off" into the ground water. We believe that twice-a-year sampling, once in the spring and once in late summer or in fall should continue. Sampling once a year, in our minds, would make it difficult to pinpoint the best time of year to take that lone sample. One would then logically wonder if the sampler had missed an unacceptable spike in TCE concentration by a couple of weeks or months. The USACE indicated in the plan as well as during the presentation at the public meeting that the data shows that there are several spikes or variations in the TCE concentrations that can not be easily explained. This is further evidence of the need to continue twice a year sampling.

Gary Morin mentioned to Marie Wojtas during the public meeting that the expanded residential well sampling proposed for every five years in the plan would start with year one once the Decision Document had been approved rather than waiting five years to conduct the first round of expanded residential well samples. Can you please confirm when the first round of expanded well testing will occur? Do you intend to do expanded residential well testing every five (5) years after the first round occurs or will expanded testing be performed more often then every five (5) years?

It was mentioned during the public meeting that the USACE could withdraw from the site if it got to the point where no wells exceed the 5 pp billion contamination level for TCE. Is this the only criteria that will be used to determine the attainment of the clean up goal? Can you provide a statistical basis for the establishment of a reasonable period of time to verify that the goal is attained? If the USACE leaves the site but unsafe levels of TCE appear again in the future, will the USACE be required to come back to the site? If so, how long would it take before the USACE could start remedial action again on the Glenburn FUDS site? If the USACE leaves the Glenburn FUDS site because it has determined that it has attained the clean up goal, will the USACE do any periodic follow up tests at the site to ensure that the problem has been remediated permanetly?

Is the Town's well water that supplies the Glenburn Town Office and Fire Station, safe to drink?

NEW MUNICIPAL BUILDING & VAPOR MITIGATION:

There seems to be some confusion over what will happen if the Town of Glenburn builds a new Municipal Building on the existing site. Assuming the Town builds a new Town Office that complies with state building codes, will the USACE perform air quality tests before the Town occupies the new building? If vapor contamination is found, will the Army Corps of Engineers be required to install a vapor removal or mitigation system after the building has been built? Are there other alternatives to a vapor removal or mitigation system that the USACE could consider imposing on the Town such as limited habitatation of the new building; i.e. requiring the Town to limit the number of hours that the new building could be open? If the Town builds a new building then is the Town solely responsible(financially & legally) for including some type of system to address any vapor intrusion of solvents from historic Department of Defense operations at the site? Will the Town be required to demolish the existing town office if a new town office is built?

It is our understanding from what is indicated in the plan and what we have been told by representatives of the USACE that if contamination is found in a new well that is drilled that the United States Army Corps of Engineers will install a treatment system on the well. If unacceptable levels of contaminates are found in the air inside a new municipal building then why will the USACE not be obligated to provide a vapor removal or mitigation system as would be the case if contaiminates were found in a new well? Is over exposure to unhealthy levels of TCE in the air any less harmful than those that are in the water? It seems like the same scenario to us and it should be treated the same. If TCE is found in the air in a new building will the USACE take responsibility for the TCE in the air or will it be attributed to new carpets or other factors associated with the new building? How will the USACE determine responsibility for TCE contaimination in the air in a new building, if it occurs?

If a vapor mitigation system is needed to protect the health of Town employees and the public when a new municipal building is constructed, it should be the responsibility of the USACE to install and maintain a vapor removal system. The USACE cites the Maine State Building Code requirements and owner responsibility for Radon removal. For reasons that have previously been stated, the two situations are not the same. We differ with the Maine DEP's comment on this, as stated in the letter from Mr. Wright to Ms. Wojtas on August 15th. We do not think that the statement on taking "appropriate response actions" in the event of vapor intrusion at an unacceptable level is strong and specific enough.

LAND USE CONTROLS:

Can the USACE or the MDEP require the Town to implement deed restrictions (a Declaration of Restrictive Covenant) on the Town's property?

Will the USACE or the DEP place a deed notification affidavit on the Town's property if the Town does not approve of a Declaration of Restrictive Covenant?

What criteria did the USACE use to classify zones 1, 2 and 3? Has a procedure been proposed to reclassify properties, if needed? If so, what is that process? Why were the zones set up by property boundaries rather than by proximity to the plume?

Will the Town be responsible for paying for the annual notice letters to private property owners or any other methods of Land Use Controls for zones 1, 2 and 3?

DECISION DOCUMENT & LONG TERM MONITORING PLAN:

Could you please clarify for the Town what the purpose of the Decision Document is for the Glenburn FUDS site? Can you tell us what the USACE intends to include in the Decision Document? Will the Decision Document include specific guidelines that will outline the responsibilities of the USACE and the processes that will be used at the Glenburn FUDS Site?

What role, if any, will the Town of Glenburn play in the creation and approval of the final Decision Document and the Long Term Monitoring Plan (LTMP)? What happens if the Town is not satisfied with the contents of the final Decision Document or Long Term Monitoring Plan? Will the Town be able to prevent the Decision Document and Long Term Monitoring Plan from being approved and implemented, if the Town is not satisfied with the content of the Decision Document and Long Term Monitoring Plan?

It was indicated during the Public Meeting that the USACE would put together a draft of the proposed Long Term Monitoring Plan for review by the MDEP and the Town. Does the USACE intend to prepare a draft of the LTMP for any interested parties and do you have an idea when that plan would be available for review by the Town? Will the Town have input into the final contents of the Long Term Monitoring Plan?

Can you define what "dynamic" means?

GENERAL QUESTIONS:

What is the clean up goal (RAO?)for the Glenburn site? What is the USACE definition for the attainment of the clean up goal? What is the statistical or scientific basis for the establishment of a reasonable period of time to verify that the goal is attained?

Please tell us what the Remedial Action Objectives (RAOs)are for the Glenburn FUDS Site.

Can you provide us with a copy of what the current Applicable or Relevant and Appropriate Regulations (ARARs)apply to the Glenburn FUDS site?

Will the United States Army Corps of Engineers (USACE)provide assistance and services to address the concerns of the Town of Glenburn beyond those that the USACE are required to provide by state and federal law i.e, the Comprehensive Environmental Response Compensation,and Liability Act(CERCLA)?

What can the United States Army Corp of Engineers unequivocally commit to regarding future remedial activities at the Glenburn site?

APPENDIX D

ADMINISTRATIVE RECORD INDEX

Administrative Record File Document Index
GLENBURN, MAINE AIR FORCE GROUND TO AIR TRANSMITTER STATION
HTRW Project D01ME056601

File Name	Document Title/Description	Author(s)	Recipient(s)	Date
00. FIIP Documentation for Explanation				
00.00 FIIP Documentation for Explanation				
D01ME056601_00.00_0005_a.pdf	Administrative Record File Introduction	Unknown (HydroGeoLogic, Inc.)	Unknown	Unknown
01. Site Management Records				
01.01 Correspondence				
D01ME056601_01.01_0002_a.pdf	Letter Re: Transmittal of MEDEP Results of Limited Investigation and Request for a Course of Action from USACE	Akladiss, Naji (Maine Department of Environmental Protection)	Holtham, Bill (USACE - New England District)	9-Feb-01
D01ME056601_01.01_0003_a.pdf	Letter Re: Request for Project Information and Update to Intended Work	Sait, Claudia (Maine Department of Environmental Protection)	Holtham, Bill (USACE - New England District)	10-Aug-98
D01ME056601_01.01_0008_a.pdf	E-mail Re: Summary of March 20, 2002 Site Visit for Review	Ilic, Jayson (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection) Various (Town of Glenburn, ME)	29-Apr-02
D01ME056601_01.01_0009_a.pdf	Letter Re: Request to Address Contamination Concerns from Town of Glenburn Selectmen	Wolfe, Theodore (Maine Department of Environmental Protection)	Holtham, Bill (USACE - New England District)	1-Feb-07
01.06 Reference Documents				
D01ME056601_01.06_0010_a.pdf	Memorandum Re: Results of Additional Groundwater Sampling Conducted May 2000 at Glenburn Town Office Area	Behr, Dick (Maine Department of Environmental Protection)	Akladiss, Naji (Maine Department of Environmental Protection)	1-Feb-01
D01ME056601_01.06_0011_a.pdf	Memorandum Re: Results of Groundwater Contamination Investigation at Glenburn Town Office Area	Peale, Rob (Maine Department of Environmental Protection)	Hyland, Mark (Maine Department of Environmental Protection)	21-Feb-96
D01ME056601_01.06_0012_a.pdf	Letter Re: Transmittal of Attached Borehole Geophysical Logging Results and Packer Sampling of Four Water Wells at Glenburn Town Office	Rawcliffe, Rudy (Northeast Geophysical Services)	Behr, Dick (Maine Department of Environmental Protection)	25-Sep-00
D01ME056601_01.06_0013_a.pdf	Letter Re: Borehole Packer Sampling Results	Rawcliffe, Rudy (Northeast Geophysical Services)	Behr, Dick (Maine Department of Environmental Protection)	29-Jan-01
D01ME056601_01.06_0014_a.pdf	Data/Spreadsheet/Table Re: Borehole Geophysical Data	Unknown (Northeast Geophysical Services)	Unknown	25-May-00
01.08 Inventory Project Reports (INPR)				
D01ME056601_01.08_0008_a.pdf	INPR Document Re: Amended Site Survey Summary Sheet	Unknown (USACE)	Unknown	Unknown
D01ME056601_01.08_0009_a.pdf	INPR Document Re: Site Survey Summary Sheet	Unknown (USACE)	Unknown	Unknown
D01ME056601_01.08_0010_a.pdf	INPR Document Re: 01 HTRW Project Summary Sheet	Unknown (USACE)	Unknown	1-Sep-98
D01ME056601_01.08_0011_a.pdf	INPR Document Re: 02 HTRW Project Summary Sheet	Unknown (USACE)	Unknown	22-Nov-02
03. Remedial Investigation (RI)				
03.01 RI Correspondence				
D01ME056601_03.01_0008_a.pdf	Letter Re: Transmittal of Final Work Plan and Sampling and Analysis Plan for RI/FS	Maynard, Donald (The Johnson Company)	Leitch, Robert (USACE - New England District) Akladiss, Naji (Maine Department of Environmental Protection)	9-Dec-08
D01ME056601_03.01_0010_a.pdf	Letter Re: Transmittal of Final Sampling and Analysis Plan for Overburden Investigation	Maynard, Donald (The Johnson Company)	Leitch, Robert (USACE - New England District) Akladiss, Naji (Maine Department of Environmental Protection)	4-Apr-07
D01ME056601_03.01_0011_a.pdf	Letter Re: Responses to Comments from MEDEP on Draft Sampling and Analysis Plan for Overburden Investigation	Maynard, Donald (The Johnson Company)	Leitch, Robert (USACE - New England District) Akladiss, Naji (Maine Department of Environmental Protection)	26-Mar-07
D01ME056601_03.01_0012_a.pdf	Letter Re: Comments on July 2008 Draft RI/FS Work Plan	Akladiss, Naji (Maine Department of Environmental Protection)	Leitch, Robert (USACE - New England District)	2-Oct-08
D01ME056601_03.01_0015_a.pdf	Letter Re: Comments on Sampling and Analysis Plan for Overburden Investigation	Akladiss, Naji (Maine Department of Environmental Protection)	Leitch, Robert (USACE - New England District)	7-Mar-08

Administrative Record File Document Index
GLENBURN, MAINE AIR FORCE GROUND TO AIR TRANSMITTER STATION
HTRW Project D01ME056601

File Name	Document Title/Description	Author(s)	Recipient(s)	Date
D01ME056601_03.01_0016_a.pdf	Letter Re: Transmittal of the Final Sampling and Analysis Plan for the Salt Shed Soil Boring Investigation (with Copy Sent to Stakeholders)	Maynard, Donald (The Johnson Company)	Wojtas, Marie (USACE - New England District)	27-Jul-10
D01ME056601_03.01_0020_a.pdf	Letter Re: Response to Comments on the June 2010 Residential and Monitoring Well Sampling Event Report	Buck, Mitchell (Woods Hole Group)	Akladiss, Naji (Maine Department of Environmental Protection)	1-Mar-11
D01ME056601_03.01_0021_a.pdf	E-mail Re: Transmittal of Attached Field Data for 2007, 2008, and 2009	McKenzie, Diana (Maine Department of Environmental Protection)	Wojtas, Marie (USACE - New England District)	6-May-11
D01ME056601_03.01_0022_a.pdf	Comments on the June 2010 Monitoring Report	Protection)	Wojtas, Marie (USACE - New England District)	28-Mar-11
D01ME056601_03.01_0023_a.pdf	Memorandum Re: Review Comments on the June 2010 Residential and Monitoring Well Sampling Event Report	Lipfert, Gail (Maine Department of Environmental Protection)	Akladiss, Naji (Maine Department of Environmental Protection)	13-Jul-11
D01ME056601_03.01_0024_a.pdf	E-mail Re: Transmittal of the Sampling and Analysis Plan and Laboratory Standard Operating Procedures	Wojtas, Marie (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection)	11-Jan-11
D01ME056601_03.01_0026_a.pdf	Letter Re: Response to Comments on the Sub-Slab Soil Vapor and Indoor Air Sampling Trip Report	Thompson, Peter (MACTEC Engineering and Consulting, Inc.) Pickett, Jeffery (MACTEC Engineering and Consulting, Inc.)	Akladiss, Naji (Maine Department of Environmental Protection)	19-Jul-11
D01ME056601_03.01_0027_a.pdf	E-mail Re: Transmittal of the Final Report Revision 1 Sub-Slab Vapor and Indoor Air Sampling Trip Report	Wojtas, Marie (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection)	17-Aug-11
D01ME056601_03.01_0028_a.pdf	Letter Re: Transmittal of Updated Final RI/FS	Maynard, Donald (The Johnson Company)	Akladiss, Naji (Maine Department of Environmental Protection)	1-Nov-11
D01ME056601_03.01_0029_a.pdf	Letter Re: Transmittal of Final RI/FS and Request for Comments or Approval	Maynard, Donald (The Johnson Company)	Akladiss, Naji (Maine Department of Environmental Protection)	18-Jul-11
D01ME056601_03.01_0030_a.pdf	Letter Re: Responses to Comments on the October 2011 Residential and Monitoring Well Sampling Event	Buck, Mitchell (Woods Hole Group, Inc.)	Akladiss, Naji (Maine Department of Environmental Protection)	26-Apr-12
D01ME056601_03.01_0031_a.pdf	E-mail Re: Transmittal of Revised Final October 2011 Residential and Monitoring Well Sampling Event Report	Wojtas, Marie (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection)	3-May-12
D01ME056601_03.01_0032_a.pdf	Letter Re: Transmittal of the Final Remedial Investigation/Feasibility Study Report	Maynard, Donald (The Johnson Company, Inc.)	Akladiss, Naji (Maine Department of Environmental Protection)	1-Nov-11
D01ME056601_03.01_0034_a.pdf	Letter Re: Response to December 13, 2011 MEDEP Comments on Bedrock Well Installation Proposal	Maynard, Donald (The Johnson Company, Inc.)	Akladiss, Naji (Maine Department of Environmental Protection)	17-Feb-12
D01ME056601_03.01_0035_a.pdf	E-mail Re: Notification that Comments on the Bedrock Monitoring Well Installation Have Been Addressed	Akladiss, Naji (Maine Department of Environmental Protection)	Wojtas, Marie (USACE - New England District)	7-Mar-12
D01ME056601_03.01_0036_a.pdf	E-mail Re: Transmittal of Meeting Minutes from May 3, 2011 Meeting	Maynard, Donald (The Johnson Company, Inc.)	Various (Town of Glenburn, ME) Various (Maine Department of Environmental Protection) Various (Town of Glenburn, ME)	16-May-11
D01ME056601_03.01_0037_a.pdf	E-mail Re: Transmittal of Meeting Minutes from June 2, 2010 Meeting	Maynard, Donald (The Johnson Company, Inc.)	Various (Maine Department of Environmental Protection) Various (USACE - New England District)	14-Jun-10
03.02 RI Sampling and Analysis Data and Plans (workplans)				
D01ME056601_03.02_0003_a.pdf	Report Re: Final Sampling and Analysis Plan for Overburden Investigation	Unknown (The Johnson Company)	Unknown (USACE - New England District)	April, 2008
D01ME056601_03.02_0004_a.pdf	Report Re: Final Sampling and Analysis Plan for RI/FS Investigation	Unknown (The Johnson Company)	Unknown (USACE - New England District)	December, 2008
D01ME056601_03.02_0005_a.pdf	Report Re: 2007 Groundwater - Surface Water Monitoring Report and 2008 Optimized Monitoring Plan	Unknown (USACE - New England District)	Unknown (USACE - New England District)	10-Apr-08
D01ME056601_03.02_0006_a.pdf	Report Re: Test Trench Report Geophysical Anomaly Investigation	Unknown (USACE - New England District)	Unknown (USACE - New England District)	4-May-07
D01ME056601_03.02_0007_a.pdf	Report Re: Geophysical Investigation	Thompson, M.D. (Argonne National Laboratory) Miller, S.F. (Argonne National Laboratory)	Unknown (USACE - New England District)	December, 2006
D01ME056601_03.02_0008_a.pdf	Report Re: Final Survey for Site Assessment	Unknown (W.L. Gore & Associates, Inc.)	Unknown (USACE - New England District)	31-Mar-04
D01ME056601_03.02_0009_a.pdf	Report Re: Final Sampling and Analysis Plan for the On-Site Salt Shed Soil Boring Investigation	Unknown (The Johnson Company)	Unknown (USACE - New England District)	July, 2010
D01ME056601_03.02_0010_a.pdf	Report Re: Final Sampling and Analysis Plan	Unknown (Woods Hole Group)	Unknown (USACE - New England District)	June, 2010

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GLENBURN, MAINE AIR FORCE GROUND TO AIR TRANSMITTER STATION
HTRW Project D01ME056601

File Name	Document Title/Description	Author(s)	Recipient(s)	Date
D01ME056601_03.02_0014_a.pdf	Report Re: GORE Survey for Site Assessment Final Report	Hodny, Jay (W.L. Gore & Associates, Inc.) Whetzel, Jim (W.L. Gore & Associates, Inc.)	Unknown (USACE - New England District)	14-Aug-03
D01ME056601_03.02_0015_a.pdf	Report Re: GORE Survey for Site Assessment Final Report	Hodny, Jay (W.L. Gore & Associates, Inc.) Whetzel, Jim (W.L. Gore & Associates, Inc.)	Unknown (USACE - New England District)	31-Mar-04
D01ME056601_03.02_0016_a.pdf	Report Re: Final Sampling and Analysis Plan	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	June, 2010
D01ME056601_03.02_0017_a.pdf	Report Re: Sampling and Analysis Plan Addendum for Sub-Slab Soil Vapor and Indoor Air	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	October, 2010
D01ME056601_03.02_0018_a.pdf	Report Re: Final Report Sub-Slab Vapor and Indoor Air Sampling Trip Report	Unknown (MACTEC Engineering and Consulting, Inc.)	Unknown (Woods Hole Group, Inc.) Unknown (USACE - New England District)	May, 2011
D01ME056601_03.02_0019_a.pdf	Report Re: Final Report Revision 1 Sub-Slab Vapor and Indoor Air Sampling Trip Report	Unknown (MACTEC Engineering and Consulting, Inc.)	Unknown (USACE - New England District)	July, 2011
03.04 RI Work Plans/Site Safety and Health Plans/Progress Reports				
D01ME056601_03.04_0003_a.pdf	Report Re: Health and Safety Plan for Overburden, Bedrock and Geophysical Investigation	Unknown (The Johnson Company)	Unknown (USACE - New England District)	March, 2008
D01ME056601_03.04_0004_a.pdf	Report Re: Final RI/FS Work Plan	Unknown (The Johnson Company)	Unknown (USACE - New England District)	December, 2008
D01ME056601_03.04_0005_a.pdf	Report Re: Work Management Plan for Geophysical Anomaly Investigation	Unknown (Argonne National Laboratory) Unknown (USACE - New England District)	Unknown (USACE - New England District)	14-Oct-04
D01ME056601_03.04_0006_a.pdf	Report Re: Final Groundwater-Surface Water Monitoring Plan	Unknown (USACE - New England District)	Unknown (USACE - New England District)	18-May-07
D01ME056601_03.04_0007_a.pdf	Report Re: Revised Final Surface Geophysical Investigation Workplan	Unknown (Argonne National Laboratory) Unknown (USACE - New England District)	Unknown	3-Nov-03
D01ME056601_03.04_0008_a.pdf	Report Re: Health and Safety Plan Addendum	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	July, 2013
03.10 RI Report and other Final RI-Related Reports				
D01ME056601_03.10_0002_a.pdf	Report Re: Hydrophysical and Wireline Straddle Packer Final Report	Unknown (RAS, Inc., Integrated Subsurface Evaluation)	Unknown (USACE - New England District)	November, 2006
D01ME056601_03.10_0003_a.pdf	Report Re: Revised Borehole Geophysics Logging Report	Unkown (Geophysical Applications, Inc.)	Unknown (USACE - New England District)	October, 2005
D01ME056601_03.10_0009_a.pdf	Report Re: June 2010 Residential and Monitoring Well Sampling Event Report	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	December, 2010
D01ME056601_03.10_0010_a.pdf	Report Re: November 2010 Residential and Monitoring Well Sampling Event Report	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	March, 2011
D01ME056601_03.10_0011_a.pdf	Report Re: Final October 2011 Residential and Monitoring Well Sampling Event Report	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	April, 2012
D01ME056601_03.10_0012_a.pdf	Report Re: Final Report August and November 2011 Groundwater Sampling Events	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	April, 2012
D01ME056601_03.10_0013_a.pdf	Report Re: Final Remedial Investigation/Feasibility Study Report - Revision 1	Unknown (The Johnson Company)	Unknown (USACE - New England District)	December, 2012
D01ME056601_03.10_0014_a.pdf	Report Re: Final April 2012 Residential and Monitoring Well Sampling Event Report	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	July, 2012
D01ME056601_03.10_0015_a.pdf	Report Re: Final October 2012 Residential and Monitoring Well Sampling Event Report	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	September, 2013
D01ME056601_03.10_0016_a.pdf	Report Re: Final July 2013 Residential and Monitoring Well Sampling Event Report	Unknown (Woods Hole Group, Inc.)	Unknown (USACE - New England District)	February, 2014
03.12 Remedial Investigation Meeting Documents				
D01ME056601_03.12_0004_a.pdf	E-mail Re: Transmittal of Attached Minutes for the June 2, 2010 Meeting Regarding the Draft RI/FS Report	Maynard, Donald (The Johnson Company)	Various (Various)	14-Jun-10
D01ME056601_03.12_0007_a.pdf	Meeting Documents Re: January 29, 2003 Technical Project Planning Meeting Notes	Novotry, Heidi (USACE - HTRW Center of Expertise)	Unknown	9-Jan-03
D01ME056601_03.12_0008_a.pdf	Meeting Documents Re: RI/FS Review Meeting Minutes	Unknown (USACE - New England District)	Unknown	2-Jun-10
D01ME056601_03.12_0009_a.pdf	Meeting Documents Re: In-Situ Remedial Presentation Meeting Minutes	Unknown (USACE - New England District)	Unknown	3-May-11

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File Name	Document Title/Description	Author(s)	Recipient(s)	Date
D01ME056601_03.12_0010_a.pdf	Meeting Documents Re: Project Status Update Meeting Minutes	Unknown (USACE - New England District)	Unknown	23-Feb-11
04. Feasibility Study (FS)				
04.01 FS Correspondence				
D01ME056601_04.01_0500_a.pdf	Comments Re: Additional Comments to USACE Response to MEDEP Comments on the Proposed Plan	Unknown (Maine Department of Environmental Protection)	Unknown (USACE - New England District) Akladiss, Naji (Maine Department of Environmental Protection)	20-Dec-13
D01ME056601_04.01_0501_a.pdf	E-mail Re: Transmittal of Draft Proposed Plan and Request for Comments	Wojtas, Marie (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME) Akladiss, Naji (Maine Department of Environmental Protection)	14-Jan-13
D01ME056601_04.01_0502_a.pdf	E-mail Re: Transmittal of Revised Proposed Plan and Request for Comments	Wojtas, Marie (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME) Akladiss, Naji (Maine Department of Environmental Protection)	9-Jan-14
D01ME056601_04.01_0503_a.pdf	E-mail Re: Transmittal of Responses to Comments on the Proposed Plan	Wojtas, Marie (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME) Akladiss, Naji (Maine Department of Environmental Protection)	9-Jul-13
D01ME056601_04.01_0504_a.pdf	E-mail Re: Transmittal of Meeting Minutes from August 20, 2013 Meeting on the Proposed Plan	Wojtas, Marie (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME)	29-Aug-13
D01ME056601_04.01_0505_a.pdf	Memorandum Re: Additional Comments to the May 31, 2013 Response to Comments on the Proposed Plan and Final RI/FS	Lipfert, Gail (Maine Department of Environmental Protection)	Akladiss, Naji (Maine Department of Environmental Protection) Akladiss, Naji (Maine Department of Environmental Protection)	22-Jul-14
D01ME056601_04.01_0506_a.pdf	Letter Re: Transmittal of Responses to MEDEP and Town of Glenburn Comments (Attached) and Revised Proposed Plan	Acone, Scott (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME)	1-Jul-13
D01ME056601_04.01_0507_a.pdf	E-mail Re: Transmittal of Chronology of Events Leading to Proposed Remedy	Wojtas, Marie (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection) Akladiss, Naji (Maine Department of Environmental Protection)	16-Apr-13
D01ME056601_04.01_0508_a.pdf	Letter Re: Transmittal of Revised Proposed Plan	Acone, Scott (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME)	2-Jan-14
D01ME056601_04.01_0509_a.pdf	Letter Re: Transmittal of Draft Proposed Plan and Final RI/FS Revision 1	Mackos, Anthony (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection)	10-Jan-13
D01ME056601_04.01_0510_a.pdf	Letter Re: Transmittal of Attached Documents Supporting Selected Remedy	Acone, Scott (USACE - New England District)	Akladiss, Naji (Maine Department of Environmental Protection) Akladiss, Naji (Maine Department of Environmental Protection)	15-Apr-13
D01ME056601_04.01_0511_a.pdf	E-mail Re: Status of Proposed Plan and Path Forward	Wojtas, Marie (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME)	4-May-12
D01ME056601_04.01_0513_a.pdf	Press Release/Public Notice Re: Notification of August 20, 2014 Public Meeting to Present the Proposed Plan	Wright, David (Maine Department of Environmental Protection)	Wojtas, Marie (USACE - New England District)	August, 2014
04.04 FS Work Plans/Site Safety and Health Plans/Progress Reports				
D01ME056601_04.04_0500_a.pdf	Report Re: Final Health and Safety Plan for the Feasibility Study Support Field Work	Unknown (Woods Hole Group)	Unknown (USACE - New England District)	June, 2010
04.10 Proposed Plan for Remedial Action (RA)				
D01ME056601_04.10_0503_a.pdf	Report Re: Proposed Plan	Unknown (USACE - New England District)	Unknown	30-Jul-14

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File Name	Document Title/Description	Author(s)	Recipient(s)	Date
04.11 Feasibility Study Meeting Documents				
D01ME056601_04.11_0500_a.pdf	Meeting Documents Re: Summary of Proposed Plan Review Meeting	Unknown (USACE - New England District)	Unknown	20-Aug-13
05. Record of Decision (ROD)/Decision Document (DD				
05.08 All Public Notices, Comments Received, and Responses to Comments				
D01ME056601_05.08_0501_a.pdf	Press Release/Public Notice Re: Notification of August 20, 2014 Public Meeting to Present the Proposed Plan	Unknown (Bangor Daily News)	Unknown	August, 2014
08. Public Affairs-Community Relations				
08.01 Correspondence				
D01ME056601_08.01_0504_a.pdf	Letter Re: Request for Project Status and Notification of Related Issues	Shook, William (Town of Glenburn, ME)	Ilic, Jayson (USACE - New England District)	28-May-02
D01ME056601_08.01_0505_a.pdf	Letter Re: Clarifications to Previously Presented Information in April 29, 2002 Email	Betterley, Carl (Town of Glenburn, ME)	Ilic, Jayson (USACE - New England District)	1-May-02
D01ME056601_08.01_0506_a.pdf	Letter Re: Correction to Previous Information regarding Well Usage at Homestead Mobile Park Home	Shook, William (Town of Glenburn, ME)	Ilic, Jayson (USACE - New England District)	5-Jun-02
D01ME056601_08.01_0529_a.pdf	Letter Re: Update on the Status of the Investigation and Recommendations for Further Testing (Unsigned)	McMillan, H. Farrell (USACE - New England District)	Betterley, Carl (Town of Glenburn, ME)	22-Feb-06
D01ME056601_08.01_0530_a.pdf	Letter Re: Request for Letter from USACE Addressing Contamination Concerns	Crooker, Mike (Town of Glenburn, ME)	Akladiss, Naji (Maine Department of Environmental Protection)	4-Jan-07
D01ME056601_08.01_0580_a.pdf	Letter Re: Local Concerns with Site Priority Level and Preference for a Community Meeting	Shook, William (Town of Glenburn, ME)	Wojtas, Marie (USACE - New England District)	3-Apr-12
D01ME056601_08.01_0581_a.pdf	E-mail Re: Review Comments on the August 20, 2013 Meeting Notes	Crooker, Mike (Town of Glenburn, ME)	Wojtas, Marie (USACE - New England District)	18-Sep-13
D01ME056601_08.01_0582_a.pdf	Letter Re: Transmittal of Draft Proposed Plan and Final RI/FS Revision 1	Mackos, Anthony (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME) Shook, William (Town of Glenburn, ME)	10-Jan-13
D01ME056601_08.01_0583_a.pdf	Letter Re: Notification of Public Informational Meeting	McMillan, Farrell (USACE - New England District)	Unknown (Landowner)	8-Jun-11
D01ME056601_08.01_0605_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW1, Collected on June 30, 2010	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	30-Aug-10
D01ME056601_08.01_0606_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Locations PW-02 and PW-03, Collected on June 30, 2010	Buck, Mitchell (Woods Hole Group, Inc.)	Brasslett, Ruthena (B&C Associates)	30-Aug-10
08. Public Affairs-Community Relations				
08.01 Correspondence				
D01ME056601_08.01_0627_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW1, Collected on November 10, 2010	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	28-Feb-11
D01ME056601_08.01_0628_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Locations PW02 and PW03, Collected on November 10, 2010	Buck, Mitchell (Woods Hole Group, Inc.)	Brasslett, Ruthena (B&C Associates)	28-Feb-11
D01ME056601_08.01_0649_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW1, Collected on May 11, 2011	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	29-Jun-11
D01ME056601_08.01_0650_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Locations PW02 and PW03, Collected on May 11, 2011	Buck, Mitchell (Woods Hole Group, Inc.)	Brasslett, Ruthena (B&C Associates)	29-Jun-11

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File Name	Document Title/Description	Author(s)	Recipient(s)	Date
D01ME056601_08.01_0652_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW02 and PW03, Collected on November 1, 2011	Buck, Mitchell (Woods Hole Group, Inc.)	Brasslett, Ruthena (B&C Associates)	4-Jan-12
D01ME056601_08.01_0656_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW1, Collected on November 1, 2011	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	4-Jan-12
D01ME056601_08.01_0688_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW1, Collected on May 1, 2012	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	16-Jul-12
D01ME056601_08.01_0689_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Locations PW-02 and PW-03, Collected on May 1, 2012	Buck, Mitchell (Woods Hole Group, Inc.)	Brasslett, Ruthena (B&C Associates)	16-Jul-12
D01ME056601_08.01_0708_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW1, Collected on October 30, 2012	Mackos, Anthony (USACE - New England District)	Crooker, Mike (Town of Glenburn, ME)	22-Jan-13
D01ME056601_08.01_0715_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW-01, Collected on July 31, 2013	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	2-Dec-13
D01ME056601_08.01_0738_a.pdf	Letter Re: Transmittal of Attached Town of Glenburn Drinking Water Sampling Results for Sampling Location PW-01, Collected on April 9, 2014	Buck, Mitchell (Woods Hole Group, Inc.)	Crooker, Mike (Town of Glenburn, ME)	9-Jul-14
D01ME056601_08.01_0753_a.pdf	Letter Re: Concerns About the Proposed Plan and Request for Attendance at Public Hearing	Unknown (Town of Glenburn, ME)	Winstead, Christopher (U.S. House of Representatives)	14-Aug-14
D01ME056601_08.01_0754_a.pdf	Letter Re: Transmittal of Attached Comments on the Proposed Plan	Crooker, Mike (Town of Glenburn, ME)	Wojtas, Marie (USACE - New England District)	4-Sep-14
08.08 News Clippings and Press Releases				
D01ME056601_08.08_0500_a.pdf	Press Release Re: Project Newsletter - Former Guidance and Tracking (GAT) Facility Issue No. 1	Unknown (Maine Department of Environmental Protection) Unknown (USACE - New England District)	Unknown	October, 2003
08.10 Public Meeting Minutes/Transcripts/Restoration Advisory Board (RAB) and Technical Review Committee (TRC) Meetings				
D01ME056601_08.10_0500_a.pdf	Meeting Documents Re: Glenburn Town Council Meeting Agenda with USACE Informational Meeting	Unknown (Town of Glenburn, ME)	Unknown	16-Jun-11
D01ME056601_08.10_0501_a.pdf	Meeting Documents Re: Transcript of August 20, 2014 Public Hearing for the Proposed Plan	Unknown (USACE - New England District)	Unknown	20-Aug-14
08.11 Fact Sheets/Newsletters				
D01ME056601_08.11_0500_a.pdf	Newsletter Re: Project Update - June 2011 Summary Newsletter	Unknown	Unknown	June, 2011
08.13 Public Notices				
D01ME056601_08.13_0500_a.pdf	Press Release/Public Notice Re: Public Meeting and Public Comment Period for the Proposed Plan	Unknown	Unknown	25-Jul-14

APPENDIX E

2015 REGIONAL SCREENING LEVEL (RSL) AND VAPOR INTRUSION SCREENING LEVEL (VISL) CALCULATOR RESULTS

[provided by MEDEP, October 2015]

Site-specific

Resident Equation Inputs for Tap Water

APPENDIX E: TABLE E-1

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m^3	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}^{der}$ (age-adjusted exposure time) hour/day	0.67077
$ET_{resw-madj}^{der}$ (mutagenic age-adjusted exposure time) hour/day	0.67077
ET_{resw}^{der} (exposure time) hour/day	24
ET_{reswc}^{der} (dermal exposure time - child) hour/day	0.54
ET_{reswa}^{der} (dermal exposure time - adult) hour/day	0.71
ET_{reswc}^{inh} (inhalation exposure time - child) hour/day	24
ET_{reswa}^{inh} (inhalation exposure time - adult) hour/day	24

Site-specific

Resident Equation Inputs for Tap Water

Variable	Value
$ET_{0\text{-}2}^{inh}$ (mutagenic inhalation exposure time first phase) hour/event	24
$ET_{2\text{-}6}^{inh}$ (mutagenic inhalation exposure time second phase) hour/event	24
$ET_{6\text{-}16}^{inh}$ (mutagenic inhalation exposure time third phase) hour/event	24
$ET_{16\text{-}26}^{inh}$ (mutagenic inhalation exposure time fourth phase) hour/event	24
$ET_{0\text{-}2}^{der}$ (mutagenic dermal exposure time first phase) hour/event	0.54
$ET_{2\text{-}6}^{der}$ (mutagenic dermal exposure time second phase) hour/event	0.54
$ET_{6\text{-}16}^{der}$ (mutagenic dermal exposure time third phase) hour/event	0.71
$ET_{16\text{-}26}^{der}$ (mutagenic dermal exposure time fourth phase) hour/event	0.71
BW_{reswa} (body weight - adult) kg	80
BW_{reswc} (body weight - child) kg	15
$BW_{0\text{-}2}$ (mutagenic body weight) kg	15
$BW_{2\text{-}6}$ (mutagenic body weight) kg	15
$BW_{6\text{-}16}$ (mutagenic body weight) kg	80
$BW_{16\text{-}26}$ (mutagenic body weight) kg	80
$IFW_{res\text{-}adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res\text{-}adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswc} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
$IRW_{0\text{-}2}$ (mutagenic water intake rate) L/day	0.78
$IRW_{2\text{-}6}$ (mutagenic water intake rate) L/day	0.78
$IRW_{6\text{-}16}$ (mutagenic water intake rate) L/day	2.5
$IRW_{16\text{-}26}$ (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswc} (events - child) per day	1
$EV_{0\text{-}2}$ (mutagenic events) per day	1
$EV_{2\text{-}6}$ (mutagenic events) per day	1
$EV_{6\text{-}16}$ (mutagenic events) per day	1

Site-specific

Resident Equation Inputs for Tap Water

Variable	Value
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2721670
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8419740
SA_{reswc} (skin surface area - child) cm^2	6378
SA_{reswa} (skin surface area - adult) cm^2	20900
SA_{0-2} (mutagenic skin surface area) cm^2	6378
SA_{2-6} (mutagenic skin surface area) cm^2	6378
SA_{6-16} (mutagenic skin surface area) cm^2	20900
SA_{16-26} (mutagenic skin surface area) cm^2	20900

Site-specific

Resident Screening Levels (RSL) for Tap Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	GIABS
Trichloroethylene	79-01-6	Yes	Yes	Organics	4.60E-02	U	4.10E-06	U	5.00E-04	U	2.00E-03	U	1

Chemical	K_p (cm/hr)	MW	B (unitless)	tSUP (hr)	τ$_{event}$ (hr/event)	FA (unitless)	In EPD?	DA_{event} (ca)	DA_{event} (nc child)	DA_{event} (nc adult)	MCL ug/L	Ingestion SL TR=1.0E-6 (µg/L)
Trichloroethylene	0.0116	131.39	0.0511406	1.3735485	0.5723119	1	Yes	0.0001428	0.0012263	0.0019959	5.00E+00	1.18E+00

Chemical	Dermal SL TR=1.0E-6 (µg/L)	Inhalation SL TR=1.0E-6 (µg/L)	Carcinogenic SL TR=1.0E-6 (µg/L)	Ingestion SL Child HQ=1 (µg/L)	Dermal SL Child HQ=1 (µg/L)	Inhalation SL Child HQ=1 (µg/L)	Noncarcinogenic SL Child HI=1 (µg/L)	Ingestion SL Adult HQ=1 (µg/L)
Trichloroethylene	7.19E+00	9.57E-01	4.93E-01	1.00E+01	6.88E+01	4.17E+00	2.82E+00	1.67E+01

Chemical	Dermal SL Adult HQ=1 (µg/L)	Inhalation SL Adult HQ=1 (µg/L)	Noncarcinogenic SL Adult HI=1 (µg/L)	Screening Level (µg/L)
Trichloroethylene	9.77E+01	4.17E+00	3.23E+00	4.93E-01 ca**

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Site-specific

Resident Risk for Tap Water

Chemical	Chemical Type	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	K_p (cm/hr)	MW	B (unitless)	tSUP (hr)
Trichloroethylene	Organics	4.60E-02	U	4.10E-06	U	5.00E-04	U	2.00E-03	U	0.0116	131.39	0.0511406	1.3735485
*Total Risk/HI		-		-		-		-		-	-	-	-

Chemical	τ$_{event}$ (hr/event)	FA (unitless)	In EPD?	MCL ug/L	Concentration (µg/L)	Ingestion Risk TR=1.0E-6	Dermal Risk TR=1.0E-6	Inhalation Risk TR=1.0E-6	Carcinogenic Risk TR=1.0E-6	Ingestion Risk Child HQ=1	Dermal Risk Child HQ=1
Trichloroethylene	0.5723119	1	Yes	5.00E+00	5.10E+00	4.31E-06	7.09E-07	5.33E-06	1.04E-05	5.09E-01	7.41E-02
*Total Risk/HI	-	-		-	-	*4.31E-06*	*7.09E-07*	*5.33E-06*	*1.04E-05*	*5.09E-01*	*7.41E-02*

Chemical	Inhalation Risk Child HQ=1	Noncarcinogenic Risk Child HI=1	Ingestion Risk Adult HQ=1	Dermal Risk Adult HQ=1	Inhalation Risk Adult HQ=1	Noncarcinogenic Risk Adult HI=1
Trichloroethylene	1.22E+00	1.81E+00	3.06E-01	5.22E-02	1.22E+00	1.58E+00
*Total Risk/HI	*1.22E+00*	*1.81E+00*	*3.06E-01*	*5.22E-02*	*1.22E+00*	*1.58E+00*

Site-specific

Resident Equation Inputs for Tap Water

APPENDIX E: TABLE E-2

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m^3	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{resw} (exposure duration - resident) year	26
ED_{reswc} (exposure duration - child) year	6
ED_{reswa} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{resw} (exposure frequency) day/year	350
EF_{reswc} (exposure frequency - child) day/year	350
EF_{reswa} (exposure frequency - adult) day/year	350
EF_{0-2} (mutagenic exposure frequency first phase) day/year	350
EF_{2-6} (mutagenic exposure frequency second phase) day/year	350
EF_{6-16} (mutagenic exposure frequency third phase) day/year	350
EF_{16-26} (mutagenic exposure frequency fourth phase) day/year	350
$ET_{resw-adj}^{der}$ (age-adjusted exposure time) hour/day	0.67077
$ET_{resw-madj}^{der}$ (mutagenic age-adjusted exposure time) hour/day	0.67077
ET_{resw}^{der} (exposure time) hour/day	24
ET_{reswc}^{der} (dermal exposure time - child) hour/day	0.54
ET_{reswa}^{der} (dermal exposure time - adult) hour/day	0.71
ET_{reswc}^{inh} (inhalation exposure time - child) hour/day	24
ET_{reswa}^{inh} (inhalation exposure time - adult) hour/day	24

Site-specific

Resident Equation Inputs for Tap Water

Variable	Value
$ET_{0\text{-}2}^{inh}$ (mutagenic inhalation exposure time first phase) hour/event	24
$ET_{2\text{-}6}^{inh}$ (mutagenic inhalation exposure time second phase) hour/event	24
$ET_{6\text{-}16}^{inh}$ (mutagenic inhalation exposure time third phase) hour/event	24
$ET_{16\text{-}26}^{inh}$ (mutagenic inhalation exposure time fourth phase) hour/event	24
$ET_{0\text{-}2}^{der}$ (mutagenic dermal exposure time first phase) hour/event	0.54
$ET_{2\text{-}6}^{der}$ (mutagenic dermal exposure time second phase) hour/event	0.54
$ET_{6\text{-}16}^{der}$ (mutagenic dermal exposure time third phase) hour/event	0.71
$ET_{16\text{-}26}^{der}$ (mutagenic dermal exposure time fourth phase) hour/event	0.71
BW_{reswa} (body weight - adult) kg	80
BW_{reswc} (body weight - child) kg	15
$BW_{0\text{-}2}$ (mutagenic body weight) kg	15
$BW_{2\text{-}6}$ (mutagenic body weight) kg	15
$BW_{6\text{-}16}$ (mutagenic body weight) kg	80
$BW_{16\text{-}26}$ (mutagenic body weight) kg	80
$IFW_{res\text{-}adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res\text{-}adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswc} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
$IRW_{0\text{-}2}$ (mutagenic water intake rate) L/day	0.78
$IRW_{2\text{-}6}$ (mutagenic water intake rate) L/day	0.78
$IRW_{6\text{-}16}$ (mutagenic water intake rate) L/day	2.5
$IRW_{16\text{-}26}$ (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswc} (events - child) per day	1
$EV_{0\text{-}2}$ (mutagenic events) per day	1
$EV_{2\text{-}6}$ (mutagenic events) per day	1
$EV_{6\text{-}16}$ (mutagenic events) per day	1

Site-specific

Resident Equation Inputs for Tap Water

Variable	Value
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2721670
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8419740
SA_{reswc} (skin surface area - child) cm^2	6378
SA_{reswa} (skin surface area - adult) cm^2	20900
SA_{0-2} (mutagenic skin surface area) cm^2	6378
SA_{2-6} (mutagenic skin surface area) cm^2	6378
SA_{6-16} (mutagenic skin surface area) cm^2	20900
SA_{16-26} (mutagenic skin surface area) cm^2	20900

Site-specific

Resident Screening Levels (RSL) for Tap Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	GIABS
Trichloroethylene	79-01-6	Yes	Yes	Organics	4.60E-02	I	4.10E-06	I	5.00E-04	I	2.00E-03	I	1

Chemical	K_p (cm/hr)	MW	B (unitless)	tSUP (hr)	τ$_{event}$ (hr/event)	FA (unitless)	In EPD?	DA_{event} (ca)	DA_{event} (nc child)	DA_{event} (nc adult)	MCL (ug/L)	Ingestion SL TR=1.0E-6 (µg/L)
Trichloroethylene	0.0116	131.39	0.0511406	1.3735485	0.5723119	1	Yes	0.0001428	0.0012263	0.0019959	5.00E+00	1.18E+00

Chemical	Dermal SL TR=1.0E-6 (µg/L)	Inhalation SL TR=1.0E-6 (µg/L)	Carcinogenic SL TR=1.0E-6 (µg/L)	Ingestion SL Child HQ=1 (µg/L)	Dermal SL Child HQ=1 (µg/L)	Inhalation SL Child HQ=1 (µg/L)	Noncarcinogenic SL Child HI=1 (µg/L)	Ingestion SL Adult HQ=1 (µg/L)
Trichloroethylene	7.19E+00	9.57E-01	4.93E-01	1.00E+01	6.88E+01	4.17E+00	2.82E+00	1.67E+01

Chemical	Dermal SL Adult HQ=1 (µg/L)	Inhalation SL Adult HQ=1 (µg/L)	Noncarcinogenic SL Adult HI=1 (µg/L)	Screening Level (µg/L)
Trichloroethylene	9.77E+01	4.17E+00	3.23E+00	4.93E-01 ca**

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Site-specific

Resident Risk for Tap Water

Chemical	Chemical Type	Ingestion SF $(mg/kg\text{-}day)^{-1}$	SFO Ref	Inhalation Unit Risk $(ug/m^3)^{-1}$	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	K_p (cm/hr)	MW	B (unitless)	tSUP (hr)
Trichloroethylene	Organics	4.60E-02	I	4.10E-06	I	5.00E-04	I	2.00E-03	I	0.0116	131.39	0.0511406	1.3735485
*Total Risk/HI		-		-		-		-		-	-	-	-

Chemical	τ$_{event}$ (hr/event)	FA (unitless)	In EPD?	MCL (ug/L)	Concentration (µg/L)	Ingestion Risk TR=1.0E-6	Dermal Risk TR=1.0E-6	Inhalation Risk TR=1.0E-6	Carcinogenic Risk TR=1.0E-6	Ingestion Risk Child HQ=1	Dermal Risk Child HQ=1
Trichloroethylene	0.5723119	1	Yes	5.00E+00	6.00E+01	5.07E-05	8.35E-06	6.27E-05	1.22E-04	5.98E+00	8.72E-01
*Total Risk/HI	-	-		-	-	*5.07E-05*	*8.35E-06*	*6.27E-05*	*1.22E-04*	*5.98E+00*	*8.72E-01*

Chemical	Inhalation Risk Child HQ=1	Noncarcinogenic Risk Child HI=1	Ingestion Risk Adult HQ=1	Dermal Risk Adult HQ=1	Inhalation Risk Adult HQ=1	Noncarcinogenic Risk Adult HI=1
Trichloroethylene	1.44E+01	2.12E+01	3.60E+00	6.14E-01	1.44E+01	1.86E+01
*Total Risk/HI	*1.44E+01*	*2.12E+01*	*3.60E+00*	*6.14E-01*	*1.44E+01*	*1.86E+01*

OSWER VAPOR INTRUSION ASSESSMENT
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

APPENDIX E: TABLE E-3

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
79-01-6	Trichloroethylene	1.45E-01	4.8E-08	1.7E-02	see note	I	2.00E-03	I	TCE

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	25
Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	25
Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	250
Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	8

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	0.00E+00
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	4.10E-06

Mutagenic Chemicals: The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride: See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:
I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).