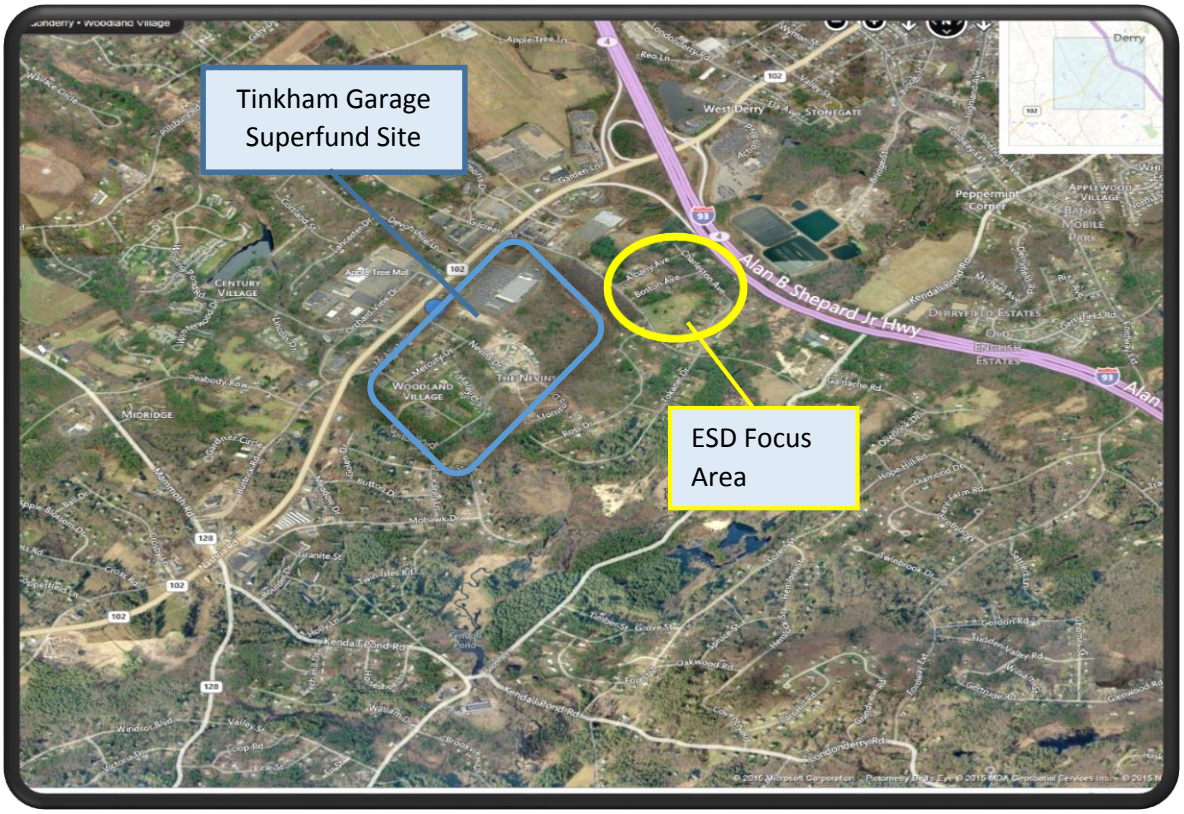
THIRD EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

Tinkham Garage Superfund Site

EPA ID: NHD062004569

Londonderry, NH

DRAFT FOR PUBLIC COMMENT- OCTOBER 2015



Tinkham Garage Superfund Site, Londonderry, NH

SDMS Doc ID 583724

Draft for Public Comment
Third Explanation of Significant Differences (ESD
Tinkham Garage Superfund Site

October 9-30, 2015

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THIRD EXPLANATION OF SIGNIFICANT DIFFERENCES

TINKHAM GARAGE SUPERFUND SITE

I. INTRODUCTION

A. SITE NAME & LOCATION

Site Name: Tinkham Garage Superfund Site (Site)

Site Location: Londonderry, NH

The 375 acre Site is generally bounded by Route 102 to the north, Gilcreast Road to the east, Ross Drive to the southeast, and an unnamed tributary to Beaver Brook to the west. (See Attachment 1)

B. LEAD & SUPPORT AGENCIES

Lead Agency: United States Environmental Protection Agency (EPA)

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Support Agency: New Hampshire Department of Environmental Services (NHDES)

- *Contact: Kenneth Richards, NHDES Remedial Project Manager, Kenneth.Richards@des.nh.gov, (603) 271 - 4060*

C. Legal Authority for ESD

Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9617(c), requires that, if the U.S. Environmental Protection Agency (EPA) determines that the remedial action being undertaken at a site differs significantly from the Record of Decision (ROD) for that site, EPA shall publish an Explanation of Significant Differences (ESD) between the remedial action being undertaken and the remedial action set forth in the ROD and the reasons such changes are being made. Section 300.435(c)(2)(i) of the National Contingency Plan (NCP), and EPA guidance (OSWER Directive 9200.1-23.P), indicate that an ESD, rather than a ROD amendment, is appropriate where the adjustments being made to the ROD are significant, but do not fundamentally alter the overall remedy with respect to scope, performance, or cost. EPA has determined that the adjustments to the 1986 ROD, 1989 Amended ROD and subsequent ESDs, as provided in this ESD, are significant but do not fundamentally alter the overall remedy for the Tinkham Garage Superfund Site with respect to scope, performance, or cost. Therefore, this ESD is being properly issued.

In accordance with Section 117(d) of CERCLA and Section 300.825(a) of the NCP, EPA has voluntarily chosen to hold a public comment period on this draft document from October 9, 2015 to October 30, 2015 to ensure that all interested parties have an opportunity to provide input to EPA before its final decision on this modification to the remedy at the Site.

D. SUMMARY OF CIRCUMSTANCES NECESSITATING THIS ESD

In late 1982, residential drinking water supplies, including the primary water supply well (LGSW) serving the Londonderry Green Apartments complex southwest of the Site were found to be

contaminated. Bottled water was supplied and Point of Entry (POE) water treatment systems were installed in nearby residential homes. The State of New Hampshire issued a health order in early 1983, advising residents not to drink their well water. Following an analysis of feasible water supply alternatives, EPA initiated an early action in the fall of 1983 to provide an alternative water supply line to approximately 400 impacted residences relying on groundwater for their drinking water supply. EPA listed the Site on the NPL in September 1983.

A Remedial Investigation (RI) conducted from 1984 to 1986 documented widespread contamination from volatile organic compounds (VOCs) in both the overburden and bedrock aquifers, as well as in surface water and in soils located in the field behind the Tinkham Garage and at the Londonderry Green Apartment Complex (now the Woodland Village Condominium Complex). Pumping tests conducted as part of the RI at the supply well (LGSW) documented that bedrock groundwater flow occurs primarily through fracture zones that are interpreted to strike (trend) in a NE/SW direction across the Site (see Attachment 2- Site Map and Attachment 3 – Pump test drawdown map). The pumping of the LGSW well indicated a significant (29 feet) drawdown in water level, 1500 feet to the northeast, in monitoring well FW-11D which is located down gradient of the primary source area near the Tinkham Garage. This bedrock drawdown was seen primarily in monitoring wells along a narrow, 2,600' long zone, however the northeastern and southwestern extent of this influence was not fully delineated.

Following the completion of a Feasibility Study in 1986, EPA issued a ROD for the Site. Based on conclusions presented in a July, 1988 Pre-Design Study Report, the ROD was amended in 1989, as well as in 1992 and 2003 through the issuance of two ESDs, as described later in this document.

In 2009, as part of the Five Year Review required for the Site, concerns were raised about elevated concentrations of 1,4- dioxane and its mobility in groundwater at the Site. Subsequently, EPA required additional investigations to evaluate the long-term protectiveness of the existing groundwater monitoring program. Specifically, existing monitoring wells utilized to monitor bedrock water quality at the Site are constructed as continuous open-hole completions in bedrock, and therefore span and connect multiple fracture zones in each well. The additional investigations were conducted to evaluate contaminant concentrations in three select bedrock monitoring wells (one source area and two down gradient) to characterize discrete fracture zones, water flow and water quality. From April through October 2014, these investigations were conducted at the Site and the results indicated elevated concentrations (up to 760 ug/l) of 1,4-dioxane within discrete fractures in bedrock intercepted by monitoring well FW-11D. This well is considered to represent bedrock conditions immediately down gradient of the former Tinkham Garage source area. In addition, a 1,4-dioxane concentration of 3.2 ug/l was identified in a water sample collected from a discrete fracture zone in monitoring well FW-28D, which is located in an area considered to represent the south/south-east boundary conditions for the Site and at 4.8 ug/l in monitoring well FW-21 which represents the southwest boundary conditions. Overall these additional bedrock investigations supported previous conclusions regarding contaminant distribution: VOCs were solubilized from soils to groundwater in the former Tinkham Garage source area and dissolved VOCs migrated in overburden groundwater from the source area towards the east, southeast and south into the nearby wetlands; VOCs migrated through the overburden and entered bedrock fractures within and down gradient from the former source area behind the Tinkham Garage and flowed within fractures which strike from northeast/southwest; and that 1,4 dioxane is found with varying concentrations within the conductive fractures that extend across the Site (See Attachments 5 - 2014 Groundwater Sampling Results and Attachment 6- 2014 Bedrock Investigation Results). These investigations also demonstrated that the current horizontal and vertical extent of groundwater contamination has not been fully delineated.

In November 2014, the NHDES MtBE Remediation Bureau, as part of an investigation conducted by the Department designed to evaluate the potential presence of MtBE in residential water supply wells, provided the NHDES Hazardous Waste Remediation Bureau and EPA with data which indicated that

residential wells in the Site vicinity are contaminated with chemical constituents, similar to those found in groundwater at the Site, at levels which exceed drinking water standards. These residences utilize deep bedrock wells as their source for drinking water and are located approximately 1500 feet northeast of the major contaminant source area at the Site, where levels of contaminants remain at concentrations greater than drinking water standards. See Attachment 2 for residential locations and Table 1 below for chemical constituents found at the Site in excess of drinking water standards and those found in the nearby residential properties.

The residential wells that were found to be impacted northeast of the Site, appear to be clustered in a location that would fall within the fracture zone of influence shown on Attachment 3, if that zone were extended another 1,500' further northeast (in the same SW/NE strike direction). Many households also located within the residential area immediately northeast of the Site have previously connected to the existing waterline. This fact, along with the 1983 removal from service of the original groundwater pumping wells southwest of the Site source area, may have made it possible that this group of residential wells located furthest northeast of the source area, to have drawn the contaminant plume through bedrock in that direction.

Table 1- Groundwater Constituents found in exceedance of Drinking Water Standards

Site Source Area Overburden Groundwater*	Site – Bedrock Groundwater down gradient of Source Area*	Residential Bedrock Water Supply Wells located northeast of the source area (Boston and Charleston Avenues) **
1,4- dioxane	1,4-dioxane	1,4 -dioxane
TCE	TCE	TCE
VC	VC	VC
1,2 -DCA	1,2-DCA	
PCE		
Cis, 1,2-DCE		
	Benzene	

Source * Haley and Aldrich, Annual Groundwater Quality Monitoring Report for 2014 for the former Tinkham Garage Site located in Londonderry, New Hampshire, March 20, 2015

Source ** NHDES MtBE Bureau sampling data 2014/2015

Upon notification of this residential well contamination, the NHDES Waste Management Division took immediate action to address risks posed by exposure to contaminants in drinking water by installing POE treatment systems in three households where concentrations were found to exceed drinking water standards. Because conventional (carbon filtration) POE systems can be generally unreliable for 1,4-dioxane removal, all properties where the NH AGQS standard of 3 ug/l was exceeded were provided with bottled water in addition to POE treatment systems.

Therefore, for the reasons described above, this ESD includes the following:

- Obtaining necessary approvals and designs for the connection and/or extension of the existing waterline in the area to reach all impacted or potentially impacted residences still relying on private wells (current data indicate that, at a minimum, five bedrock wells are impacted by Site contaminants along Charleston and Boston Avenues);
- Installation of all water line extension and/or connection infrastructure to all Site impacted or potentially impacted residences;
- Proper abandonment of any existing potable water well that is not utilized for long-term groundwater monitoring, per EPA's direction; and

- Required monitoring of residential water supply wells to establish a further understanding of the area of Site impacts or potential future impacts through continued use of residential water supply wells not connected to the waterline.

EPA, in consultation with NHDES, believes that connection to a waterline (which is already present in the area), for those residents whose wells have been impacted by the Site or may be impacted in the future from continued use of their well, is an acceptable and sustainable alternative for preventing human exposure to contaminated groundwater with concentrations above drinking water standards.

In addition, this ESD addresses the groundwater remedy set forth in the 1986 ROD, as amended, and specifically addresses a recently identified Contaminant of Concern (COC) at the Site, namely 1,4-dioxane.

Therefore, this ESD:

- Formally incorporates 1,4-dioxane as a Site COC with the NH Ambient Groundwater Quality Standard (AGQS) of 3 ug/l in groundwater as a cleanup level that shall be met at the completion of the remedy.

- Requires a review and revision of the institutional controls (Groundwater Management Zone-GMZ, and deed restrictions), as needed, as well as implementation of additional bedrock investigations to evaluate the contaminant extent, fate, transport, and timeframe for attainment of the groundwater cleanup level due to the addition of 1,4-dioxane.

Therefore this ESD also includes:

- Clarification on the approach that will be utilized to determine that groundwater Cleanup Levels have been attained; the groundwater remedy is protective; and support for a determination that groundwater restoration is complete.

E. AVAILIBILITY OF DOCUMENTS

EPA will consider and respond to all formal comments received during the comment period before issuing a final ESD. EPA's response to these public comments will be attached as a Responsiveness Summary to the final ESD. The ESD, the supporting documentation for the ESD, and the Administrative Record are available to the public at the following locations and may be reviewed at the times listed below:

U.S. Environmental Protection Agency
Office of Site Remediation and Restoration Records Center
5 Post Office Square, Suite 100
Boston, MA 02109-3912
(617) 918-1440
Monday-Friday: 9:00 am - 5:00 pm
http://www.epa.gov/region1/cleanup/resource/records

Leach Library
276 Mammoth Road
Londonderry, NH 03053
(603) 432-1132
Monday-Thursday: 9:00 am – 8:00 pm
Friday: 10:00 am – 2:00 pm
Saturday: 9:00 am – 5:00 pm

This draft ESD and the Administrative Record are available for public review at the locations and times listed above as well as on the internet at: http://www.epa.gov/region1/superfund/sites/Tinkham/. Adobe Reader is required to review the documents on-line.

Notice of the release of the final ESD will be published in the Derry News.

II. SUMMARY OF SITE HISTORY, SELECTED REMEDY AND RECENT CONTAMINATION

A. SITE HISTORY AND RISKS

History

This Site is located approximately one mile southwest of the intersection of Interstate Route 93 and State Route 102 in Londonderry, New Hampshire.

Initial complaints of foam and odors occurring in a small unnamed brook crossing Ross Drive led the Londonderry Health Department to Tinkham Garage in April 1978. Their investigation concluded that liquids and sludge from tank truck washings had been dumped behind the Tinkham Garage directly to the ground surface. A subsequent citizen complaint to the New Hampshire Water Supply and Pollution Control Commission (NHWS&PCC), now the NHDES, resulted in ordering a cleanup involving removal of surface contamination. Additionally, a diversion trench was excavated to divert surface water run-off from behind the garage area away from Ross Drive

EPA completed a Preliminary Assessment in August 1981 which showed that the groundwater, used as a potable water supply, as well as soil and surface water, were contaminated with VOCs. In January 1983, the drinking water supply well servicing the Londonderry Green Apartments (presently Woodland Village Condominiums) and several residential supply wells along Mercury and McAllister Drive were taken out of service because of documented and potential organic chemical contamination. These residents were temporarily supplied bottled water and POE treatment systems until a feasibility study was completed and a permanent water line was installed by the NHWS&PCC under a cooperative agreement between the State and the EPA in November 1983.

The Site was put on the National Priorities List (NPL) in September 1983. The Remedial Investigation (RI) was completed in January 1986. The investigation documented contamination from volatile organic compounds in both the overburden and bedrock aquifers, as well as in surface water and in soils located in the field behind the Tinkham Garage and at the Woodland Village Condominium Complex.

Risk

The 1986 ROD indicated that the greatest potential risk presented by the Site is from ingestion of groundwater contaminated with VOCs including benzene, chloroform, 1,2-dichloroethane, methylene chloride, tetrachloroethylene, trichloroethylene and vinyl chloride. Groundwater from the fractured bedrock served as the primary source of drinking water prior to 1983 when use of wells onsite ended and the alternate water supply (waterline) was provided. Groundwater is contaminated primarily by volatile organic compounds and their degradation products including recently detected 1,4-dioxane. Based on the current understanding of exposure pathways and contaminants found at the Site, additional risks would include inhalation from exposure to TCE while showering and ingestion of groundwater contaminated with 1,4-dioxane. Groundwater from fractured rock still provides drinking water to residents living outside the current GMZ to the east, northeast, and southeast of the Site.

At the time of the 1986 ROD, contaminants ranged from approximately 1 ug/l to 6,700 ug/l total VOCs and the upper limit lifetime cancer risk was estimated at $2 \times l0^{-2}$. As a result, the bedrock aquifer presented unacceptable risks and was undrinkable. Also in 1986, given the active pumping and the short distance to the former condominium supply wells, as well as geological factors, EPA concluded that the disposal area behind the Tinkham Garage was the primary source of contaminants found in the nearby residential supply wells. While the plume of groundwater contaminants has dispersed across much of the Site and the concentrations have decreased, AGQS exceedances remain highest within and near the former source area behind the Tinkham Garage.

B RECENT CONTAMINATION

2014 Bedrock Investigations

Included as part of the Groundwater Management Permit, a network of seven bedrock monitoring wells, with long open-borehole intervals which intersect multiple water-bearing fracture zones, have been part of the long term monitoring program. Bedrock investigations were conducted in 2014 to assess the long term protectiveness and adequacy of this groundwater monitoring program. Because concentrations of contaminants (VOCs and 1,4-dioxane) can vary between individual fracture zones, monitoring data results may reflect contaminant concentrations from individual fractures which then are potentially diluted by clean water entering the borehole from more transmissive fractures in the bedrock. The 2014 bedrock investigations included packer testing to ascertain contaminant concentrations within discrete fracture zones within the boreholes at three bedrock monitoring wells: FW11D, FW28D and FW-21D.

The results indicated that concentrations of total VOCs and 1,4-dioxane found in the deepest intervals studied were higher than the shallowest intervals by a factor of roughly an order of magnitude of 1.2 to 5, respectively. The total VOC and 1,4-dioxane concentrations measured in the individual fracture zones tested support the conceptual site model and previous conclusions regarding contaminant distribution, wherein the highest concentrations are found in bedrock well FW11D, immediately down gradient of the former Tinkham Garage source area, lower concentrations are found farthest down gradient in bedrock FW21D, which is located in an aquifer discharge area, and that higher contaminant concentrations are found in the conductive fractures that extend between these two wells. Under pumping and ambient conditions, the majority of the water would be produced from fractures between 70 and 110 feet below ground surface and the highest concentrations of total VOCs and 1,4-dioxane were also generally found in fractures at depths between 70 and 110 feet below ground surface. Bedrock investigations were not extended deeper at these locations during these investigations. The bedrock fracture scope and assessment, prepared by Haley & Aldrich, is summarized in a report titled "Fractured-Bedrock Evaluation, Tinkham Garage Site, Londonderry, New Hampshire," dated 24 October 2014.

2014 Groundwater Monitoring Results

Former Source Area & Areas Down Gradient: Monitoring well NAI-K2 (located within the former source area) was sampled in March/April and November 2014. Results of VOC and 1,4-dioxane analyses indicated that concentrations of tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC) exceeded AGQS standards for both sampling rounds. (See Attachment 5)

In wells located down gradient of the former source area, FW20 and OW-2D, concentrations of 1,2-dichloroethane (1,2-DCA), VC, and 1,4-dioxane exceeded the AGQS standards for both sampling rounds.

Bedrock monitoring well FW11D (located immediately down gradient of the former source area) as well as bedrock monitoring wells LGSW, ERT01, and FW21D (all located further down gradient in the residential/condominium area) were sampled in March/April 2014. Monitoring well FW11D was sampled again in November 2014. During March/April 2014, VC and 1,4-dioxane concentrations in well FW11D exceeded MCL/AGQS standards. In addition to VC and 1,4-dioxane, concentrations of TCE and 1,2-DCA were above their MCL/AGQS during the sampling round in November 2014. Detected concentrations of 1,4-dioxane were above the AGQS standard of 3 ug/L in monitoring wells, LGSW, ERT01 and FW21D in March/April 2014. In addition, benzene exceeded the AGQS criteria in well LGSW. Detected VOC concentrations appear to be decreasing at these locations.

GMZ Boundary Wells: VOCs were not detected in GMZ boundary wells FW-25, ERT-04, and FW28D in the March/April and November sampling rounds. 1,4-dioxane was detected in GMZ boundary well FW28D at concentrations of 1.6 µg/L (open borehole) in March/April 2014. While the borehole average concentration was found below 2 ug/l, 1,4-dioxane was found at 3.2 ug/l during the 2014 bedrock investigations, within a discrete fracture, which is above the AGQS of 3 ug/l.

Surface Water: Surface water locations SW-1 and SW-2, near the former source area, were sampled in March/April and November 2014. (See Attachment 4) Aside from 1,4-dioxane, no other VOCs were detected at either surface water location during both sampling events. In March/April 2014, 1,4-dioxane was detected 0.30 ug/L at SW-2. 1,4-dioxane concentrations were 1.1 ug/L and 1.3 ug/L at locations SW-1 and SW-2, respectively, in November 2014.

C SUMMARY OF THE SELECTED REMEDY

The 1986 ROD for the Tinkham Garage Superfund Site groundwater cleanup required: (1) removal of volatile organic compound (VOC) contaminated groundwater from the overburden and bedrock aquifers through the use of two former bedrock supply wells (LGSW and LGAW), and a shallow trench to be located behind the Tinkham Garage building; (2) transfer of contaminated groundwater through a force main and pump station to the Derry Publically Owned Treatment Works (POTW) for off-site treatment; and (3) pre-treatment of extracted groundwater on-site as necessary to attain pre-treatment standards required by the Derry POTW.

The installation of the water line for private residences and the condominiums in 1983 was relied upon for the continued protection of public health in the selection of the 1986 remedial action as well as the extension of this water supply for residences and commercial properties built within the boundaries of the Site since 1986.

The ROD was amended in March 1989 to change the remedial approach for soils to vacuum-enhanced extraction (VEE) which, in turn, allowed the shallow groundwater extraction remedy to be modified from the planned trench behind the Tinkham Garage building, to a well system installed as part of the

VEE. The 1986 ROD required that groundwater extraction would proceed for a two year period from the date of implementation. At the end of the two year period, an evaluation would be made by EPA to assess progress towards meeting the remedial objectives for the cleanup of groundwater at the Site. If steady state conditions have been reached, and it is evident remedial objectives are not achievable, EPA would re-evaluate the objectives and its remedial approach for groundwater at the Tinkham Site.

The soil vacuum extraction began operations in November 1994. Groundwater extraction was initiated in May 1995. Bedrock groundwater was extracted from the two previous condominium supply wells, LGAW and LGSW, and was conveyed back on-site via a dedicated sewer line. At the source area, shallow groundwater was extracted through the vacuum extraction wells and was pretreated on-site via an air stripper and carbon, before both were discharged to the Derry POTW. Following attainment of the soil remedial goals within the former source area in November 1995, the VEE system was dismantled and the shallow groundwater extraction system was then modified to include six independent wells pumping a combined flow of 4,500 gallons per day, however reduced contaminant levels allowed pretreatment to be discontinued, prior to discharge to the POTW.

In July 1996, the potentially responsible party (PRP) group requested a temporary shutdown of the two bedrock pumping wells on the basis that VOC contamination had reached steady-state conditions. The PRPs' consultant, GEI, prepared a report, Revised Request for Temporary Shutdown of Bedrock Pumping Systems, July 8, 1996. The 1986 ROD, as amended in 1989, required the pumping of shallow groundwater and contaminated bedrock aquifers for a period of up to two years, until treatment goals of 5 ug/l of PCE and TCE were reached at each monitoring well, or until a decision was approved to cease pumping either following the two year period or if/when steady state conditions were reached and/or remedial objectives were deemed not to be achievable. In May 1997 the PRPs requested that EPA evaluate the permanent shutdown of the complete groundwater extraction system based on evidence of natural attenuation through active biodegradation in the shallow aquifer, attainment of steady-state conditions in the bedrock aquifer, and an estimate that drinking water standards were expected to be achieved within a 15 year period.

Groundwater pumping of the two bedrock wells (former condominium supply wells), which had a combined flow rate of 110,000 gallons per day, was suspended in 1997, though monitoring continued, as the groundwater plume was deemed to have reached steady state conditions. The provision of the alternate drinking water source (1983 waterline) had reduced the potential for exposure to contamination at the Site and protected public health while cleanup activities were being completed. The 2003 ESD documented the data collected to support the change from the 1986 cleanup to the use of natural attenuation processes to reduce concentrations in groundwater at the Site to remain protective of public health and the environment and in the interim, relied upon established institutional controls as part of a NHDES Groundwater Management Permit.

Construction within the Site has continued since 2003 and both a 165 unit residential retirement development as well as several commercial properties utilize potable water supplied through an extension of the water line installed in 1983. A five year review was completed in 2004, as was a Reuse Assessment. A Groundwater Management Permit (Permit) was issued by the State of NH in 2007 and renewed in 2012 to ensure that the existing groundwater monitoring and institutional controls remained in place until cleanup levels are achieved at the Site. The Permit established a Groundwater Management Zone (GMZ) that is defined as the subsurface volume in which groundwater contamination associated with Site is contained. Both the third five year review completed for the Site in 2009 and the fourth five year review completed in September 2014 state that the remedy at the Site is expected to be or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Long-term monitoring indicates that anaerobic degradation processes are reducing chlorinated compounds in groundwater at the Site.

As required by the Permit, long-term groundwater monitoring continues at the Site. The elevated concentrations detected of 1,4-dioxane in the bedrock in 2014 suggest that the time to achieve drinking water standards will be extended beyond the 15 years estimated in 1997. In light of the findings of these investigations, and the finding of nearby impacted residential water supply wells, additional Site investigations are deemed necessary to further identify the nature and extent of Site contaminants in bedrock, whether the current GMZ is adequate and whether additional groundwater monitoring points are necessary to administer the Permit. The Permit and associated GMZ will be revised as necessary in response to the additional data collected from these investigations. The current remedy, which allows for natural attenuation at the Site to reduce the concentrations of chlorinated compounds to below drinking water standards, will be reviewed following these investigations along with the findings of elevated concentrations of 1,4-dioxane, which is not known to readily undergo natural attenuation in the subsurface.

III. DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE BASIS FOR THESE DIFFERENCES

A. Adding 1,4-dioxane as a Site Contaminant of Concern

1,4-dioxane is a clear liquid with a faint pleasant odor that mixes easily with water. Once dissolved into water, it does not easily leave the water and enter into the air. It is used primarily as a solvent in the manufacture of other chemicals and as a laboratory reagent. 1,4-dioxane may also be present in trace amounts in cosmetics, detergents, and shampoos.

Currently, there is not a federal enforceable drinking water standard for 1,4-dioxane. However, under New Hampshire Statutes (RSA 485-C: 6), the NHDES Commissioner is directed to establish and adopt an Ambient Groundwater Quality Standard (AGQS) for contaminants which adversely affect human health or the environment. Under the statute, where health advisories have been established for a contaminant and where such standards are based on a cancer risk, the AGQS for a contaminant shall be equivalent to a lifetime exposure risk of one cancer in one million (1 in 1,000,000 or 10^{-6}) exposed population. According to NHDES regulations, ambient groundwater quality standards are also considered drinking water standards if a Maximum Contaminant Level (MCL) standard has not been developed for a particular compound.

In 2005, NHDES adopted an AGQS for 1,4-dioxane of 3 micrograms per Liter (µg/L) based on information provided at the time by EPA's Integrated Risk Information System (IRIS) toxicological review. In 2010, EPA developed a cancer risk screening level, which was updated in February 2015, for 1,4-dioxane in tap water of 0.46 µg/L using risk assessment guidance from the EPA Superfund program. This federal screening level guideline of 0.46 µg/L is equivalent to 1 in one million (1 in 1,000,000 or 10^{-6}) cancer risk which is at the most conservative end of EPA's acceptable risk range of between 10^{-6} (1 in 1,000,000) to 10^{-4} (1 in 10,000) cancer risk. The federal screening level for 10-4 (or 1 in 10,000) cancer risk is 46 ug/l. The Hazard Quotient (HQ) equal to one is 56.7 ug/L (child). These levels are developed for ingestion, inhalation, and dermal contact with groundwater via drinking and household uses. The cancer levels are for a child and adult resident while the non-cancer level (HQ) is for a child resident only, the more vulnerable receptor. These screening values are considered by EPA to be protective of humans (including sensitive groups) over a lifetime. The NH AGQS concentrations of 3 ug/L for 1,4-dioxane is well within EPA's acceptable risk range for Superfund sites.

In 2008, following the establishment of the AGQS for 1,4-dioxane, NHDES required that the groundwater at impacted sites be tested for 1,4-dioxane. Subsequently, in May 2008, 1,4-dioxane was added to the list of parameters being tested for in the Site's groundwater. From 2008 to the present,

results of long-term monitoring events have documented the presence of 1,4-dioxane at several Site wells, with the highest concentrations documented at well FW-11D, down gradient of the former source area behind Tinkham Garage. As previously noted, the highest observed 1,4-dioxane level found in that well, within a discrete fracture, was 760 μg/L during the 2014 bedrock investigations.

Based on these results 1,4-dioxane is now incorporated as a contaminant of concern in groundwater and a cleanup level of 3 μg/L is established through this ESD. All future monitoring activities and long-term monitoring plans, including monitoring performed as part of the NHDES Permit, shall include sampling for 1,4-dioxane. New Hampshire's AGQS for 1,4-dioxane is identified as an applicable requirement and the State's fact sheet (WD-DWGB-3-24, 2011,) states that AGQS' are considered drinking water standards if an MCL standard has not been developed for a particular compound. All other ARARs identified in the 1986 ROD, as amended, remain the same.

The costs associated with this change, which includes costs related to sampling for 1,4-dioxane, are expected to be insignificant. 1,4- dioxane is a compound that is now routinely analyzed for at the Site.

B. Use of an Alternative Water Supply (Waterline)

EPA has modified the cleanup decision for the Tinkham Garage Superfund Site to allow for the use of an existing public water supply (water line) as an acceptable option to prevent human exposure to groundwater concentrations above drinking water standards. Use of a waterline as the permanent, sustainable alternative for potable water to residents impacted by the Site eliminates the long-term requirement to provide bottled water and to provide, maintain, and monitor point of entry treatment systems for impacted potable water wells as necessary. In addition, residential wells nearby, which remain in use, could continue to draw contamination from the bedrock and become contaminated, thus requiring frequent monitoring and observation. Because an alternative water source is readily available, a contract with the private utility to connect impacted properties and/or extend the existing waterline to residents, as needed, offers a sustainable, implementable, and cost effective solution over the need for supplying bottled water and installing, monitoring, and maintaining treatment systems. EPA, in consultation with the NHDES, has determined that connection to and/or the extension of the nearby waterline is a better long-term solution than providing potable water and the continued use of point of entry treatment systems and has modified the cleanup decision for the Site to acknowledge the use of this public water supply as an acceptable option to protect human health.

This ESD is therefore being issued to modify the selected remedy as set forth in the 1986 ROD for the Site, as amended. The modification described in this ESD is to provide alternative water to prevent human exposure to Site-related groundwater with contaminant concentrations above drinking water standards to residents outside of the existing GMZ. Similar actions were initiated in 1983 to address and prevent human exposure to groundwater in residential areas south west of the source area.

Potable supply wells impacted by the Site that are replaced with connections to either an existing waterline (where present), or a new (e.g., extended) waterline will be properly abandoned or decommissioned unless they need to be utilized as long-term groundwater monitoring wells per EPA's direction, and the POE treatment systems will be removed, thereby eliminating the requirement to provide, maintain, and monitor such systems. Potable wells that remain in use as groundwater monitoring wells shall be secured so as to prevent other uses.

A routine sampling plan for the monitoring of all nearby residential properties which continue to utilize the bedrock aquifer for a private potable water supply will be implemented to ensure protection of public health. In the future, if additional potable wells are found to contain Site-related contamination above drinking water standards, or are otherwise found to be impacted by Site contaminants, the option to

provide connections to the waterline, as described in this ESD, will also be the remedial option for additional impacted residents.

The evaluation of historical groundwater data, data generated from additional bedrock geophysical and packer testing conducted in 2014 and the results of recent residential well sampling has led EPA and NHDES to conclude that the extent of bedrock groundwater contamination present at the Site is not adequately characterized. Further, the recent data results indicate that the current monitoring well network is not adequate to demonstrate the full lateral and vertical extent of groundwater impacts associated with the Site. Supplemental bedrock investigations shall be conducted that will delineate the full lateral and vertical extent of groundwater contamination, and shall include the installation of a more robust groundwater monitoring well network designed to support the monitoring requirements established by the Permit, and to demonstrate attainment of the cleanup levels as outline below. Upon completion of the required investigations, a revised Permit will be issued that will provide an updated groundwater monitoring program and if necessary, a revised GMZ.

The costs associated with this change are expected to be insignificant (less than $500,000) in comparison to the overall estimated costs expended for the Site to date (approximately $10 million).

C. Evaluation of Cleanup Level Attainment

The 1986 ROD, and subsequent ESDs, described a process for evaluating when groundwater cleanup levels have been achieved. Through this latest ESD, the evaluation of attainment of groundwater Cleanup Levels is being clarified and updated, as follows:

The determination that groundwater Cleanup Levels have been met will now be based on site-specific considerations. In particular, EPA will consider historical and current monitoring data, contaminant distribution, trend analysis, the appropriateness of the compliance monitoring program (i.e., locations, frequency of monitoring, sampling parameters, geology, etc.), and attainment of cleanup levels throughout the GMZ, as modified. At the time this determination is made, EPA will provide a complete description of this technical evaluation documenting attainment of groundwater Cleanup Levels. Because the groundwater remedial action has been on-going at this Site, cleanup levels may be achieved early in the process for some contaminants, and therefore EPA may rely on historical data, such as number of years of sampling with no detections for these contaminants, whether cleanup levels were reached in every well and statistical averages in their determination.

After all groundwater Cleanup Levels have been met, as determined by EPA consistent with Agency guidance available at the time, EPA will perform a risk evaluation which considers additive risk from remaining COCs considering all potential routes of exposure to document the residual risk based on exposure to groundwater at the Site. The residual risk evaluation will document the potential risk associated with the concentrations of COCs remaining in groundwater at the Site (if detected).

This updated approach to evaluating attainment of groundwater Cleanup Levels, protectiveness of the groundwater remedy, and completion of groundwater restoration efforts reflects: 1) acknowledgement that MCLs established under the Safe Drinking Water Act are deemed protective by EPA; 2) consideration of all potential routes of exposure for groundwater; 3) improved methods for assessing data variability and other dynamic aquifer conditions that impact monitoring data; and 4) reliance on up-to-date technical guidance and tools. This updated approach will support determinations when groundwater at the Site has been restored for its permissible, beneficial use, and that the groundwater no longer presents an unacceptable risk to human health due to the presence of site-related contaminants.

The costs associated with this change are expected to be minimal.

IV. SUPPORTING AGENCY COMMENTS

The State of New Hampshire Department of Environmental Services (NHDES) has participated with the EPA in reviewing the modifications to the remedy described herein and supports the currently proposed changes to the 1986 ROD, as amended. The NHDES will evaluate public comments on this draft ESD before making a final decision on their concurrence with this ESD.

V. STATUTORY DETERMINATIONS

In accordance with Section 121 of CERCLA, EPA, in consultation with NHDES, has determined that the modified remedy remains protective of human health and the environment, complies with all Federal and State requirements that are applicable or relevant and appropriate to the remedy as modified herein and is cost-effective. While the modification for the addition of a new COC does not currently alter the Site remedy, connection to a water line would provide a permanent and sustainable solution for residences impacted by this Site.

VI. PUBLIC PARTICIPATION COMPLIANCE

In accordance with Section 300.825(a) of the NCP, EPA has voluntarily chosen to allow a 21-day public comment period prior to the finalization and signing of this ESD. Such comment period is designed to allow consideration of any possible concerns from the public, local municipalities, and/or the PRPs. A draft of this ESD was issued publicly on October 1, 2015. A formal public comment period regarding the draft ESD will be held from October 9, 2015 to October 30, 2015. EPA is accepting written and e-mailed comments on this draft ESD which will be included in the Administrative Record.

Comments may be submitted by October 30, 2015 via mail, e-mail, or fax to:

Cheryl Sprague, Remedial Project Manager
USEPA Region 1, OSRR07-1,
5 Post Office Square - Suite 100
Boston, MA 02109-3912
E-mail: Sprague.cheryl@epa.gov
Fax: (617) 918-0244

or

Rodney Elliot, Community Involvement Coordinator
USEPA Region 1, ORA01-1,
5 Post Office Square,
Boston, MA 02109-3912
E-mail: Elliot.rodney@epa.gov
Fax: (617) 918-0031

Public comments received will be addressed in a Responsiveness Summary that will be attached to the final ESD.

In accordance with Section 117(d) of CERCLA, this draft ESD and the Administrative Record are available for public review at the locations and times listed in Section I.E above as well as on the internet at www.epa.gov/region1/superfund/tinkham. Adobe Reader is required to review the documents.

A public notice, which summarizes the modification to the remedy as set forth in the final ESD shall be published in the Derry News.

VII. DECLARATION

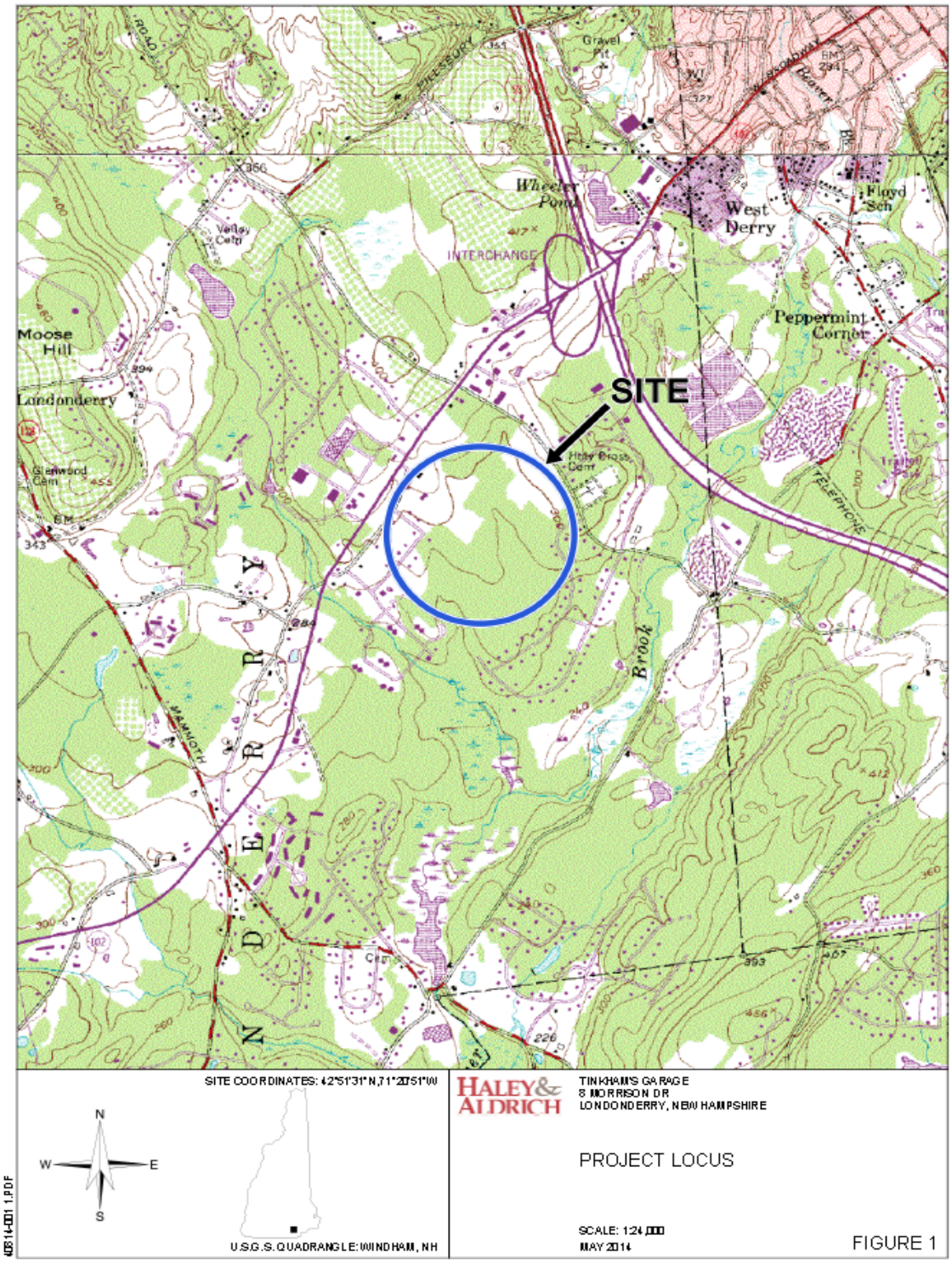
For the foregoing reasons, by my signature below, I approve the issuance of this Third Explanation of Significant Differences for the Tinkham Garage Superfund Site in Londonderry, New Hampshire, and the changes stated therein.

_____
Date

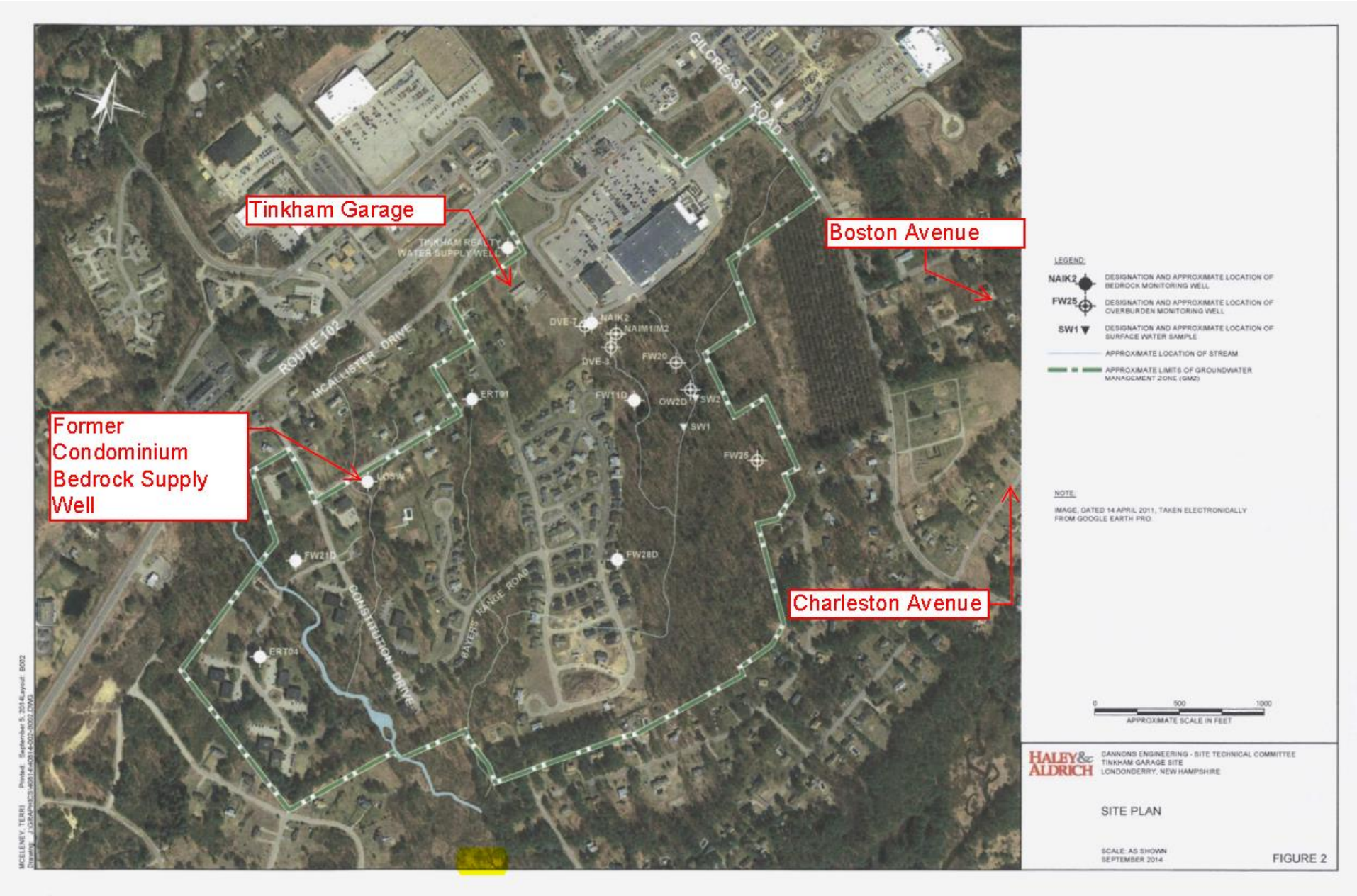
[DRAFT FOR PUBLIC COMMENT]
Nancy Barmakian, Acting Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency
Region 1 - New England

ATTACHMENTS

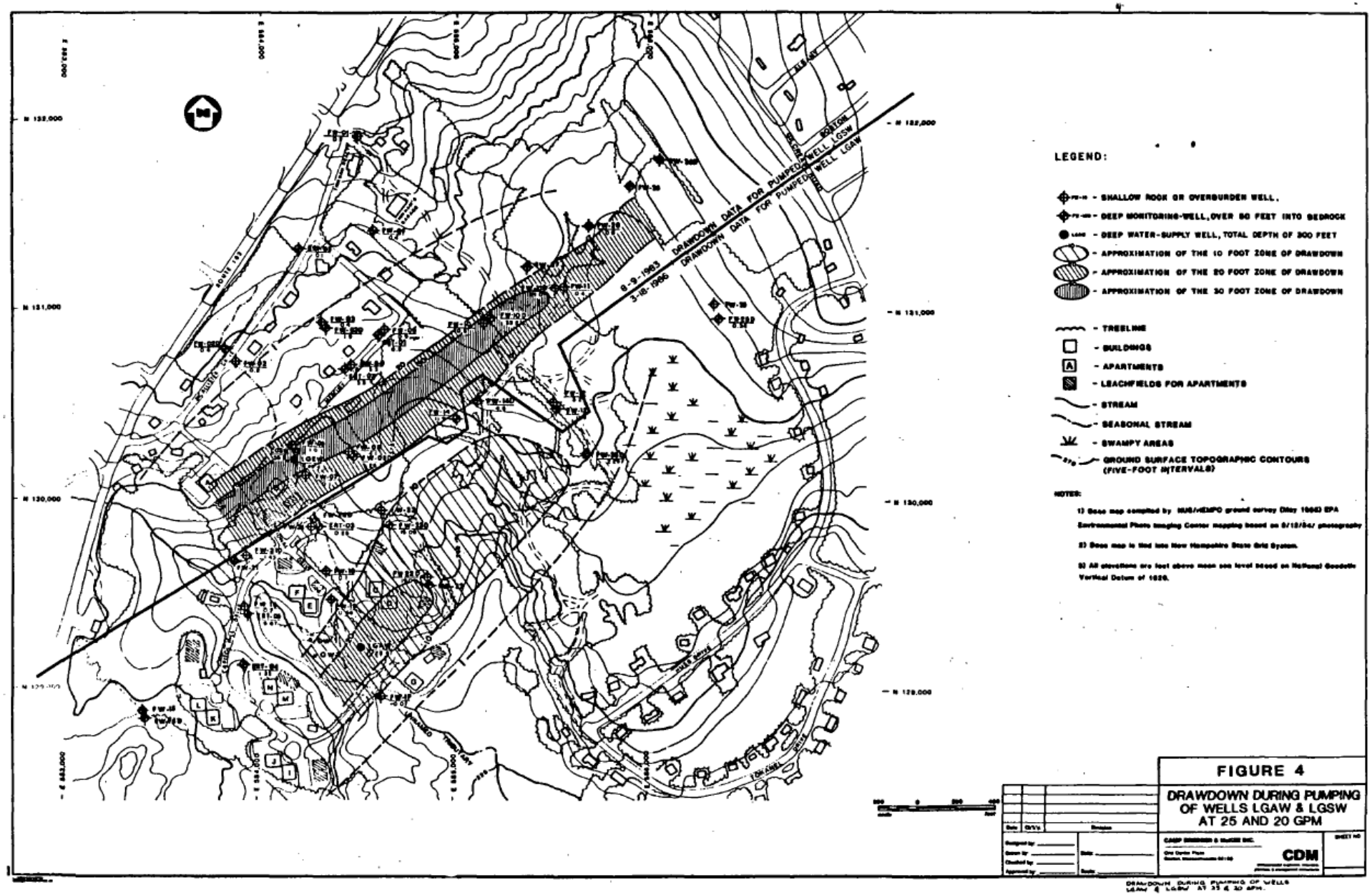
ATTACHMENT 1



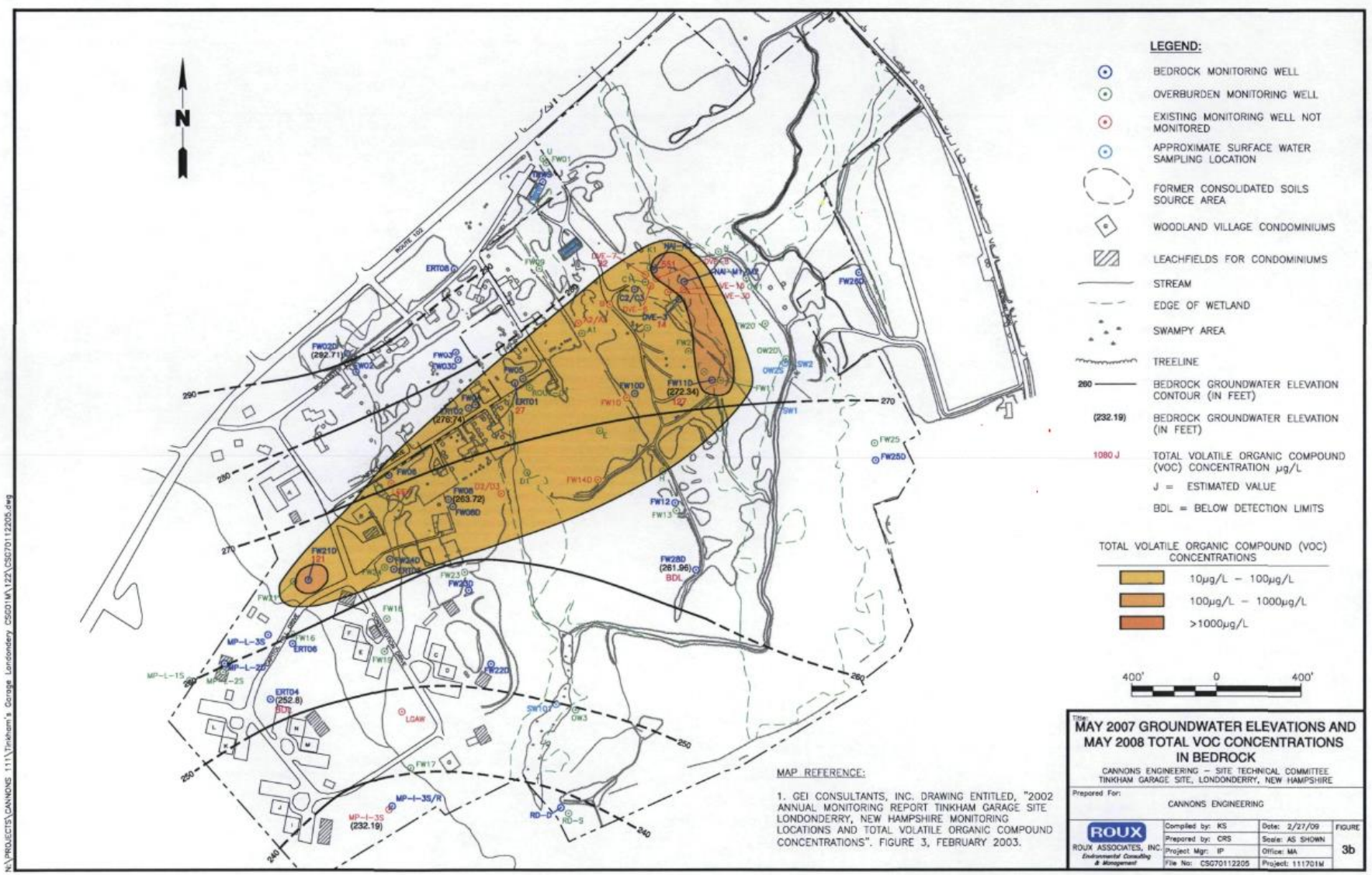
ATTACHMENT 2- Site Plan – GMZ and Monitoring Wells



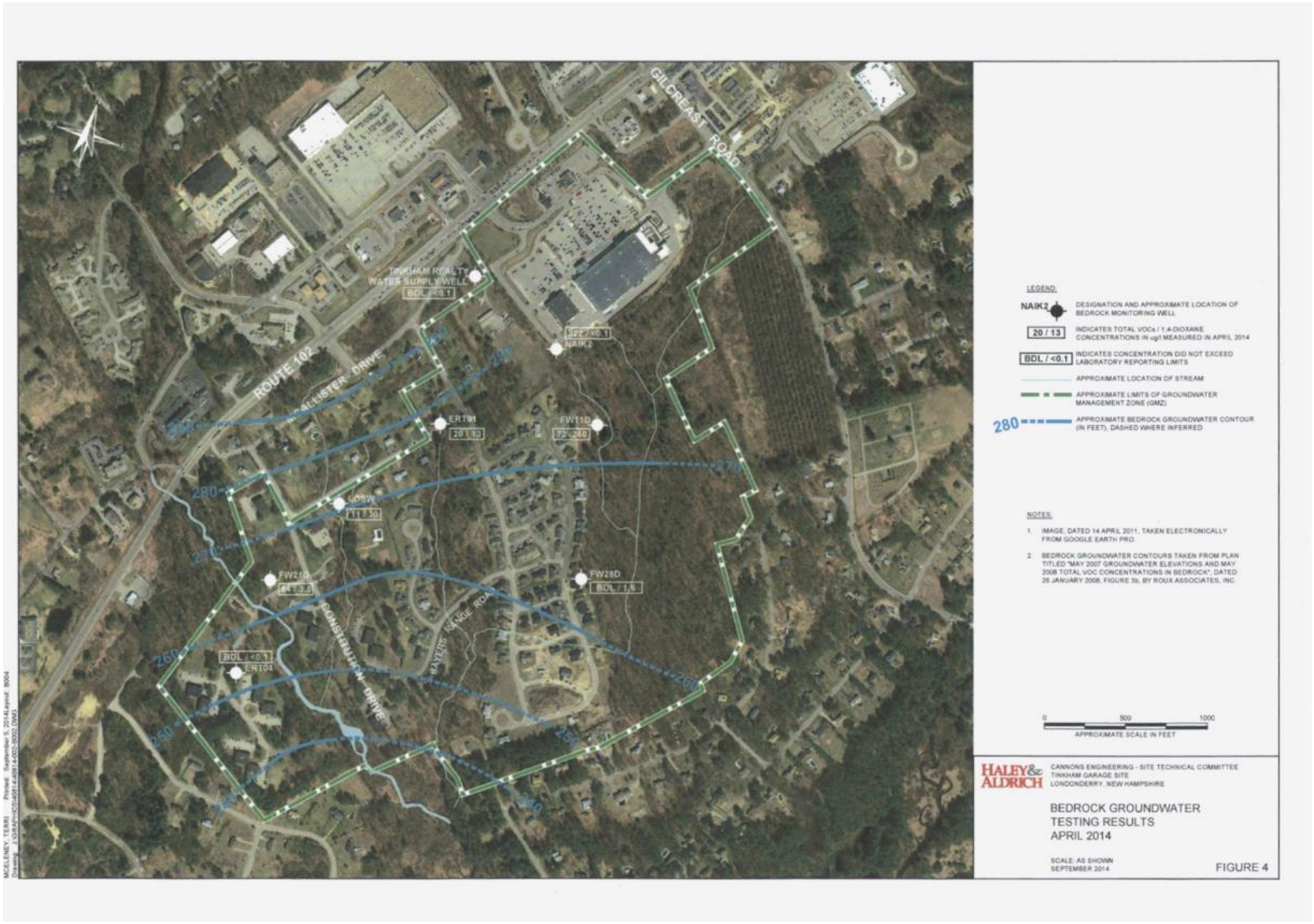
ATTACHMENT 3- Drawdown in Bedrock During 1983 and 1986 Pump tests



ATTACHMENT 4- VOCs in Bedrock 2008



ATTACHMENT 5 – 2014 Map showing Total VOC and 1,4-Dioxane Concentrations



ATTACHMENT 6 –

2014 Bedrock Investigation

Fracture Sampling

Results and Map of Well Locations

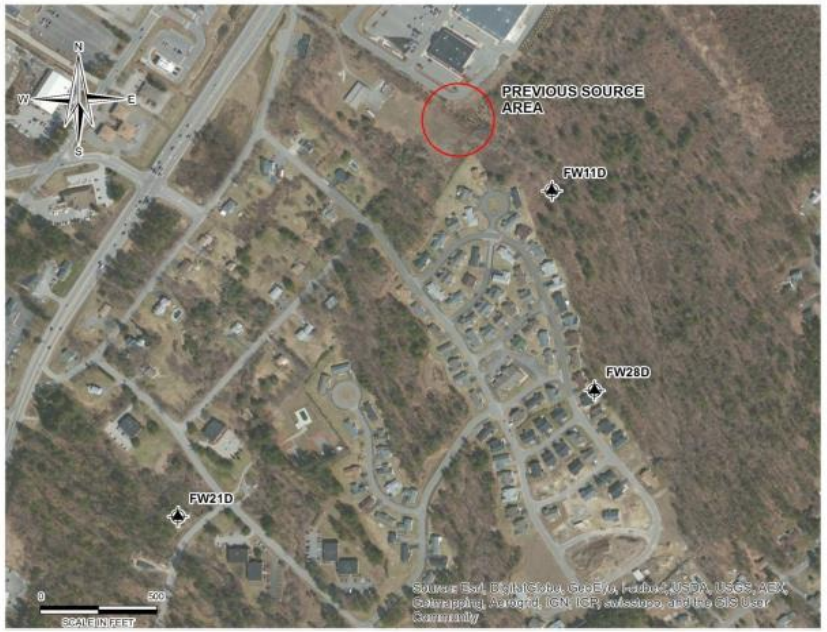


Figure 2: Approximate locations of Source Area and wells FW11D, FW21D, and FW28D at the Site.

19 highlighted number indicates concentrations at or exceeding a drinking water standard

	Open Hole		Packer Test				Open Hole	Packer Test		Open Hole	Packer Test		
	FW11D (before drilling)	FW11D (After drilling)	FW11D-35-45	FW11D-50-60	FW11D-73-83	FW11D-88-98	FW21D	FW21D-30-40	FW21D-72-82	FW28D	FW28D-75-85	FW28D-100-110	FW28D-165-175
Vinyl Chloride	19	43	< 2	23	53	23	2	12	2	< 2	< 2	< 2	< 2
Diethyl Ether	< 5	6	< 5	< 5	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	< 5	1	< 5	2	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Isopropyl Ether (DIPE)	< 5	7	< 5	< 5	8	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
trans-1,2-Dichloroethene	< 2	2	< 2	4	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethane	12	33	9	25	45	22	14	12	15	< 2	< 2	< 2	< 2
cis-1,2-Dichloroethene	25	62	28	99	46	54	11	39	10	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	< 10	30	10	10	20	20	20	20	20	< 10	< 10	< 10	< 10
Benzene	1	8	2	2	9	5	3	2	3	< 1	< 1	< 1	< 1
1,2-Dichloroethane	5	19	5	12	26	12	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	4	14	33	27	4	15	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Toluene	< 1	1	< 1	< 1	1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	< 2	< 2	5	< 2	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chlorobenzene	< 2	2	< 2	< 2	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Ethylbenzene	< 1	2	< 1	< 1	< 1	< 1	21	4	21	< 1	< 1	< 1	< 1
Isopropylbenzene	< 1	2	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,4-Dichlorobenzene	< 1	2	< 1	1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dichlorobenzene	6	21	8	17	25	13	13	11	15	< 1	< 1	< 1	< 1
Total VOCs	72	255	100	222	253	168	84	100	86	ND	ND	ND	ND
1,4 Dioxane	240	480	140	340	760	400	3.8	2.9	4.8	1.6	< 0.1	3.2	1.8

Notes:

1. Bold values indicate detected substance
2. When summing VOCs, non detects are given a value of 0

ATTACHMENT 7 Historical Data Comparison Table

Contaminant	MCL/NH AGQS Ug/l Shading indicates exceeds standard	Concentrations During RI/ROD Ug/l 1983-1985	LT Monitoring Overburden-Source Area Ug/l Annual report 2012 data Highest well noted	LT Monitoring- "down-gradient" plume-Bedrock Ug/l Annual report-2012 data Highest well noted	LT Monitoring Overburden-Source Area Ug/l Annual report 2013 data Highest well noted	LT Monitoring- "down-gradient" plume-Bedrock Ug/l Annual report 2013 data Highest well noted	LT Monitoring Overburden – Source Area Ug/l Annual report 2014 data Highest well noted	LT Monitoring- "down-gradient" plume Bedrock Ug/l Annual report 2014 data Highest well noted	Residential water supply wells: Ug/l Boston Ave 2014/2015	Residential water supply wells Ug/l Charleston Ave 2014/2015
Benzene	5	2-120	5 FW-20	<1-6 LGSW	<1-3 FW-20	<1-8 LGSW	<1-4 FW-20	<1-7 LGSW		
Toluene	1000	2-1400								
Ethylbenzene	700	2-6000	<5	22 FW-21D	<1	<1-27 FW-21D	<1	21 FW-21D		
Xylenes	10,000	10-2200								
Chloroform		5-34								
11DCA	81	2-1200	<2-25 NAI-K2	<2-15 FW-11D	<2-35 NAI-K2	<2-16 FW-11D	<2-28 NAI-K2	<2-25 FW-11D	8.9	2.5
12 DCA	5	2-400	<2-12 OW2D	6/7 FW-11D	<2-13 OW2D	<2-8 FW-11D	<2-11 OW2/FW20	<2-16 FW-11D		
Trans 1,2 DCE	100	2-6728	<5	2 FW-11D	<2-6 NAI-K2	<2-2 FW-11D	<2-2 NAI-K2	<2-2 FW-11D	13	
Cis-1,2 DCE	70		3-220 NAI-K2	<2-30 FW-11D	2-270 NAI-K2	<2-26 FW-11D	<2-240 NAI-K2	<2-49 FW-11D	13	2.4
PCE	5	4-91	<2-26 NAI-K2	<2	<2-37 NAI-K2	<2	<2-42 NAI-K2	<2	2.8	
111 TCA	200	2-1250	<2-16 NAI-K2	<2	<2-40 NAI-K2	<2	<2-34 NAI-K2	<2		
TCE	5	4-450	<2-49 NAI-K2	<2-7 FW-11D	<2-88 NAI-K2	<2-6	<2-85 NAI-K2	<2-29 FW-11D	27	
VC	2	14-230	<2-22 FW-20	2-23 FW-11D	>2-20 NAI-K2	<2-27 FW-11D	<2-18 FW-20	<2-19 FW-11D		2.4
THF	154		<10	<10-30 FW-21D	<10	<10-30 FW-21D	<10	<10-20 FW-21D		
1,4-Dioxane	3	Not analyzed until 2008	<0.1-81 OW-2D	0.43-240 FW-11D	<0.1-130 OW2D	<0.1-480** FW-11D ** 780 during bedrock study	<.1-100 FW-20	1.6-360 FW-11D	0.35	16

ATTACHMENT 8- Table of Applicable or Relevant and Appropriate Requirements (ARARs)

Action-Specific ARARs

Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARAR
Federal Requirements			
ATSDR Public Health Statement, 1,4-Dioxane CAS#123-91-1 (April 2012)	To Be Considered	Public Health Statement from the Department of Health and Human Services provides information about 1,4-dioxane and effects of exposure to it.	EPA considered this Statement when modifying the remedy.
State Requirements			
New Hampshire Ambient Groundwater Quality Standard (NH AGQS) for 1,4-Dioxane (Env-Or 603.03, Table 600-1).	Applicable	The NH AGQS for 1,4-dioxane is 3.0 µ/L. NH AGQS have been established for site groundwater contaminants for which no MCLs are established, and are derived to be protective for drinking water uses. The NH AGQS will be used for site contaminants where MCLs are not currently established.	1,4-dioxane has been added as a contaminant of concern in groundwater for the Site. The NH AGQS of 3.0 µg/L for 1,4-dioxane is added as a performance standard for monitoring Site groundwater as part of the remedy.
NHDES Environmental Fact Sheet, 1,4-Dioxane and Drinking Water (WD-DWGB-3-24) 2011	To Be Considered	This fact sheet describes New Hampshire's drinking water health standards as related to 1,4-Dioxane.	NH Fact Sheet states that by regulation, ambient groundwater quality standards are also considered drinking water standards if a Maximum Contaminant Level standard has not been developed for a particular compound.

Chemical-Specific ARARs

State Requirements			
New Hampshire Ambient Groundwater Quality Standard (NH AGQS) for 1,4-Dioxane (Env-Or 603.03, Table 600-1).	Applicable	The NH AGQS for 1,4-dioxane is 3.0 µ/L. NH AGQS have been established for site groundwater contaminants for which no MCLs are established, and are derived to be protective for drinking water uses. The NH AGQS will be used for site contaminants where MCLs are not currently established.	1,4-dioxane has been added as a contaminant of concern in groundwater for the Site. The NH AGQS of 3.0 µg/L for 1,4-dioxane is added as a cleanup level for Site groundwater as part of the remedy. Long-term monitoring will include 1,4-dioxane and will be performed to evaluate whether the natural attenuation remedy is effective.
NHDES Environmental Fact Sheet, 1,4-Dioxane and Drinking Water (WD-DWGB-3-24) 2011	To Be Considered	This fact sheet describes New Hampshire's drinking water health standards as related to 1,4-Dioxane.	NH Fact Sheet states that by regulation, ambient groundwater quality standards are also considered drinking water standards if a Maximum Contaminant Level standard has not been developed for a particular compound.

Chemical-Specific ARARs

Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARAR
Federal Requirements			
USEPA Risk Reference Dose (RfDs)	To Be Considered	Reference Doses (RfDs) are estimates of the daily exposure levels that are unlikely to cause significant adverse non-carcinogenic effects over time	RfDs are used to characterize human health risks due to non-carcinogens in site media.
USEPA Cancer Slope Factors (CSFs)	To Be Considered	Cancer slope factors (CSFs) represent the upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular concentration of a potential carcinogen.	CSFs are used to compute the individual incremental cancer risk resulting from exposure to carcinogens in site media.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Guidelines are used to evaluate all risk assessments on carcinogenicity.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Guidelines are used to evaluate all risk assessments on carcinogenicity in children.
ATSDR Public Health Statement, 1,4-Dioxane CAS#123-91-1 (April 2012)	To Be Considered	Public Health Statement from the Department of Health and Human Services provides information about 1,4-dioxane and effects of exposure to it.	EPA considered this Statement when modifying the remedy.