EPA REGION 1

RECORD OF DECISION

COMMERCE STREET PLUME SUPERFUND SITE
WILLISTON, VERMONT

SEPTEMBER 2015

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DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Commerce Street Plume
Commerce Street, Town of Williston
Chittenden County, Vermont
VTD 098352545

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Commerce Street Plume Superfund Site (the "Site") in Williston, Vermont, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision (ROD).

This decision was based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Dorothy Alling Memorial Library, 21 Library Lane, Williston, and at the United States Environmental Protection Agency (EPA or the Agency) New England OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix F to the ROD) identifies each of the items comprising the Administrative Record upon which the Agency relied in making the selection of this remedial action. The State of Vermont concurs with the selected remedy.

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for the Commerce Street Plume Superfund Site, which includes soil, groundwater and vapor migration alternatives to address risk to human health. The selected alternatives form a comprehensive approach that addresses all current and potential future risks caused by contamination in soil and groundwater at the Site.

The remedy selected in this ROD requires:

- Excavation of approximately 630 cubic yards of contaminated soil in the area of the former unlined lagoon at 96 Commerce Street (Lot 07:019:011000) and off-site disposal at a licensed facility, in compliance with all applicable Resource Conservation and Recovery Act and Vermont hazardous waste regulations;

- *In situ* treatment followed by monitored natural attenuation in those portions of the groundwater plume that are the most highly contaminated and monitored natural attenuation throughout the rest of the groundwater plume;

- Institutional controls such as a municipal ordinance and/or deed restrictions to limit the withdrawal of contaminated groundwater and limit the exposure of persons working in soils saturated with contaminated groundwater, and state reclassification of the groundwater to Vermont Class IV (non-potable) which prohibits the use of groundwater for drinking, until cleanup levels are met;

- Institutional controls to require the continued operation of the sump pump, passive gas venting and sump water discharge system already installed in 830 South Brownell Road (Lot 07:003:023000) and to allow access to EPA and the Vermont Department of Environmental Conservation (VT DEC) for inspection and maintenance, with the installation of a sump water discharge treatment system (e.g., carbon filters in a shed on site); or additional vapor mitigation (e.g., active venting, vapor barrier, etc) or other engineering controls to supplement or replace the existing vapor mitigation system at 830 South Brownell Road, as determined necessary based on a risk analysis of additional data collected during pre-design;

- Additional vapor mitigation in other buildings in the vicinity of the plume, if EPA determines at a future time that Site/plume conditions and/or risk and toxicity parameters have changed, and EPA subsequently determines through a vapor intrusion study based on multiple lines of evidence (e.g., groundwater, sub-slab soil gas and/or indoor air data) and a risk analysis that a vapor intrusion pathway into a building exists that is a threat to human health. Vapor mitigation measures will include enhancement of any existing sump pump system by adding passive venting (and sump discharge treatment if necessary), or other appropriate measures (e.g., active venting, vapor barrier or other engineering controls), to be selected in a future decision document, as appropriate. Institutional controls will require continued operation of and access to any enhanced or new vapor mitigation system;

- Long-term groundwater monitoring at the boundaries (Site, institutional control zone

and Class IV, to the extent that they are different) to ensure that the contaminant plume is not migrating; and

- Reviews at least every five years to ensure that the remedy remains protective of human health and the environment.

There are no "principal threat" wastes at the Commerce Street Plume Site. The elevated concentrations of trichloroethylene (> 50,000 ppb) in deep overburden groundwater are suggestive of the presence of a principal threat waste, however no non-aqueous phase liquid was found at the Site.

Contaminated soil in the area of the former wastewater lagoon at 96 Commerce Street is considered a low-level threat waste under a future residential use scenario. The cumulative concentrations of arsenic, polycyclic aromatic hydrocarbons and chromium (assumed hexavalent) in soil exceed EPA's acceptable risk range. Excavation and off-site disposal to a licensed facility will address the low-level threat.

Trichloroethylene that has sorbed to the finer-grained sand and silt layers at depth in the sandy unit in the overburden aquifer is likely an ongoing source of dissolved-phase contamination. Concentrations of trichloroethylene, tetrachloroethylene, methylene chloride, vinyl chloride, cis-1,2 dichloroethylene, 1,2 dichloroethane, arsenic, cobalt and chromium (hexavalent) in groundwater exceed EPA's acceptable risk range. There is no current exposure to contaminated groundwater. However, there is the potential for groundwater to be used for drinking water in the future; and per the Vermont Groundwater Protection Rule, it is the policy of the State of Vermont to protect groundwater resources to maintain high-quality drinking water. *In situ* treatment of the more contaminated zones of groundwater, together with monitored natural attenuation until federal and state drinking water standards and other risk-based levels are met, will address the low-level threat.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility or volume of materials comprising principal threats through treatment). Because this remedy will result in hazardous substances remaining on site above levels that allow for unlimited use and unrestricted exposure (and groundwater and land

use restrictions are necessary), a review will be conducted within five years after initiation of remedial action, and every five years after that, to ensure that the remedy continues to provide adequate protection of human health and the environment over time.

F. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for this Site.

1. Chemicals of concern (COCs) and their respective concentrations (Section E, Table G-1);
2. Baseline risk represented by COCs (Section G, Tables G-2 and G-3);
3. Cleanup levels established for COCs and the basis for the levels (Table L-1);
4. Current and future land and groundwater use assumptions used in the baseline risk assessment and ROD (Section F);
5. Land and groundwater use that will be available at the Site as a result of the selected remedy (Section L);
6. Estimated capital, operation and maintenance, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section L, Tables L-2 to L-4); and
7. Decisive factor(s) that led to the selection of this remedy (Sections G and M).

G. AUTHORIZING SIGNATURE

This ROD documents the selected remedy for soil, groundwater and vapor intrusion at the Commerce Street Plume Superfund Site. This remedy was selected by EPA with the concurrence of the Vermont Department of Environmental Conservation (see Appendix A).

Approval of the Record of Decision:

By: Nancy Barmakian Date: 09/30/15

Nancy Barmakian, Acting Director
Office of Site Remediation and Restoration
EPA Region 1

DECISION SUMMARY

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

The Commerce Street Plume Superfund Site (the "Site") is located in the Town of Williston, Chittenden County, Vermont, approximately 5 miles southeast of the City of Burlington (Figure 1). The Site includes the areal extent of groundwater contamination and suitable areas in very close proximity necessary for implementing the remedy. It includes a former wastewater lagoon and a plume of primarily volatile organic compound (VOC) contamination that extends over 70 acres in overburden groundwater. A map showing the extent of trichloroethylene (TCE), the contaminant of greatest concern, that exceeds federal and state drinking water standards, is attached as Figure 2. The Site encompasses the former Alling Industrial Park on Commerce Street, portions of residential Kirby Lane, and portions of South Brownell and Shunpike Roads which are mixed commercial and residential. A small unnamed stream runs along the eastern side of the Site and flows into a tributary of Muddy Brook about a mile south of the Site. Public water and sewer is supplied to the area and there are no known current exposures to contaminated groundwater. However, there is the potential for it to be used for drinking water/household uses in the future; and per the Vermont Groundwater Protection Rule, it is the policy of the State of Vermont to protect groundwater resources to maintain high-quality drinking water. The Site was listed on the National Priorities List (NPL) in April 2005.

Light industrial and commercial development along Commerce Street in the Alling Industrial Park began in 1946 and continues to present day. The most likely source of the groundwater contamination given the nature, extent and distribution of contaminants; processes typical to the electroplating industry; and known disposal practices is the former Mitec Systems Corporation (Mitec Systems) which leased property on Commerce Street between 1979 and 1986. During that time, Mitec Systems operated as an electroplater of microwave components and disposed of an undetermined quantity of wastewater into an unlined lagoon at the rear of the property. Disposal of solvents to a sanitary leach field is also suspected.

A more complete description of the Site can be found in Section 1 of the Remedial Investigation (RI) Report, Volume 1 (Nobis, July 2015b).

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

Aerial photographs from 1937 show the Site to be a vegetated area with a dirt road (later Commerce Street) surrounded by agricultural land. Development of the former Alling Industrial Park began in 1946 when Alling Enterprises began manufacturing cup hooks and

caster caps. Since then, Commerce Street has been occupied by various light industrial and commercial tenants. Previous studies identified three properties within the industrial park as locations of former manufacturing and/or fabrication operations that could have contributed to groundwater contamination.

- *96 Commerce Street/Lot 07:019:011000*. In 1960, George and Beatrice Alling developed and leased this parcel to the Sunshine Biscuit Company for use as a warehouse and distribution center until 1972. In 1972, an unlined lagoon was excavated and used until 1977 by Qual Tech (1972-1974) and North American Alloys (1974-1977) for on-site disposal of wastewater. Garmont International operated a ski boot warehouse and distribution center on the property from 1977 to 1979. In 1979, Mitec Systems Corporation leased the property and for the next five years discharged an undetermined quantity of rinse waters and sludge waste containing chromium, cadmium, cyanide, nickel and industrial solvents associated with electroplating operations through a pipe that had been installed from the building directly to the unlined lagoon. These wastes constitute characteristic hazardous wastes under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901, which became effective in 1980. In addition, although the leach field was reportedly for sanitary use only, a VOC plume that appears to be emanating from it suggests that it was also used for the disposal of industrial degreasers. After a Mitec Systems employee expressed concern to the VT Agency of Natural Resources (VT ANR) in March 1982, the State found the company in violation of hazardous waste regulations for the disposal of chromium contaminated wastes. Contaminated soil was removed from the lagoon in 1985 and 1989 by the landowner, under the direction of VT ANR (which now oversees VT DEC).

- *87 Commerce Street/Lot 08:019:012000*. Two underground storage tanks were removed from this lot in 1994 by the landowner revealing a previous release of BTEX (benzene, toluene, ethylbenzene and xylene) compounds. Groundwater samples from shallow monitoring wells at the property contained elevated BTEX concentrations.

- *63 Commerce Street[1]/Lot 08:019:002000 (former EMCO property)*. Manufacturing operations began on this parcel in 1947. A disposal pit and two pipes protruding from the western bank of the unnamed stream were found on the property. Only Shelburne Industries, a tenant that manufactured sporting goods from 1958 to 1961, is thought to have used chlorinated solvents at this location. Between 1995 and 1997, the landowner removed approximately 25 cubic yards of soil from the former disposal pit and another 30 cubic yards of sediment from the unnamed stream.

1 This parcel is now listed as 21 – 67 Commerce Street by the Williston Tax Assessor's office.

A more detailed description of the Site history can be found in Section 1 of the RI Report (Vol 1).

2. History of Federal and State Investigations and Removal and Remedial Actions

Numerous groundwater, surface water, sediment, indoor air and soil investigations have occurred throughout the former Alling Industrial Park (AIP) since the discovery in 1985 of chromium in groundwater downgradient of the former unlined lagoon. Significant investigations and actions taken to date are summarized in the table below. A more complete description of these and other environmental studies can be found in Sections 1 and 2 of the RI Report (Vol 1).

Date	Action	Legal Authority	Who Undertook	Results	Related Documents
1985	Private drinking water wells surveyed		VT Dept. of Health	Public water and sewer brought into area	
1985	Contaminated soil removed from sides and bottom of unlined lagoon		Mitec Systems Corporation		
1986	Groundwater monitoring		VT Agency of Environmental Conservation	TCE, PCE, chromium and cadmium plumes delineated	Report on Investigations of Contamination Emanating from the AIP
1987	Preliminary Assessment of Mitec Systems and AIP	CERCLA	EPA	Additional groundwater studies recommended	Preliminary Assessment, Mitec, Williston, VT

1989	Residential indoor air study		VT DEC	Mitigation implemented in one home on South Brownell Road	
1993	Site Investigation of EMCO	CERCLA	EPA	Wide-spread VOC plume not related to EMCO	Site Inspection, AIP, Williston, VT
1999 to 2000	Site investigation of AIP and adjacent residential areas		HSI GeoTrans on behalf of Mitec Systems for VT DEC	Delineated full extent of groundwater plume	Site Investigation Report, AIP, Williston, VT
2003	Site inspection at 96 Commerce Street	CERCLA	EPA	Formed the basis for EPA's decision to propose Site for NPL	Expanded Site Inspection Final Summary Trip Report for Mitec, Williston, VT
Sept 2004	Site proposed for NPL	CERCLA	EPA		
April 2005	Site listed on the NPL	CERCLA	EPA		
July 2015	Public health assessment (PHA)		Agency for Toxic Substances and Disease Registry	Residents exposed to TCE in private wells may have increased risk of harmful health effects	PHA for Commerce Street Plume, Williston, VT

July 2015	Phased RI, including risk assessment, and feasibility study	CERCLA	EPA	Proposed cleanup remedy selected	Proposed Plan, RI Report (Volumes I & II), Feasibility Study

3. History of CERCLA Enforcement Activities

The Commerce Street Plume Superfund Site is EPA fund lead.

- In February 2010, EPA reached a settlement with Mitec Telecom, Inc. (now Mitec Technologies, Inc.) on behalf of Mitec Systems Corporation in the amount of $120,000, based on its ability to pay at that time. The settlement provides a covenant not to sue with respect to EPA's response costs through the remedial investigation.

- On July 10, 2007, EPA recorded a lien pursuant to Section 107(l) of CERCLA in the chain of title for the 96 Commerce Street property in the land evidence records located in the Town of Williston Clerk's Office.

C. COMMUNITY PARTICIPATION

EPA has kept the community and other interested parties informed about the Site through informational meetings, fact sheets, press releases and a public hearing. Below is a brief chronology of public outreach efforts.

- On September 23, 2004, EPA issued a press release proposing the Commerce Street Plume Site to be included on the National Priorities List and opened a 60-day public comment period on the proposal. The Site was placed on the NPL on April 27, 2005.

- On September 21, 2005, EPA, along with representatives from the Agency for Toxic Substances and Disease Registry (ATSDR) and VT Department of Environmental Conservation (DEC), held a public informational meeting in Williston Town Hall.

- On January 11, 2006, EPA and VT DEC held a public informational meeting at Williston Town Hall.

- In March 2008, EPA prepared a briefing document on the Site for the Williston Planning Commission.

- In May 2010, EPA issued a Community Update on the status of the remedial investigation and upcoming field work, and held two (evening and morning) availability sessions for the public in the training room at the Williston Police Department.

- In September 2012, EPA mailed individual results of the first of two rounds of indoor air sampling to residents who participated in EPA's vapor intrusion study.

- In January 2013, EPA mailed results of the first of two rounds of indoor air sampling to the owner of the two commercial properties included in EPA's vapor intrusion study.

- In September 2013, EPA mailed the results of the second of two rounds of indoor air sampling and final conclusions to all participants in EPA's vapor intrusion study.

- On July 29, 2015, EPA mailed a letter to approximately 70 parties that own property on or near the Site, providing a copy of the Proposed Plan, and notice of EPA's informational meeting and public hearing about the Proposed Plan on August 12, 2015 at Williston Town Hall. Similar notice was sent to Mitec Technologies, Inc.

- On July 30, 2015, EPA published notice of the Proposed Plan in the Williston Observer and announced dates of the comment period and public hearing to accept oral comments.

- On August 6, 2015, EPA made the Proposed Plan and supporting Administrative Record available at the Alling Memorial Library in Williston and EPA Records Center in Boston.

- From August 6 to September 4, 2015, EPA held a 30-day comment period to accept public comment on EPA's preferred alternative for remedial action as well as alternative plans under consideration, as presented in the Proposed Plan and Feasibility Study. No comments were received.

- On August 8, 2015, EPA mailed postcards announcing the public meeting and public hearing on the Proposed Plan to over 400 parties.

- On August 12, 2015, EPA held an informational meeting at the Williston Town Hall to present the Agency's Proposed Plan. At this meeting, attended by about 20 members of the public, representatives from EPA and VT DEC presented information about the Proposed Plan and answered questions from attendees.

- On August 12, 2015, EPA held a public hearing immediately following the aforementioned informational meeting at the Williston Town Hall to accept oral comments on the Proposed Plan. No comments were offered by the public in attendance.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for Site remediation. In summary, the final remedy for the Commerce Street Plume Site will include:

- Excavation of approximately 630 cubic yards of contaminated soil in the area of the former unlined lagoon at 96 Commerce Street (Lot 07:019:011000) and off-site disposal at a licensed facility, in compliance with all applicable RCRA and Vermont hazardous waste regulations;

- *In situ* treatment followed by monitored natural attenuation (MNA) in those portions of the groundwater plume that are the most highly contaminated (i.e., concentrations thousands of times higher than federal and state drinking water standards), and monitored natural attenuation throughout the rest of the groundwater plume;

- Institutional controls (ICs) such as a municipal ordinance and/or deed restrictions to limit the withdrawal of contaminated groundwater and limit the exposure of persons working in soils saturated with contaminated groundwater, and state reclassification of the groundwater to Vermont Class IV (non-potable) which prohibits the use of groundwater for drinking, until cleanup levels are met;

- Institutional controls to require the continued operation of the sump pump, passive gas venting and sump water discharge system already installed in 830 South Brownell Road, and to allow access to EPA and VT DEC for inspection and maintenance, with the installation of a sump water discharge treatment system (e.g., carbon filters in a shed on site); or additional vapor mitigation (e.g., active venting, vapor barrier, etc.) or other engineering controls to supplement or replace the existing vapor mitigation system at 830 South Brownell Road, as determined necessary based on a risk analysis of additional data collected during pre-design;

- Additional vapor mitigation in other buildings in the vicinity of the plume, if EPA determines at a future time that Site/plume conditions and/or risk and toxicity parameters have changed, and EPA subsequently determines through a vapor intrusion study based on multiple lines of evidence (e.g., groundwater, sub-slab soil gas and/or indoor air data) and a risk analysis that a vapor intrusion pathway into a building exists that is a threat to human health. Vapor mitigation measures will include enhancement of any existing sump pump system by adding passive venting (and sump discharge treatment if necessary), or other appropriate measures (e.g., active venting, vapor barrier or other engineering controls), to be selected in a future decision document, as

appropriate. Institutional controls will require continued operation of and access to any enhanced or new vapor mitigation system;

- Long-term groundwater monitoring at the boundaries (Site, IC zone and Class IV, to the extent that they are different) to ensure that the contaminant plume is not migrating; and

- Reviews at least every five years to ensure that the remedy remains protective of human health and the environment.

Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Wastes generally considered to be principal threats are liquid, mobile and/or highly-toxic source material.

There are no principal threat wastes at the Commerce Street Plume Site. The elevated concentrations of trichloroethylene (> 50,000 ppb) in deep overburden groundwater are suggestive of the presence of a principal threat waste, however no non-aqueous phase liquid (NAPL) was found at the Site.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes generally considered to be low-level threat wastes include non-mobile contaminated source material of low-to-moderate toxicity, surface soils containing chemicals of concern that are relatively immobile in air or groundwater, low leachability contaminants or low toxicity source material.

Contaminated soil in the area of the former wastewater lagoon at 96 Commerce Street is a low-level threat waste under a future residential use scenario. The cumulative concentrations of arsenic, polycyclic aromatic hydrocarbons and chromium (assumed hexavalent) in soil exceed EPA's acceptable risk range. Excavation and off-site disposal to a licensed facility will address the low-level threat.

Trichloroethylene (TCE) that has sorbed to the finer-grained sand and silt layers at depth in the sandy unit in the overburden aquifer is likely an ongoing source of dissolved-phase contamination. Concentrations of TCE, tetrachloroethylene (PCE), methylene chloride, vinyl chloride, cis-1,2 dichloroethylene (cis-1,2-DCE), 1,2 dichloroethane, arsenic, cobalt, and chromium (hexavalent) in groundwater exceed EPA's acceptable risk range. There is no current exposure to contaminated groundwater. However, there is the potential for it to be used for drinking water in the future; and per the Vermont Groundwater Protection Rule, it is the policy of the State of Vermont to protect groundwater resources to maintain high-quality drinking

water. *In situ* treatment of the more contaminated zones of groundwater and MNA until federal and state drinking water standards are met will address the low-level threat.

E. SITE CHARACTERISTICS

EPA conducted a remedial investigation of the Site in several phases over four years. Between 2010 and 2012, activities included groundwater and soil sampling, geophysical surveys, and field tests to determine the presence of NAPL. Surface water, sediment and aquatic invertebrates were collected from the unnamed stream. Between 2012 and 2013, a vapor intrusion study of five residential and two commercial properties considered representative of Site conditions was completed; a sixth residential property was investigated in 2014. In 2013, additional soil sampling was conducted to determine what fraction, if any, of the chromium previously detected in soil was the more toxic hexavalent form. In 2014, an investigation of sump water and sump discharges to surficial soil was conducted along South Brownell Road, where the plume of groundwater contamination is the shallowest.

Section 1 of the Feasibility Study (FS) (Nobis, July 2015a) contains an overview of the remedial investigation activities conducted at the Commerce Street Plume Site. For a more detailed discussion of field activities and results, see Section 2 of the RI Report (Vol 1). The significant findings of these remedial investigation activities are summarized below.

1. Physical Setting

Surface Features

The Site is generally flat and slopes up slightly to the north and east. It contains a large number of separate parcels, both residential and commercial. Williston Road (Vermont Route 2) and South Brownell Road are major commercial arteries for the Town of Williston, while Kirby Lane and Commerce Street are both dead-end roads used only for local traffic (Figure 3). The Site is located in the Lake Champlain drainage basin and Winooski sub-basin in the northwest portion of Vermont. The sub-basin drainage area is estimated to be 1,044 square miles.

Surface water at the Site consists of the unnamed stream that runs behind the buildings on the eastern side of Commerce Street, which flows in a southerly direction into Tributary #4 to Muddy Brook. The stream has been referred to as an intermittent stream, however, it has been observed to flow continuously throughout the year, even in periods of relatively low surface water discharge in the area. A small wetland is associated with the confluence of the unnamed stream and Tributary #4 at the southern end of Commerce Street. Tributary #4 joins the Muddy Brook one mile south of the Site, near Interstate 89.

All surface waters in Vermont are State-designated areas for protection and maintenance of aquatic life under the Clean Water Act. In 2004, the unnamed stream and associated wetlands were assessed for and found to be unlikely potential habitat for the two Vermont-listed threatened species, the eastern sand darter and eastern pearl shell mussel, a conclusion confirmed again in 2014 by State of Vermont personnel (VT DEC, 2014). No other rare, threatened or endangered species have been identified. Downstream of the Site, Muddy Brook flows into the Winooski River, which is a known fishery.

On the western edge of the Site near the intersection of Shunpike and South Brownell Roads is an "unmapped intermittent stream," a topographic depression with culverts in some areas that conveys intermittent groundwater discharge.

The Vermont Division for Historic Preservation completed a desk review of the area of potential effect (APE) from the remedial action, which included analysis using the Environmental Predictive Model for Locating Prehistoric Archaeological Sites. Although the APE is characterized by mixed residential, industrial and commercial development, there are areas within the APE, particularly in undisturbed soils between Commerce Street and Kirby Lane, which appear to have high probability of containing significant pre-contact archaeological sites.

Site Geology

Bedrock in the area is mapped as the Beckman Formation, which is part of the Hinesburg Synclinorium structure. The Beckman Formation is Lower Ordovician in age and consists of white marble and massive gray limestone and dolomite. Bedrock was encountered in previous investigations of the Site at 99 feet below ground surface (bgs) and 115 feet bgs.

The unconsolidated material in the overburden consists of three units: sand, clay and glacial till. Previously published interpretations of the local geology describe deltaic deposits overlying sub-aqueous fans which in turn overlie lacustrine silts and clays, all of which were deposited during the retreat of the last continental glaciers less than 12,000 years ago.

- A fairly thick sand unit extends to approximately 40 feet bgs across the Site. Grain size generally gets finer at depth, with medium to coarse sand noted in the more shallow intervals (less than 20 feet bgs) and fine sand interbedded with silty layers predominating below this depth. "Running" or "heaving" sands were common from approximately 30 to 40 feet bgs indicating that the material is composed of relatively fine and uniform grains that could readily flow under hydrostatic pressure.

- Beneath the sandy material is a ten to 30-foot thick layer of clay that appears to be continuous across the Site, which presumably acts as a barrier to the downward movement of contaminated groundwater. The contact between the sand unit and the clay is a sand/silt mixture consisting of thin, interbedded clay and silt layers and lenses. Local depressions in the clay layer identified during geophysical surveys were thought to be likely places for dense non-aqueous phase liquid (DNAPL) to accumulate however none was observed.

- Beneath the clay layer, a dense glacial till was encountered at approximately 60 to 100 feet bgs across the Site. This unit is expected to impede groundwater flow between the overburden and bedrock.

Site Hydrogeology

Depth to the water table is on average 5 feet bgs across the Site, but seasonally the water table can be much higher. Groundwater flow in the overburden aquifer is generally northeast to southwest with some amount of radial flow in the central portion of the Site (Figure 2). Locally, groundwater flow has a southeasterly component towards the unnamed stream. There is also a westerly component towards Kirby Lane, which may be influenced by the operation of sump pumps in several residences along South Brownell Road. Low horizontal flow rates – on the order of 60 feet per year – reflect the relatively flat topography and relatively uniform stratigraphy.

A preferential flow path was likely created in 1985 and 1986 when the sewer and water lines were extended down Commerce Street. The sewer line trenches were dug on the west side of Commerce Street to a minimum depth of 10 feet bgs and water line trenches on the east side of Commerce Street were to a minimum depth of 8 feet bgs. The excavation of the trenches and any backfill would create isolated areas of higher permeability along the center of Commerce Street.

Vertical groundwater gradients are generally fairly low and indicate that groundwater (and by extension contamination) has a relatively low potential to move downward or upward. This suggests that gravity and the denser-than-water properties of the contaminants at the Site were the primary initial drivers for carrying contamination to the deeper portions of the overburden aquifer where it has come to be located.

Groundwater Classification and Use

Per Vermont statute (Title 10: Conservation and Development, Chapter 48: Groundwater Protection 10 V.S.A §1390), "it is the policy of the state that the state shall protect its

groundwater resources to maintain high-quality drinking water." Under 10 V.S.A. §1394, all groundwater in the State of Vermont is classified as Class III, which is "suitable as a source of water for individual domestic water supply, irrigation, agricultural use and general industrial and commercial use," unless otherwise reclassified by the Secretary of VT ANR. In determining appropriate classification of groundwater, the Secretary of VT ANR considers, among other things, the consequences of potential contamination. Class IV groundwater is designated "not suitable as a source of potable water, but suitable for some agricultural, industrial and commercial use." Pursuant to VT DEC's Environmental Protection Rule Chapter 12, drinking water must meet designated Primary Groundwater Quality Enforcement Standards. As part of the remedy selected in this ROD, contaminated groundwater at the Site will be reclassified to Class IV (non-potable), with the goal of meeting Class III (potable) standards at the Class IV boundary and to return groundwater quality within the Class IV area back to Class III.

2. Conceptual Site Model

The sources of contamination, release mechanisms, and exposure pathways to receptors for the soil, wetland soil, groundwater, surface water, sediment and air, as well as other site-specific factors, are considered while developing a Conceptual Site Model (CSM). The CSM is a three-dimensional "picture" of site conditions that identifies contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for all environmental media for the Site are based on this CSM.

The CSM summarizes the release mechanisms governing fate and transport of contaminants from industrial sources that have been transported to soil and groundwater, and secondarily to indoor air in one home, at the Site. The pathways for contaminant transport from the point of release are summarized below. A more complete discussion can be found in Section 5 of the RI Report (Vol 1).

The most likely source of the contamination at the Site given the nature, extent and distribution of contaminants, processes typical to the electroplating industry, and known disposal practices, is the former Mitec Systems which leased property on Commerce Street between 1979 and 1986. During that time, Mitec Systems operated as an electroplater of microwave components and disposed of an undetermined quantity of wastewater into an unlined lagoon at the rear of the property. Because the former lagoon on the 96 Commerce Street property was not lined, chemicals (VOCs, metals) in the wastewater and sludge that were disposed of in the lagoon migrated into the surrounding soil and groundwater.

Based on the distribution of contaminants in groundwater, the geometry of the plume, and the characteristics of the overburden aquifer, it is believed that solvents containing TCE were also disposed of in the sanitary leach field during Mitec System's tenancy at 96 Commerce Street. The groundwater concentrations (TCE > 50,000 ppb) in the "hotspot" along Commerce Street are indicative of the presence of DNAPL; however, no DNAPL has been found at the Site. It is likely that the solvents, once disposed of in the leach field, migrated vertically fairly quickly through the coarse sand in the overburden aquifer, until it encountered the finer-grained material in the silty layers at the bottom of the sand unit and where it was also likely influenced by the confining clay layer below the sand. DNAPL migrated vertically and laterally at depth and as it was dissolved by groundwater, the dissolved-phase TCE diffused into finer-grained materials and sorbed to the aquifer where it continues to act as an ongoing source of TCE to the dissolved-phase plume.

The plume of dissolved-phase contamination also extends to the west of the former Mitec Systems facility, following the flow of groundwater which locally has both southwesterly and southeasterly components. Here, groundwater contamination is more shallow and may be influenced by both the operation of sump pumps in homes along South Brownell Road and the topographic depression with culverts in some areas that conveys intermittent groundwater discharge. Shallow groundwater contamination also discharges to the unnamed stream at the southeastern corner of the Site.

The clay and dense glacial till layers that together extend up to 60 to 100 feet bgs appear to be acting as barriers to migration from the overburden aquifer into bedrock.

The vapor intrusion pathway was determined to be complete in one residential building at the Site, along South Brownell Road where the plume is shallower. Here, vapors emanating from contaminated groundwater in the basement sump (or from groundwater that would otherwise flood the basement but for the sump) did have an impact on indoor air quality. This residence is located on a low-lying parcel adjacent to the drainage ditch with intermittent flow and the homeowner reports having to run a sump pump continuously to keep water out of the basement. Given that the water table is only on average 5 feet bgs, there is the potential for more instances in the future of vapors emanating from contaminated groundwater in the sumps of other buildings, and from contaminated groundwater that floods basements of other buildings, should the plume migrate and/or climatic conditions change.

3. Nature and Extent of Contamination

As stated in the introduction to Section E, the remedial investigation was conducted in phases over the course of several years. A summary of the distribution of contaminants by

environmental medium is provided below. A complete discussion of the sampling results may be found in the RI Report (Vol 1).

Overview of Chemical Compounds Detected

- *Volatile Organic Compounds* were found in groundwater across the Site, the most prevalent being TCE which was found at concentrations as much as 10,000 times higher than federal and state drinking water standards. TCE daughter products cis-1,2-DCE and vinyl chloride are also present.

- *Semi-volatile Organic Compounds* were detected in one soil sample in the area of the former wastewater lagoon at 96 Commerce Street, such as chrysene, fluoranthene, pyrene and other polycyclic aromatic hydrocarbons (PAHs).

- *Metals* of interest that were found in soil and groundwater include arsenic, chromium, cobalt and iron. Hexavalent chromium (the more toxic form) was detected in one soil sample; to be conservative, all chromium is assumed to be hexavalent.

Soil

Soil samples were taken from across the Site, with a higher density of sampling locations in the area of the former lagoon and the residential areas near South Brownell and Shunpike Roads where groundwater contamination is the shallowest (Figure 4A). Samples were taken from surficial soil (0 – 1 foot) and at depth in increments to the top of the clay layer at 35 to 40 feet bgs.

TCE was the only Site-related VOC detected in soil (minor concentrations of acetone are attributed to laboratory processes). TCE was found at all soil boring locations in the area of the former lagoon and along the length of Commerce Street, but only at depths of 17 feet bgs or deeper and at concentrations ranging from 1 µg/kg (SB-03) to 12,500 µg/kg (SB-02). TCE was also detected in two of six locations (SB-12-01 and SB-12-02) in the residential area at South Brownell and Shunpike Roads, but at depths of 10 feet bgs or deeper and at concentrations ranging from 93 µg/kg to 2,100 µg/kg.

Surficial soil samples were collected from properties along South Brownell Road where residents report discharging sump water to the ground surface (Figure 5). TCE was detected in only one of 17 surficial soil samples (910 µg/kg at SB-14-04) at the location where water was actively being discharged from the sump in the basement at 830 South Brownell Road.

Field tests (the "Oil-Red-O" shake test) were performed on soil borings where DNAPL was most likely to be found in the subsurface. No evidence of DNAPL was found.

Seven SVOCs, including four PAHs, were detected at in only one soil sample (one foot bgs at SB-12-05), in the area of the former unlined wastewater lagoon. Neither dioxin nor furans were detected in soil anywhere on site.

Sixteen metals were detected in soils across the Site, the majority at low concentrations indicative of background conditions or anthropogenic activities unrelated to Mitec Systems. Of the heavy metals expected to be associated with electroplating processes, only total chromium (Figure 4B) was detected at elevated levels on the 96 Commerce Street parcel. All samples taken from that location contained total chromium, however one of five samples contained the more toxic hexavalent chromium (0.85 mg/kg at SB-13-02). Total chromium was also detected in soil samples taken in the residential areas on the western side of the Site, but at low levels and no hexavalent chromium was detected.

Arsenic was found in soils at all depths across the entire Site but at concentrations that were below 10 mg/kg, which is the concentration the State of Vermont assumes is representative of background conditions.

Surface Water

Surface water samples, co-located with sediment samples, were collected from five locations in the unnamed stream at the east side of the Site, including one upstream reference location north of Williston Road/VT Route 2 (Figure 6). A second surface water sample (PW-02) was taken at the northern end of the Site, adjacent to the former EMCO parcel. Two were taken from the area where shallow groundwater discharges to the unnamed stream (PW-11 and PW-17); the fifth one was taken at the southernmost, downgradient edge of the groundwater plume (PW-20). Surface water samples were analyzed for VOCs and anions. TCE, cis-1,2-DCE and vinyl chloride were detected as were chloride, nitrate and sulfate.

No VOCs were detected in the upstream reference location or PW-02. The highest concentrations of TCE and cis-1,2-DCE were detected in PW-11 (15 µg/L and 39 µg/L, respectively) and PW-17 (6 µg/L and 9.2 µg/L, respectively) which declined at the PW-20 location (2.6 µg/L and 3.8 µg/L, respectively). Vinyl chloride was detected only at PW-11 (3.4 µg/L).

Sediment

Sediment samples were collected from the same locations as the surface water samples described above. Samples were analyzed for VOCs, SVOCs, metals including mercury, and total organic carbon.

No VOCs were detected in sediment samples. SVOCs were detected in only the upstream reference location, and PW-20, the most downstream sample. Metals were detected in all sediment samples collected from the stream. The highest concentrations were detected almost exclusively in the off-site reference location. Only arsenic and copper concentrations were higher in other samples. Of the on-site sample locations, PW-17 was the location with the highest metals concentrations, however, none exceeded EPA or VT benchmarks for sediment in freshwater.

Groundwater

Data from 109 locations (monitoring wells, vertical profiles, Waterloo profiles) were used to delineate the nature and extent of groundwater contamination at the Site. The groundwater studies conducted for the remedial investigation show a distribution of contamination consistent with those conducted prior to its inclusion on the Superfund NPL.

To assist with plume delineation, the overburden has been divided into shallow (less than 20 feet bgs), intermediate (between 20 and 30 feet bgs), and deep (more than 30 feet bgs) intervals. One well (BR-1) is screened in the glacial till. As earlier investigations did not detect contamination in bedrock, no wells were drilled into bedrock as part of this remedial investigation to prevent the potential for downward migration of the plume. For a comprehensive description of the nature and extent of groundwater contamination including a discussion of the fate and transport of the contaminants in the overburden groundwater, refer to Sections 4 and 5 of Volume 1 of the RI Report.

- *Volatile Organic Compounds (VOCs)*

VOCs, in particular TCE, are the contaminants of greatest concern in the groundwater in terms of areal extent and concentrations. Shallow overburden TCE contamination is primarily located in two distinct areas or "hotspots": near the intersection of South Brownell and Shunpike Roads along the western side of the Site (TCE $\leq$ 380 µg/L) and along Commerce Street (TCE $\leq$ 6,100 µg/L) (Figure 7A). Pore water results indicate that the unnamed stream is intercepting the shallow TCE plume in the eastern portion of the Site (Figure 8) and TCE is undergoing degradation as shown by the presence of daughter products cis-1,2-DCE and vinyl chloride. Lower concentrations of PCE were detected in

fewer than 15% of the samples collected with the highest concentration (28 µg/L) reported in a well at the intersection of South Brownell and Shunpike Roads.

Contamination increases at depth. In the intermediate overburden (Figure 7B), the plume is more aerially extensive; however traces of the two distinct areas mapped in the shallow overburden remain. The highest TCE concentrations are along Commerce Street (41,900 µg/L and 34,000 µg/L) next to the unnamed stream. PCE was detected in the western area (≤ 83 µg/L), however none of the samples on the eastern side of the plume show the PCE historically detected there.

The highest concentrations of contamination at the Site are in the deep overburden in the eastern portion of plume along Commerce Street where TCE concentrations were in the 55,000 µg/L to 61,000 µg/L range (Figure 7C).

The TCE plume that exceeds federal and state drinking water standards is over 70 acres and is shown in cross-section on Figures 3-1 and 4-6 to 4-10 of the RI Report (Vol 1). The PCE plume that exceeds federal and state drinking water standards is approximately two acres.

- *Semi-volatile Organic Compounds (SVOCs)*

In 22 samples collected during 2008, 15 SVOCs were detected; bis(2-ethylhexyl)phthalate, found in 20 samples, was detected most often. Concentrations ranged from 0.28 µg/L to 4 µg/L. Naphthalene was detected in five of 22 samples with concentrations ranging from 0.3 µg/L to 23 µg/L. The remaining 13 SVOCs were detected in fewer than three samples. In May 2010, fewer SVOCs (9) were detected; however, they were detected more frequently. Acetophenone, benzaldehyde and bis(2-ethylhexyl)phthalate (0.27 µg/L to 12 µg/L) were detected in all 29 samples. Caprolactam, not found in 2008, was detected in 15 of 29 samples. Five months later, four of the SVOCs previously found at the Site were detected, with only one occurrence each in the 45 samples collected.

SVOCs, bis(2-ethylhexyl)phthalate in particular, are found most consistently in the glacial till well (BR-1) and in other wells located in the area of the cul-de-sac on Kirby Lane, but are also found scattered across the Site.

- *Metals*

Groundwater samples were analyzed for both filtered (i.e., dissolved) and unfiltered (i.e., total) metals. The metals of interest, due to their elevated concentrations, frequency of detections and/or association with electroplating rinse water and sludge are arsenic, barium,

cadmium, lead, chromium and manganese.

Arsenic concentrations increased in terms of concentrations and frequency of detections over the course of the remedial investigation. In 2008, arsenic was detected in eight of 22 samples with a maximum concentration of 10.2 µg/L which was detected east of the unnamed stream. In 2010, arsenic was detected in 40 of 74 samples at concentrations ≤ 23.7 µg/L and in 2012, all 18 samples at concentrations ≤ 27.2 µg/L. In general, arsenic is most frequently detected at the southern end of the Site, in intermediate and deep overburden wells.

Cadmium was detected in about 20 percent of the samples collected. It was most frequently detected in May 2010 when it was found in 16 of 29 samples with a maximum concentration of 45.8 µg/L. Five months later, it was detected in two of 45 samples at concentrations of 13.6 and 45.5 µg/L. In 2012, it was found in two of 18 samples at concentrations of 0.46 and 0.81 µg/L. Two monitoring wells locations where cadmium was consistently detected are downgradient of the former unlined lagoon and one (MI-8) is in very close proximity.

Total chromium was detected in over half the samples taken from across the Site. In 2008 and the first half of 2010, the maximum concentration reported was 18 ug/L. In November 2010, the maximum concentration increased to 62.3 µg/L due to a spike in concentration in a well at the far southwestern portion of the Site. Speciation was done on a limited number of groundwater samples in 2013; hexavalent chromium was found only in the same well (MI-8) where cadmium was consistently reported, at a concentration of 19 µg/L.

Barium, lead and manganese were detected in nearly all groundwater samples taken from across the Site between 2008 and 2012. The highest concentrations of barium were found in the glacial till well (BR-1) and were consistently over 4000 µg/L. Lead was detected often, generally in low concentrations, but in two samples taken years apart and from wells located in different portions of the Site, the concentrations were over 20 µg/L. Manganese was detected in all but two samples collected in the four sampling rounds conducted between 2008 and 2012. Mean concentrations of manganese increased each round with the highest mean of 1,270 µg/L detected in 2012.

Metals were found in groundwater across the Site with temporal and spatial variations that are not indicative of a pattern of contamination that can be related to the disposal of material in the unlined lagoon with the exception of cadmium and chromium. These two metals, which are associated with electroplating rinse waters and sludge are detected most consistently in a small plume that is downgradient of and in close proximity to the former lagoon. The size and shape of this plume is similar to that mapped in 1999 as part of

environmental investigations conducted under the direction of VT DEC (HSI GeoTrans, 2000), and does not appear to be migrating. The cause for increasing levels of manganese and arsenic may be mobilization of natural minerals due to reducing conditions related to biodegradation of VOCs.

Sump Water

VT DEC sampled the water in the sump at 830 South Brownell Road on two occasions in 2014. TCE was detected at concentrations of 75 µg/L and 104 µg/L. EPA also collected samples from the sumps at nine additional residences along South Brownell Road and analyzed them for VOCs in 2014 (Figure 5). No VOCs were detected.

Vapor Intrusion

EPA conducted indoor air and sub-slab soil gas sampling during non-heating (June 2012) and heating (January 2013) seasons at representative properties (five residential, two commercial) across the Site, selected on the basis of the following criteria:

- Proximity to highest groundwater concentrations;
- Property owners willing to grant access;
- Presence of sensitive populations (children, elderly, infirm); and
- Absence of practices at commercial properties that might impact results (e.g., cat hospital, print shop).

The investigation included grab samples of sub-slab soil gas and 24-hour indoor air samples, analyzed for VOCs, and the results compared to conservative health-based screening concentrations (see Section 6 of the HHRA found in Volume 2 of the RI Report).

TCE was found in the indoor air of only one home (4.3 $\mu g/m^3$) but not in the sub-slab soil gas beneath the structure. All other residential samples were non-detect for TCE. TCE was found in the indoor air in one commercial property during one of two sampling events (ranging from 0.59 to 0.81 $\mu g/m^3$) but not in sub-slab soil gas samples taken at either commercial property. TCE detections in indoor air but not in sub-slab soil gas indicate the TCE may be from a non-Site source.

PCE was detected in residential indoor air (ranging from 0.35 to 9.4 $\mu g/m^3$) and half the sub-slab soil gas samples (ranging from 1.2 to 9.7 $\mu g/m^3$) in three of the five homes but at levels that did not exceed conservative health-based screening concentrations. In a fourth home, PCE was detected in one of three sub-slab samples (14 $\mu g/m^3$) but not in the indoor air. PCE was not detected in any samples taken at the fifth residence. PCE was detected in

sub-slab soil gas at low concentrations at both commercial properties (ranging from 1.9 to 23 $\mu g/m^3$) but not in indoor air.

In December 2013, VT DEC conducted a soil gas and shallow ($\leq$ 3 feet bgs) groundwater study in the area of South Brownell and Shunpike Roads. On the basis of a finding of elevated soil gas concentrations in the vicinity of the home at 830 South Brownell Road, VT DEC conducted an indoor air study in the home. Concentrations of TCE ($\leq$ 30 $\mu g/m^3$) and PCE ($\leq$ 1.4 $\mu g/m^3$) were above their Vermont Target Indoor Air Standards and VT DEC installed a covered sump pump, passive venting and sump water discharge system.

Following VT DEC's installation of the vapor mitigation system, EPA re-sampled the indoor air in the home; sub-slab soil gas samples could not be collected because the water table was at a higher elevation than the basement floor. The only detection was a low level of PCE (1.3 $\mu g/m^3$) on the first floor. No VOCs were detected in the basement air. Additional indoor air samples at 830 South Brownell Road are needed to confirm the efficacy of the current vapor mitigation system.

4. Principal and Low-Level Threat Waste

Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Wastes generally considered to be principal threats are liquid, mobile and/or highly-toxic source material.

There are no principal threat wastes at the Commerce Street Plume Site. The elevated concentrations of TCE (> 50,000 ppb) in deep overburden groundwater are suggestive of the presence of a principal threat waste, however no DNAPL was found at the Site.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes generally considered to be low-level threat wastes include non-mobile contaminated source material of low-to-moderate toxicity, surface soils containing chemicals of concern that are relatively immobile in air or groundwater, low leachability contaminants or low toxicity source material.

Contaminated soil in the area of the former lagoon at 96 Commerce Street is a low-level threat waste under a future residential use scenario. Cumulative concentrations of arsenic, PAHs and chromium (assumed hexavalent) in soil exceed EPA's acceptable risk range. Excavation and off-site disposal to a licensed facility will address the low-level threat.

TCE that has sorbed to the finer-grained sand and silt layers at depth in the sandy unit in the overburden aquifer is likely an ongoing source of dissolved-phase contamination. Concentrations of TCE, PCE, cis-1,2-DCE, methylene chloride, vinyl chloride, 1,2 dichloroethane, arsenic, cobalt and chromium (hexavalent) in groundwater exceed EPA's acceptable risk range. There is no current exposure to contaminated groundwater however, there is the potential for it to be used for drinking water in the future, and per the Vermont Groundwater Protection Rule, it is the policy of the State of Vermont to protect groundwater resources to maintain high-quality drinking water.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The current and anticipated future uses of the Site form the basis for the exposure assumptions that are used for the risk assessment, are considered in the development of remedial objectives and remedial alternatives, and are considered in the selection of the appropriate remedial action.

The future land use assumptions are based on discussions with officials from the Planning and Zoning Department of the Town of Williston and a review of the Town's zoning ordinance. The future groundwater use assumptions are based on discussions with VT DEC personnel and a review of Vermont's Groundwater Protection Rule (10 V.S.A §1390-1419) which sets policy for the protection of all groundwater resources across the state for drinking water. VT DEC personnel were also consulted regarding the protection and maintenance of surface water and associated wetlands.

Information on the current and potential future uses of land, groundwater and surface water is summarized below.

1. Land Use

Current zoning allows for mixed residential, commercial and industrial uses. Commerce Street and the areas to the east are predominantly commercially zoned lots that are either developed or are in the process of being developed. Kirby Lane is entirely residential. South Brownell and Shunpike Road are residential and commercial. Pedestrian access is unrestricted.

Even though land at the Site, including along Commerce Street, is zoned for commercial and industrial uses, Town of Williston officials indicated in an interview on November 7, 2013, that the Town anticipates future use to include residential; therefore, any cleanup must be based on the presumption of future residential exposures.

2. Groundwater

Groundwater at the Site is currently not being used for drinking water or other household uses. EPA is aware of only one well, located outside of the currently known vicinity of the plume, which is used for agricultural purposes at a commercial garden center. The well draws water from the bedrock and given what is known about the distribution of contamination at the Site as well as the stratigraphy, there appears to be no potential risk from the continued agricultural use of that well.

Per Vermont Groundwater Protection Rule, "it is the policy of the state that the state shall protect its groundwater resources to maintain high-quality drinking water." Cleanup will thus be based on restoration of groundwater to drinking water standards. Until such time as impaired groundwater at the Site meets Vermont Primary Groundwater Quality Enforcement Standards, the VT DEC will reclassify groundwater from Class III (potable) to Class IV, designating it unsuitable for potable uses.

3. Surface Water and Wetlands

There are no known recreational uses of the unnamed stream that runs parallel to Commerce Street along the eastern edge of the Site. However, because access is unrestricted, it is appropriate to consider recreational scenarios for surface water and sediment.

All surface waters in Vermont are State-designated areas for protection and maintenance of aquatic life under the Clean Water Act. The unnamed stream flows in a southerly direction into Tributary #4 to Muddy Brook, and downstream of the Site, Muddy Brook flows into the Winooski River which is a known fishery.

* * *

Based on current and anticipated future land and groundwater uses discussed above, the following exposure scenarios were considered for the human-health risk assessment (Section G):

Groundwater

- Future consumption of and dermal contact with contaminated groundwater, and inhalation of vapors generated during other household uses (e.g., showering).

- Dermal contact with and inhalation of vapors from shallow groundwater during excavations and trenching in saturated soils.

Soil

- Incidental ingestion, inhalation and dermal contact with contaminated soil.

Indoor Air

- Inhalation of vapors emanating from contaminated groundwater (vapor intrusion).

Surface Water and Sediment

- Incidental ingestion and dermal contact with contaminants in surface water and sediment while wading in the unnamed stream.

The ecological receptors identified for purposes of assessing ecological risk were infaunal and epifaunal benthic invertebrates in the unnamed stream.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The public health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the Site were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action are discussed below followed by a summary of the environmental risk assessment.

1. Human Health Risk Assessment

A baseline human health risk assessment (HHRA) was completed for the Commerce Street Plume Superfund Site to evaluate the likelihood and magnitude of potential human health effects associated with historical disposal practices. The baseline HHRA is presented in Volume 2 of the RI Report and provides estimates of risk based on reasonable maximum exposure (RME)

expected to occur under both current and anticipated future use scenarios. The HHRA also estimates risk based on central tendency, or average, exposures (CTE). Both RME and CTE are used to estimate cancer risk and non-cancer health hazards. Groundwater, soil, indoor air, surface water and sediment were evaluated for potential health effects.

The human health exposure scenarios evaluated in the HHRA included current/future recreational visitors exposed to sediments and surface water at the unnamed stream; current/future construction workers exposed to shallow groundwater and vapors in excavation trenches; current/future residents potentially exposed to contaminants in shallow groundwater through inhalation of volatiles in indoor air; current commercial/industrial workers and future residents exposed to contaminants in soil; and future local residents exposed to groundwater as drinking water and other household uses. Contaminated soils were removed in 1985 and 1989. For this reason, the evaluation of soils was limited to a semi-quantitative evaluation. Potential exposures to contaminants in groundwater through volatilization into indoor air were evaluated through a separate vapor intrusion evaluation.

Chemicals of potential concern (COPCs) were identified as those chemicals that exceeded human health screening levels for the various exposure media. Screening levels for soil were EPA regional screening levels (RSLs) for residential soil set at the lower of either a hazard quotient (HQ) of 0.1 or an Excess Lifetime Cancer Risk (ELCR) of 1×10^{-6}. Screening levels for groundwater were EPA RSLs for residential tap water set at the same risk levels as soil (HQ = 0.1, ELCR = 1×10^{-6}). Screening levels for recreational receptors exposed to surface water and sediment were conservatively set at the same risk levels as those used for tap water and residential soil. Screening levels for construction workers exposed to soil and groundwater were set at the same risk levels as used for residential tap water and residential soil. Screening levels in groundwater for vapor intrusion were based on Vapor Intrusion Screening Levels (VISLs) for HQ = 0.1 or ELCR = 1×10^{-6}. The RSLs and VISLs used exposure assumptions and toxicity parameters that were current as of 2015.

The COPC selections for each exposure medium are shown in Table G-1. A chemical was selected as a COPC if the maximum concentration exceeded the selected screening level or if there were no screening level available, regardless of detection frequency or background concentration. The COPC selection screening levels for lead were 400 mg/kg in soil for residential areas and the 15 ug/L drinking water action level in groundwater.

The exposure point concentration (EPC) for each COPC was then estimated as described below and provided in Appendix A of the HHRA. The EPC represents an estimated concentration to which a receptor is assumed to be continuously exposed while in contact with an environmental medium. The EPCs for sediment and surface water are generally defined as the 95 percent upper confidence limit (95% UCL) on the arithmetic average and is calculated using EPA's ProUCL

software. However, because of the small sample sets sizes, maximum concentrations were selected as EPCs for these media. The EPC for groundwater exposure to construction workers was the maximum concentration in shallow groundwater at any area. The maximum concentration was used because construction worker exposure could occur at any location, and there were insufficient data to calculate the 95% UCL at each potential area.

For potential exposures to groundwater as drinking water, the EPC is now defined by EPA as the 95% UCL from wells at the core of the plume (OSWER Directive #9200.1-120; February 6, 2014). The core of the Commerce Street plume is located in intermediate to deep overburden and is identified as the area of highest TCE concentrations. Analytical results from the eight wells selected as representative of the core of the groundwater plume were used to develop EPCs, as described in Section 3.3 of the HHRA, which also describes how EPCs were calculated for air in construction trenches and for groundwater vapors during household water use.

The EPCs were used in combination with appropriate exposure assumptions related to each potential exposure pathway. The exposure pathways are summarized in Table 2-1 of the HHRA, and include incidental ingestion of sediment, dermal contact with sediment, incidental ingestion of surface water, dermal contact with surface water, inhalation of volatile contaminants in groundwater that may volatilize into excavation trenches, incidental ingestion of shallow groundwater in excavation trenches, dermal contact with shallow groundwater in excavation trenches, ingestion of groundwater used as drinking water, dermal contact with groundwater during household water use, inhalation of groundwater vapors during showering, inhalation of indoor air, incidental ingestion of soils, dermal contact with soils, and inhalation of dust and volatiles from soil. The exposure assumptions for each pathway are provided in Appendix A of the HHRA.

The exposure for the recreational receptors was calculated only for the Reasonable Maximum Exposure (RME), whereas the exposure for the construction worker and adult and child resident was calculated for both the RME and the Central Tendency Exposure (CTE). EPA generally bases remedial decisions primarily on the RME scenarios; therefore only RME exposures are discussed below. As detailed in Appendix A of the HHRA, current default EPA RME and CTE exposure assumptions were used for residential receptors (OSWER Directive #9283.1-42; March 11, 2014) exposed to groundwater. Exposure of the child and adult resident to groundwater was calculated separately for non-cancer risk and as age-adjusted exposure for cancer risk. For the recreational receptor, the RME exposure frequency was 22 days/year for 6 years (child) or 22 days/year for 20 years (adult). For the construction worker, the RME exposure to groundwater and air in a trench was assumed to be 130 days/year for one year. Other exposure parameters such as skin surface area, body weight, ingestion rates, etc. are provided in Appendix A of the HHRA. Potential exposures to contaminants in groundwater through volatilization into indoor air were evaluated through a separate vapor intrusion evaluation and summarized in the HHRA.

Because contaminated soils were removed in 1985 and 1989, the risk evaluation of soils was limited to a semi-quantitative evaluation conducted by EPA and summarized in the HHRA. The semi-quantitative approach used was to calculate the risks of the maximum concentration of remaining soil COPCs relative to EPA RSLs for residential soil. For non-cancer risk, the maximum contaminant concentration was divided by the non-cancer residential soil RSL for HQ = 1. The risk was considered acceptable if the concentration was less than the RSL. For cancer risk, the maximum contaminant concentration was divided by the cancer-based RSL for ELCR = 1×10^{-6} and then multiplied by 1×10^{-6}. The resulting cancer risks were added and compared with EPA's acceptable cancer risk range of 1×10^{-6} to 1×10^{-4}.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a calculated daily intake level by the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk" – or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke, dental x-rays, or exposure to ultraviolet radiation from the sun. EPA's generally acceptable risk range for site related exposure is one in ten thousand (10^{-4}) to one in a million (10^{-6}). Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. A summary of the cancer toxicity data relevant to the chemicals of concern is presented in Appendix A of the HHRA.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake level by the reference dose (RfD) or other suitable benchmark. Reference doses have been developed by EPA and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. An HQ < 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) within or across those media to which the same individual may reasonably be exposed. An HI < 1 indicates that toxic non-carcinogenic effects are unlikely. A summary of the non-carcinogenic toxicity data relevant to the chemicals of concern at the Site is presented in Appendix A of the HHRA.

Results

The cancer and non-cancer HHRA risks in groundwater, sediment and surface water are summarized in Table G-2. The risks associated with recreational RME exposure to surface water and sediment in the unnamed stream were lower than an HI of 1 and an ELCR of 1×10^{-5}, and are therefore within EPA's acceptable risk criteria. The risks associated with the RME exposure of a construction worker to groundwater and air in a trench were an ELCR of 2×10^{-6} and an HI of 3. Although the ELCR is within EPA's acceptable risk range, the HI is higher than the acceptable HI of 1. TCE was the primary contributor to non-cancer risk with an individual HQ of 2.1. The risks associated with residential exposure to groundwater as drinking water and household water use were much higher than EPA maximum acceptable risk levels. The RME ELCR was 9.2×10^{-2} (about 9 in 100), and the total RME HI was 3181 for the child and 2778 for the adult. TCE and chromium were the principal contributors to the excess cancer risk projections. Other significant contributors included 1, 2–dichloroethane, vinyl chloride, methylene chloride, and arsenic. The non-cancer Hazard Indices exceeded unity for potential adverse effects on multiple organ systems. The major contributor to non-cancer risk was TCE (HQ = 3159). Chemicals with HQ values greater than 1 included methylene chloride, cis-1, 2-DCE, arsenic, and cobalt. The average concentration of lead (9 ug/l) did not exceed EPA's level of concern for blood lead using blood lead modeling.

EPA's vapor intrusion investigation evaluated sub-slab soil gas and indoor air sampling at five residential and two commercial properties considered representative of conditions across the Site (see Appendix C of the HHRA). The results confirmed the findings of the indoor air study conducted by VT DEC in the early 1990s and did not show a complete vapor intrusion pathway across the Site. However, in a sixth residence investigated by VT DEC in 2014, vapors emanating from contaminated groundwater in the sump did have an impact on indoor air quality and, if not vented, would present a risk to human health. This residence is located on a low-lying parcel adjacent to the drainage ditch with intermittent flow on the western portion of the Site and the homeowner reports having to run a sump pump almost continuously in order to keep water out of the basement. EPA sampled the water in sumps from neighboring residences (Figure 5) which were found not to contain contaminated groundwater. However, the water table at the Site is shallow (on average five feet bgs) and there is the potential for more instances in the future of vapors emanating from contaminated groundwater in the sumps of other buildings, or from contaminated groundwater that floods basements of other buildings, should the plume migrate and/or climatic conditions change.

The semi-quantitative risk evaluation for soil is presented in Appendix B of the HHRA and summarized in Table G-3. EPA's semi-quantitative evaluation of soil concluded that non-cancer health hazards (individual contaminant HQs or organ-specific HIs) were less than one and the cancer risk estimates were within or less than the EPA targeted cancer risk range (10^{-4} to 10^{-6}).

The evaluation concluded that chromium in soils at properties along Shunpike Road and South Brownell Road does not pose a potential health threat. A second more conservative evaluation of risk assuming all chromium in the soil in the area of the former lagoon at 96 Commerce Street was the more toxic hexavalent form resulted in an excess cancer risk that exceeds EPA risk range under a residential scenario. The cumulative risk from hexavalent chromium, PAHs and arsenic exceed the EPA risk range. Due to uncertainty about whether elevated chromium at the former Mitec property may be hexavalent chromium, EPA recommends that soil be removed from 96 Commerce Street, with a goal to reduce the concentration of PAHs and total chromium. While lead was detected in soils at the Site, a formal evaluation of the potential hazards resulting to exposure to lead in soils was not performed because the average lead concentration was below EPA's screening benchmark of 400 mg/kg for residential land use (OSWER Directive #9355.4-12; July 14, 1994).

There are numerous sources of uncertainty and limitations in the risk estimations as calculated for this Site. The net impact of these uncertainties and limitations to the overall risk estimates is difficult to discern as some of these factors may lead to an overestimation of risk whereas others may lead to an underestimate of risk. Examples of uncertainties in the hazard identification stem from EPA's limited ability to characterize the full range of potential adverse effects from the available research. Often, data on specific effects (i.e., developmental effects) are lacking or are not adequate for inclusion in the hazard assessment. Thus, the risk estimates projected are limited by our ability to adequately characterize the full range of potential adverse effects on all potentially susceptible populations that may result from exposure to compounds detected in the environment.

Risk estimates are also based on the assumption that each of the contaminants persist in the environment at the concentrations noted historically when transformation, degradation and dilution processes may lead to lesser or greater concentrations in the future, or result in the creation of new compounds having greater or lesser toxicity than those characterized in this assessment. The exposure assessment also assumes that an individual may be exposed to all compounds simultaneously which may lead to an overestimation of actual risks if this is not the case.

Uncertainty is also inherent in EPA's evaluation of cumulative risk and hazard assessments. In the absence of specific information on the effects of a mixture, EPA assumes dose additivity and an absence of either synergistic or antagonistic behaviors of the chemicals. To the extent that these assumptions are incorrect, over- or underestimation of risk could result.

For the purposes of this ROD, the potential human exposures that present an unacceptable risk include:

- Potential future residential exposure to soil at 96 Commerce Street contaminated with chromium (presumed hexavalent), PAHs and arsenic that present an unacceptable risk to human health;

- Potential future exposure to contaminated groundwater that could be used as a source for drinking/household uses and present an unacceptable risk to human health;

- Potential current and future exposure to utility and construction workers working in soils saturated with contaminated groundwater that present a potential unacceptable risk to human health; and

- Potential current and future exposure to volatile chemicals emanating to indoor air from contaminated groundwater that presents an unacceptable risk to human health.

2. Ecological Risk Assessment

Procedures for addressing ecological risks are not as standardized as they are for human health risk assessments. Specific procedures and level of effort for an ecological risk assessment vary significantly depending on site-specific factors. EPA conducted a Screening Level Ecological Risk Assessment (SLERA) on the unnamed stream at the Site because preliminary studies indicated that Site-related VOCs were elevated in sediment pore water and surface water in an area where emergence of groundwater into the stream was suspected. The methods and results of the SLERA are detailed in Section II of Volume 2 of the RI Report and summarized below.

Surface water and sediment were considered for the SLERA. Surface and subsurface soil were not considered during the SLERA because Site soils were removed in 1985 and 1989, and there is little available wildlife terrestrial habitat. The Site is now highly developed, comprised primarily of buildings, pavement and landscaped areas. Initial pore water and surface water sampling had identified elevated levels of Site-related VOCs and conductivity in an area of the stream where groundwater from the Site probably emerges into surface water (Figure 8). The concentration of TCE in surface water was higher than a highly conservative surface water no-effects benchmark for aquatic organisms but lower than a more realistic benchmark based on equilibrium partitioning. In order to address this uncertainty, it was decided to evaluate whether there was an impact on benthic organisms at a series of stations at this potential "impact" area, as well as upstream and downstream from this potential "impact" station. Surface water and sediment samples were collected from the potential "impact" station, two upstream reference stations and two stations downstream from the potential "impact" station, for chemical analysis as well as determination of the number and taxonomic identity of benthic and epibenthic aquatic organisms collected in or on the sediment. The surface water was analyzed for VOCs and

inorganic chemical species that might contribute to the observed higher conductivity (chloride, bromide, fluoride, nitrate, nitrite, and sulfate). The sediment was analyzed for VOCs, SVOCs, and metals.

TCE, cis-1,2-DCE and vinyl chloride in surface water were detected at highest concentrations at the potential "impact" station at concentrations lower than available no-effect benchmarks. VOCs decreased by about half at the next downstream station and by about half again at the most downstream station. Chloride was slightly elevated compared to reference stations at the "impact" location, and more than double this level at the next downstream station, reaching levels above the available effect benchmark for chloride. The other inorganic species were either not detected or not elevated compared to the reference stations.

In sediment, VOCs were not detected, and the only exceedance of no-effect benchmarks was for PAHs in the most downstream station. The benthic and epibenthic organism community was also sampled at each station and the number and species of benthic organisms were determined. Relative to upstream reference stations, there was an adverse impact on the number of individuals and species of benthic organisms at the "impact" station and the next downstream station, compared to the upstream stations. The benthic organism counts and species returned to reference condition at the most downstream station. It was concluded that chloride, probably related to road salting, was the most probable cause of the impact on benthic organisms because there was most impact where the highest chloride occurred, and the VOCs did not exceed available no-effect benchmarks. Although there was some uncertainty about this conclusion, the benthic community had returned to reference condition by about 1900 feet downstream from the potential "impact" area, indicating that Site-related contaminants did not have a significant ecological impact.

In summary, there was an impact on benthic organisms where Site groundwater is emerging; however, the impact was due to background chloride contamination rather than Site contaminants. The benthic community recovered downstream from the stations of maximum chloride concentrations. It was concluded that there was no ecological impact due to Site contaminants.

3. Basis for Response Action

Because the baseline human-health risk assessment revealed that future potential residential and worker exposure to compounds of concern in the groundwater and an evaluation of risk revealed a future potential residential exposure to compounds of concern in soil at 96 Commerce Street, the Site presents an unacceptable human health risk, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this

ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

H. REMEDIATION OBJECTIVES

As stated previously, the anticipated future land use at the Site is residential and the State of Vermont's goal for all groundwater in the state is restoration to high-quality drinking water. The risk assessment evaluated pathways associated with residential living, utility/construction workers potentially exposed to saturated soils, and recreational use of the unnamed stream along the eastern portion of the Site. There are no ecological risks from site-related contaminants to the unnamed stream. Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives (RAOs) were developed to aid in the development and screening of remedial alternatives. These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health. The RAOs selected for the Commerce Street Plume Site are:

Soil

- Prevent potential future residential exposure to contaminants in soil at 96 Commerce Street above background levels that would result in an excess cancer risk between 1×10^{-4} and 1×10^{-6} or a non-carcinogenic risk greater than an HI of 1.

Groundwater

- Prevent ingestion and other household uses of groundwater containing levels of site-specific contamination in excess of federal MCLs, non-zero MCLGs or the Primary Groundwater Quality Enforcement Standards of the Vermont Groundwater Rule and Strategy, Enforcement Protection Rules, Chapter 12, whichever is lower or, in their absence, a level that is set at a non-cancer HQ of 1 or an excess cancer risk between 1×10^{-4} and 1×10^{-6}.

- Prevent construction worker exposure to shallow groundwater and volatiles in trench air at concentrations that would result in an excess cancer risk between 1×10^{-4} and 1×10^{-6} or a non-carcinogenic risk greater than an HI of 1.

- Minimize the migration of contaminants beyond the Class IV/Site boundary.

- Minimize the migration of contaminants to the unnamed stream and the wetlands at the confluence of the unnamed stream and Tributary #4 to Muddy Brook.

Indoor Air

- Prevent inhalation of contaminants from vapors emanating from contaminated groundwater that would result in an excess cancer risk between 1 x 10^{-4} and 1 x 10^{-6} or a non-carcinogenic risk greater than an HI of 1.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

1. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

2. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives was developed for the Site.

With respect to soil, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long term management. This range also included alternatives that treat the threats posed by the Site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternative(s) that involve little or no treatment but provide protection through engineering or institutional controls; and a no action alternative.

For groundwater, a similar range of alternatives was developed in the RI/FS. However, as

the RAOs for groundwater in part involve ensuring that there is no exposure to groundwater within the Site and/or Class IV boundaries, the response actions evaluated involved monitoring and institutional controls, such as a municipal ordinance and/or deed restrictions, to prevent exposure within and migration beyond the boundaries (Site, IC zone and Class IV, to the extent that they are different).

For vapor intrusion, a limited number of alternatives that included institutional and engineering controls, and the no action alternative were considered.

As discussed in Section 3 of the FS, soil, groundwater and vapor intrusion treatment technology options were identified, assessed and screened based on implementability, effectiveness, and cost (see FS Tables 3-2 to 3-4). Remedial technologies that were not screened from further evaluation were developed into site specific remedial alternatives and are presented in Section 4 of the FS. Retained remedial alternatives are evaluated in detail in Section 5 of the FS.

J. DESCRIPTION OF ALTERNATIVES

This section provides a narrative summary of each of the alternatives for soil, vapor intrusion and groundwater that were retained for detailed analysis. A comparative analysis of the retained alternatives is found in Section K of this ROD.

1. Soil Alternatives

The following alternatives were evaluated for the soil in the area of the former lagoon at 96 Commerce Street (Lot 07:019:011000).

- SO1: No Action

  Alternative SO1 is the "No Action" alternative required by the NCP and EPA guidance. Under this alternative, no further actions (including monitoring) would be taken to prevent exposure to contaminated soil in the location of the former unlined lagoon. Any reduction in risk will occur only through natural processes. Five-year reviews (FYRs) of the remedy would still be required by CERCLA due to the fact that waste is being left in place. The only cost associated with this alternative is $62,037 for FYRs.

- SO2: Limited Action/Institutional and Engineered Controls

  Under this alternative, access to impacted soil at 96 Commerce Street will be restricted by institutional and engineering controls. Institutional controls in the form of a deed

restriction will be placed on the property to prevent disturbance of the soil without certain protective measures during invasive subsurface activities (e.g., excavations, utility trenches) to prevent human exposures to contaminated soil. A chain-link fence with lockable gates will be placed around the impacted soil in the area of the former unlined lagoon, and would require routine operation and maintenance (O&M). Warning signs will be attached to the fence alerting visitors to the hazards associated with contact with the soil. A fence and signs can be installed in about a week; deed restrictions however can take several years. Long-term monitoring to assess changes in soil concentrations is not included, but FYRs would be required due to the fact that waste is being left in place. The estimated present value cost of this alternative is $184,185.

- SO3: Excavation and Off-Site Disposal

  This alternative includes the excavation of approximately 630 cubic yards of soil (containing RCRA characteristic wastes) that exceeds cleanup levels in the area of the former unlined lagoon and will take less than one month to complete. Additional soil sampling during remedial design will refine the limits of the excavation and establish background concentrations. The contaminated soil will be taken off site to a licensed facility, in compliance with all RCRA and Vermont Waste Management Act requirements. The area will be backfilled with clean soil, and all disturbed areas will be restored to existing grades and seeded. The estimated present value cost of this alternative is $657,196.

2. Vapor Intrusion Mitigation Alternatives

The following alternatives were evaluated for the residence at 830 South Brownell Road (Lot 07:003:023000).

- VM1: No Action

  Alternative VM1 is the "No Action" alternative required by the NCP and EPA guidance. Under this alternative, no further actions (including monitoring) would be taken to prevent exposure to vapors in indoor air at 830 South Brownell Road from contaminated groundwater that is below the basement and has at times entered the basement through cracks in the foundation and overtopping of the sump. FYRs of the remedy would still be performed, as required by CERCLA due to the fact that waste is being left in place. The only cost associated with this alternative is $62,037 for FYRs.

- VM2: Sump Pump, Vapor Venting, Treatment and Discharge

  Under this alternative, institutional controls in the form of a deed restriction or other enforceable mechanism would be implemented to require the continued operation of the sump pump, passive gas venting and sump water discharge system already installed at 830 South Brownell Road by VT DEC, in consultation with EPA. The deed restriction or other enforceable mechanism would also require that VT DEC, EPA and/or their representatives be allowed access to the existing system to perform inspections and regular O&M. In addition, a system will be installed on the property (e.g., carbon filters in a shed on site) for the treatment of sump water prior to discharge to the ground surface and indirectly to groundwater, as required by Vermont's Water Pollution Control law. FYRs of the remedy would be performed, as required by CERCLA. The estimated present value cost of this alternative is $113,141.

- VM3: Enhanced Vapor Mitigation

  This alternative includes all elements described in Alternative VM2, but also requires, as determined necessary based on a risk analysis of additional data collected during pre-design, the installation of additional vapor mitigation (e.g., active venting, vapor barrier, etc.) or other engineering controls to supplement or replace the existing vapor mitigation system at 830 South Brownell Road. The alternative will require an institutional control in the form of a deed restriction (or other enforceable mechanism), requiring the continued operation of the enhanced vapor mitigation system and allow EPA, VT DEC and/or their representatives continued access to the enhanced vapor mitigation system in order to perform inspections and regular O&M.

  The alternative also includes additional vapor mitigation in other buildings in the vicinity of the plume, if EPA determines at a future time that Site/plume conditions and/or risk and toxicity parameters have changed, and EPA subsequently determines through a vapor intrusion study based on multiple lines of evidence (e.g., groundwater, sub-slab soil gas and/or indoor air data) and a risk analysis that a vapor intrusion pathway into a building exists that is a threat to human health. Vapor mitigation measures will include enhancement of any existing sump pump system by adding passive venting (and sump discharge treatment if necessary), or other appropriate measures (e.g., active venting, vapor barrier or other engineering controls), to be selected in a future decision document as appropriate. Institutional controls will require continued operation of and access to any enhanced or new vapor mitigation system.

  The estimated present value cost of this alternative is $157,412.

3. Groundwater Alternatives

The groundwater alternatives address contaminants that have migrated into the overburden groundwater from the original source of contamination, likely the former unlined lagoon and sanitary leach field 96 Commerce Street. TCE that has sorbed to the finer-grained sand and silt layers at depth in the sandy unit in the overburden aquifer is likely an ongoing source of dissolved-phase contamination.

- GW1: No Action

  Alternative GW1 is the "No Action" alternative required by the NCP and EPA guidance. Under this alternative, no further actions would be taken to prevent exposure to contaminated groundwater at the Site. Any reduction in risk will only occur through natural processes. FYRs of the remedy would still be required by CERCLA due to the fact that waste is being left in place. The only cost associated with this alternative is $62,037 for FYRs.

- GW2: Limited Action/Institutional Controls

  Under this alternative, exposure to contaminated groundwater will be restricted by institutional controls. Institutional controls such as deed restrictions and/or municipal ordinances would be used to limit withdrawal of contaminated groundwater and to limit the exposure of utility workers and others who may come in contact with soils saturated with contaminated groundwater until cleanup levels are met. As an additional institutional control, the State of Vermont will reclassify contaminated groundwater at the Site as Class IV, designating it non-potable and restricting the installation of drinking water supply wells on properties near the 70-acre plume. Institutional controls may take several years to complete. Any reduction in risk will only occur through natural processes. This alternative would include limited groundwater monitoring for contaminant migration across the Site/Class IV boundary, which should the plume migrate, result in more groundwater being deemed unfit for drinking and other household uses. O&M on the groundwater monitoring wells would be needed. FYRs of the remedy would be performed. The estimated present value cost of this alternative is $245,639.

- GW3: Monitored Natural Attenuation (MNA) and Long-Term Monitoring

  This alternative includes the institutional controls, including Class IV redesignation, to prevent exposure to groundwater that exceeds federal and state drinking water standards, as described in GW2. In addition, it relies on naturally-occurring biological, physical and chemical attenuation processes in the subsurface and groundwater (collectively referred

to as "natural attenuation") to reduce risk. Monitoring the result of these processes over time throughout the plume is an integral component of this remedial technology. More comprehensive long-term, regular monitoring of VOCs and geochemical parameters will be conducted across the entire plume and subjected to trend analysis to determine MNA effectiveness. The groundwater monitoring wells will require O&M. Based on analytical modeling developed only for purposes of comparing one groundwater alternative to another, it may take anywhere from 115 to 250 years, or longer, to achieve groundwater cleanup levels with MNA. FYRs of the remedy would be performed. The estimated present value cost of this alternative is $1,587,524.

- GW5: *In Situ* Treatment and Monitored Natural Attenuation

  In addition to all the elements of Alternatives GW2 and GW3, Alternative GW5 includes active treatment of the groundwater plume. Chemical reagents (e.g., hydrogen peroxide, ozone, etc.) and/or biological stimulants (e.g., molasses, VOC-consuming microbes, etc.) will be injected into the most contaminated zones of the overburden aquifer to reduce the concentrations of VOCs. Of the *in situ* treatment options evaluated in the FS, the one that EPA believes will achieve Vermont's groundwater restoration goals in a reasonable timeframe, based on current understanding of the subsurface conditions at the Site, is a treatment train of chemical oxidation in portions of the plume where TCE concentrations exceed 50,000 ppb, followed by biological treatment where TCE concentrations are greater than 500 ppb. Conceptually, *in situ* treatment is expected to last two to three years, consisting of a total of four injections, each lasting three weeks. The time between injections is expected to be six months to a year depending on how long the reagents persist in active form in the subsurface. A treatment plan addressing delivery methods; types and volumes of amendments to be applied (chemical reagents, biological stimulants or both); locations and arrangements of injections; duration and schedule of injections; etc., will be refined during remedial design. The remainder of the plume will be treated with an MNA polishing step until groundwater cleanup levels are met. Based on analytical modeling, it may take anywhere from 50 to 75 years, or longer, to achieve groundwater cleanup levels with *in situ* treatment and MNA. The estimated present value cost of this *in situ* treatment option is $7,572,143.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked. This assessment also addresses other information from advisories, criteria, and guidance that is "to be considered."

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement an option.

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

COMPARISON OF SOIL, VAPOR MITIGATION AND GROUNDWATER CLEANUP ALTERNATIVES

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found Section 5 of the FS.

The section below presents a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives that satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria. State Acceptance and Community Acceptance are evaluated after the public comment period.

Comparative Analysis of Remedial Alternatives for Soil at 96 Commerce Street

- SO1: No Action
- SO2: Limited Action/Institutional and Engineering Controls
- SO3: Excavation and Off-Site Disposal

Overall Protection of Human Health and the Environment

The No Action alternative does not meet this threshold criterion. It provides the least amount of protection of human health and the environment of the soil alternatives because no actions would be taken to further reduce the ongoing risk presented by impacted soil.

Alternatives SO2 (Institutional/Engineering Controls) and SO3 (Excavation/Off-Site Disposal) both meet this criterion by eliminating exposure to contaminated soil exceeding cleanup levels. Alternative SO2 restricts access to the impacted soil with the installation of a fence, although a fence would be susceptible to damage, vandalism or trespass or other failure. SO2 also includes institutional controls, which are only adequate and reliable if they are monitored for compliance and enforced. Alternative SO3 provides the greatest degree of overall protection because it would permanently remove soil that poses an unacceptable risk and disposes of it off site at a licensed facility.

Compliance with Applicable or Relevant and Appropriate Environmental Requirements (ARARs)

Neither the No Action alternative (SO1) nor the Limited Action alternative (SO2) meet this criterion; Alternative SO3 does.

No chemical-specific ARARs exist with respect to exposure to contaminants in soil. Instead, cleanup levels are based on risk.

RCRA characteristic hazardous waste was disposed in the lagoon at 96 Commerce Street, thus requiring either full removal of contaminated soil or a RCRA-compliant cap. Neither SO1 nor SO2 meet this action-specific ARAR requirement. Alternative SO3, by contrast, requires characterization, identification and removal of the soils contaminated with hazardous wastes from the former lagoon area at 96 Commerce Street for off-site disposal at a licensed facility, in compliance with all RCRA and Vermont Waste Management Act requirements.

Wetlands are present between Commerce Street and Kirby Lane and to the east of the unnamed stream located near the eastern boundary of the Site, but not in the area of the former unlined lagoon. However, prior to any soil removal activities with SO2 (fence posts) and SO3 (excavation), confirmatory wetland, wetland buffer zone and riparian buffer zone delineation will be performed. Work will be performed and erosion control measures implemented to avoid/minimize impacts to wetlands, buffer zones, and other resources that may be nearby, and any impacts to protected resources will be mitigated to restore ecological functions and values to comply with wetland rules. Measures will be used to minimize airborne dust. As soils at the Site were identified by the Vermont Division for Historic Preservation to potentially contain pre-contact archeological sites, SO2 and SO3 will be implemented to conform to state and federal archeological and historic preservation laws.

Long-Term Effectiveness and Permanence

The No Action alternative (SO1) does not provide any long-term effectiveness or permanence and does not meet this criterion. Alternative SO2 leaves the contaminated soil on site and relies

on individuals to abide by land use restrictions. The fence would be susceptible to vandalism, wear and tear and weather-related damage, and would have to be repaired or replaced periodically. Alternative SO3 provides a greater degree of long-term effectiveness and permanence than SO2 because the impacted soil is permanently removed from the Site and disposed of at a licensed facility.

Reduction of Toxicity, Mobility or Volume Through Treatment

There is no reduction in toxicity, mobility or volume under the No Action alternative (SO1) or the Limited Action alternative (SO2). Alternative SO3 will reduce toxicity, mobility and volume, although not by treatment, by removing the contaminated soil from the Site.

Short-Term Effectiveness

The No Action alternative (SO1) has no short-term impacts since there would be no short-term risks posed to the community or on-site workers during implementation of the alternative, nor impacts to the environment. However, the No Action alternative would not reduce risk from exposure to contaminated soil nor achieve protection at any time.

A fence (Alternative SO2) can be constructed quickly and with only nominal short-term risks to the community, Site workers or the environment.

Alternative SO3 has the greatest potential for short-term impacts to Site workers from the inhalation of airborne contaminants during excavation; however, these can be addressed through dust suppression measures and personal protective equipment. Impacts to the community include an increase in truck traffic as contaminated material is taken off site and clean fill is brought in. However, as this is expected to take less than one month to complete, any inconveniences will be short lived. Work will be performed during typical work hours to minimize noise in nearby residential areas. Alternative SO3 would most fully reduce risk from Site soils in the shortest period of time and would be protective immediately after implementation.

Implementability

Alternative SO1 (No Action) is the easiest to implement because no remedial actions are required; only a review of the remedy is required every five years as is the case with all the cleanup options evaluated.

The engineering controls in Alternative SO2 are also easy to implement; contractors to install the fence are readily available and could do so in one week's time. O&M of this alternative includes

seasonal inspections and maintenance as needed. Deed restrictions can be more difficult to implement as EPA cannot record them unilaterally and needs the cooperation and assistance of third parties (e.g., property owners, mortgage holders, town officials). Alternative SO3 is also easy to implement. Contractors capable of performing the excavation and restoration (backfilling, grading, seeding) are readily available and the active construction is expected to take about two weeks. The material to be shipped off site is a relatively small volume and locating a licensed facility is not expected to be an issue. Deed restrictions would not be required under Alternative SO3, making it easier to implement than SO2.

Cost

Alternative SO1 (No Action) has no capital costs associated with it and the costs associated with required five-year reviews are low. Alternative SO2 at $184,185 is relatively low and most of the cost is for future O&M of the fence and ensuring compliance with deed restrictions. Alternative SO3 will cost $657,196 due in part to the fact that the soil will be managed and disposed of as RCRA characteristic waste. SO3 is the most expensive of the three soil alternatives, however, it is the only one that includes active remediation of the contaminated soil.

State Acceptance

The State of Vermont has given its support for Alternative SO3: Excavation and Off-Site Disposal for the contaminated soil at 96 Commerce Street.

Community Acceptance

No comments, written or oral, were received during the comment period. The community has expressed neither support for nor dissatisfaction with any component of the selected remedy.

Comparative Analysis of Remedial Alternatives for Vapor Intrusion Mitigation

- VM1: No Action
- VM2: Sump Pump, Vapor Venting, Treatment and Discharge
- VM3: Enhanced Vapor Mitigation

Overall Protection of Human Health and the Environment

Alternative VM1 (No Action) does not meet this criterion because it does not require, among other things, the continued operation of the existing vapor mitigation system (sump pump, passive venting and water discharge) at 830 South Brownell Road, or the potential enhancement of that system, as deemed necessary based on collection of additional data and risk analysis.

Alternative VM2 better protects human health by limiting exposure to vapors emanating directly from contaminated groundwater that is below the basement and has in the past entered the basement, but it does not meet this criterion because insufficient data currently exist for a risk analysis to determine if the current vapor mitigation system adequately protects human health, and VM2 does not require the improvement or replacement of the existing system as deemed necessary based on further study.

Alternative VM3 meets this criterion; it requires data collection (e.g., indoor air, sub-slab soil gas) and the installation of additional vapor mitigation or other engineering controls to supplement or replace the existing sump, venting and discharge system, as necessary, based on risk analysis of the additional data collected during design. Alternative VM3 also calls for additional vapor mitigation in other buildings in the vicinity of the plume, if EPA determines at a future time that Site/plume conditions and/or risk and toxicity parameters have changed, and EPA subsequently determines through a vapor intrusion study based on multiple lines of evidence (e.g., groundwater, sub-slab soil gas and/or indoor air data) and a risk analysis that a vapor intrusion pathway into a building exists that is a threat to human health.

Compliance with Applicable or Relevant and Appropriate Environmental Requirements (ARARs)

All three alternatives meet this criterion. No chemical-specific ARAR exists with respect to exposure to contaminants in vapor.

Alternatives VM2 and VM3 involve the continued operation of the previously installed sump pump and venting system. Both alternatives include the addition of sump water treatment before it is discharged to the ground and indirectly to groundwater in conformance with Vermont's Water Pollution Control law. Soil disturbance for the installation of the water treatment system or other engineering control is expected to be very minimal, but work will conform to state and federal archeological and historic preservation laws and wetlands laws, upon further delineation of work areas, wetlands, wetland buffer zones, and riparian buffer zones.

Long-Term Effectiveness and Permanence

The No Action alternative (VM1) does not provide any long-term effectiveness or permanence and does not meet this criterion.

Through the implementation of an institutional control, Alternatives VM2 and VM3 ensure the continued operation of the existing vapor mitigation system at 830 South Brownell Road, and continued access to EPA and VT DEC and/or their representatives for maintenance and oversight. These institutional control measures will help protect the residents in that home from harmful vapors until such time as groundwater concentrations are reduced and no longer pose a

potential inhalation risk. Due to a lack of sufficient data and risk analysis however, it is unclear whether VM2 would provide adequate protection of human health. Alternative VM3 provides the greatest degree of long-term effectiveness and permanence because it will require the improvement or replacement of the existing vapor mitigation system, as determined necessary based on additional data sampling and risk assessment. Additional data are needed to confirm whether the existing vapor mitigation system at 830 South Brownell Road adequately protects residents from inhaling potentially harmful vapors emanating from contaminated groundwater. Moreover, VM3 includes additional vapor mitigation in other buildings in the vicinity of the plume, if EPA determines at a future time that Site/plume conditions and/or risk and toxicity parameters have changed, and EPA subsequently determines through a vapor intrusion study based on multiple lines of evidence (e.g., groundwater, sub-slab soil gas and/or indoor air data) and a risk analysis that a vapor intrusion pathway into a building exists that is a threat to human health.

Reduction of Toxicity, Mobility or Volume Through Treatment

There is no reduction in toxicity, mobility or volume under the No Action alternative. Alternatives VM2 and VM3 use engineering controls (rather than treatment) to reduce the toxicity, mobility and volume of vapors into 830 South Brownell Road. However, per the requirement of Vermont's Water Pollution Control law, VM2 and VM3 do require treatment of water from the sump in the basement at 830 South Brownell Road prior to discharge to the ground surface and indirectly to groundwater.

Short-Term Effectiveness

There are no short-term risks to the community, Site workers or the environment from implementation of Alternatives VM1, VM2 or VM3. Alternative VM1 requires no action. Alternative VM2 will not take long to implement, as the vapor intrusion system is already in place, and the recording of a deed restriction and construction of a water treatment shed are relatively straightforward. Alternative VM3 will take longer to achieve than VM2 due to the need to collect more data and perform a risk analysis, and contingent on the results, improve or replace the existing vapor mitigation system. Alternative VM3, however, is the only alternative that will fully address vapor inhalation risk at 830 South Brownell Road and in other buildings in the vicinity of the plume, as deemed necessary based on risk analyses.

Implementability

The No Action alternative (VM1) is the easiest to implement because no remedial actions are required other than FYRs. The system requirements under Alternatives VM2 and VM3 are easy to implement; contractors capable of designing and installing a sump discharge treatment system

(e.g., running the discharge through activated carbon in a treatment shed on site) and/or active venting or vapor barrier mitigation measures, if deemed necessary, are readily available. Institutional controls, required under Alternatives VM 2 and VM3 are relatively easy to implement.

Cost

Alternative VM1 (No Action) has no capital costs associated with it and the costs associated with required five-year reviews are low. Alternatives VM2 at $113,141 and VM3 at $157,412 have relatively modest costs, most of which is for future maintenance of the vapor mitigation system until such time as groundwater concentrations are reduced and no longer pose a potential inhalation risk.

State Acceptance

The State of Vermont has given its support for Alternative VM3: Enhanced Vapor Mitigation to fully address potential inhalation risk at 830 South Brownell Road, and, in other buildings in the vicinity of the plume if EPA later determines through a vapor intrusion study and risk analysis that a pathway exists that is a threat to human health.

Community Acceptance

No comments, written or oral, were received during the comment period. The community has expressed neither support for nor dissatisfaction with any component of the selected remedy.

Comparative Analysis of Remedial Alternatives for Groundwater

- GW1: No Action
- GW2: Limited Action/Institutional Controls (ICs)
- GW3: Monitored Natural Attenuation (MNA) and Long-Term Monitoring
- GW5: *In Situ* Treatment and Monitored Natural Attenuation

Overall Protection of Human Health and the Environment

The No Action alternative (GW1) does not meet this criterion, the remaining three alternatives do. Alternative GW1 will not protect human health and the environment because no action would be taken to address risks posed by the dissolved contaminants in the overburden aquifer. Any reduction in risk will occur only through natural attenuation processes.

Residents and businesses at the Site currently use municipal water. Under the Limited Action

alternative (GW2), institutional controls include deed restrictions and/or a municipal ordinance to prevent withdrawal of contaminated groundwater, as well as the State of Vermont's reclassification of contaminated groundwater at the Site to Class IV (non-potable), to prohibit the use of drinking water wells. Alternative GW2 includes only limited monitoring for the possible migration of contaminants across the Site/Class IV boundary. This alternative would be protective of human health as long as ICs are enforced to prevent exposure to contaminated Site groundwater.

Alternatives GW3 (MNA) and GW5 (*In Situ* Treatment) also require the ICs, non-potable Class IV designation and groundwater monitoring of GW2. The monitoring program in Alternatives GW3 and GW5 is more comprehensive than GW2 in that in addition to monitoring for possible migration of the plume, these alternatives will evaluate the effectiveness of the ongoing natural degradation processes across the entire plume.

Alternative GW5 is the most protective of human health and the environment as it includes active treatment to destroy in a substantially shorter time period the contaminants in the groundwater that exceed federal and state drinking water standards.

Compliance with Applicable or Relevant and Appropriate Environmental Requirements (ARARs)

The No Action alternative (GW1) does not meet this criterion, the remaining three alternatives do.

Because Alternatives GW2 (Limited Action) and GW3 (MNA) include no active remediation, compliance with location-specific ARARs will be relatively straightforward. Any work associated with GW2, GW3 or GW5 (e.g., for installation of wells) will be performed to conform to state and federal archaeological and historic preservation laws, wetlands laws, and upon further delineation of work areas, wetlands, wetland buffer zones and riparian buffer zones. In addition to the location-specific requirements just described, Alternative GW5 (*In Situ* Treatment) will be conducted to comply with action-specific state and federal underground injection rules and with RCRA Chemical, Physical and Biological Treatment regulations.

Alternatives GW1, GW2 and GW3 will not achieve water quality chemical-specific ARARs until contaminants naturally attenuate. Alternative GW5 (*In Situ* Treatment) is the only alternative that will achieve the chemical-specific ARAR cleanup levels earlier than natural attenuation. Implementation of this technology has the potential to meet chemical-specific ARARs for TCE in approximately 50 to 75 years (based on analytical modeling) whereas it will take 115 to 250 years with Alternatives GW1, GW2 and GW3.

Long-Term Effectiveness and Permanence

The No Action alternative GW1 does not provide any long-term effectiveness or permanence that can be assessed.

Alternatives GW2 (Limited Action) and GW3 (MNA) are more effective than GW1 due to institutional controls that will limit the withdrawal of groundwater, limit the exposure to utility workers and others who may come in contact with soils saturated with contaminated groundwater and reclassify groundwater to Class IV (non-potable), prohibiting drinking water wells. However, like Alternative GW1, Alternatives GW2 and GW3 leave behind significant residual risk over an extended period of time because no actions would be taken to permanently reduce the level of contaminants in the plume in the long term beyond natural attenuation processes.

Alternative GW5 would provide the highest level of long-term effectiveness and permanence because it relies on destructive *in situ* treatment, implemented over a relatively short (two to three years) period of time, to achieve cleanup levels in the shortest period of time.

Reduction of Toxicity, Mobility or Volume Through Treatment

The No Action alternative (GW1) will not reduce contaminant toxicity, mobility or volume through treatment. Alternatives GW2 (Limited Action) and GW3 (MNA) provide no active treatment for groundwater and rely on natural degradation processes to decrease contaminant mass in the long term. Without treatment, the volume, toxicity and migration of the contaminant plume will continue to persist over a long period of time. Alternative GW5 (*In Situ* Treatment) would actively reduce the toxicity, mobility and volume of the contamination at the Site, and satisfies CERCLA's statutory preference for treatment better than GW2 and GW3.

Short-Term Effectiveness

No active treatments are associated with Alternatives GW1 (No Action), GW2 (Limited Action) or GW3 (MNA); therefore, short-term risks to the community, Site workers or the environment from the installation of new monitoring wells or other incidental work necessitated by these alternatives is minimal. Alternative GW5 (*In Situ* Treatment) is an active treatment that would take place in an area that is heavily developed. The pressurized injection of reagents or amendments creates a risk to Site workers that can be mitigated through implementation of proper engineering controls and standard health and safety measures. Administrative and engineering controls and communication with local officials and the community would ensure the safe transportation, storage and injection of these materials.

Based on an analytical model (REMChlor) of groundwater contaminant transport and degradation, under Alternatives GW1, GW2 and GW3 cleanup could take 115 -250 years. By adding active treatment with GW5, cleanup times could be reduced to 50 to 75 years. (Note: REMChlor cannot predict when cleanup levels will actually be achieved; it is used only to evaluate how the alternatives compare to each other given a similar set of assumptions.)

Implementability

Each groundwater alternative is generally easy to implement. Alternative GW1 requires no action other than FYRs and is therefore the easiest. All alternatives except for No Action (GW1) require administrative actions and the same level of coordination with third parties to enact institutional controls, and require monitoring at the Site/Class IV boundary. The monitored natural attenuation programs under Alternatives GW3 (MNA) and GW5 (*In Situ* Treatment) would be more comprehensive than monitoring under GW2 (Limited Action), however, redevelopment of existing monitoring wells or installation of new monitoring wells is not expected to require a significant effort. Methods for sampling groundwater and analysis are well established. Of the groundwater alternatives, GW5 is the most difficult to implement because it requires injections in several locations and phases. However, *in situ* technology has been used at other Superfund sites with similar subsurface conditions, and contractors capable of performing the work are readily available.

Cost

The only costs associated with the No Action alternative (GW1) are for five-year reviews which is the same for all remedial alternatives.

Costs for groundwater monitoring and future maintenance in the Limited Action alternative (GW2) are relatively low, $245,639. The groundwater monitoring program in Alternative GW3 is more comprehensive than GW2, with more monitoring wells to install, sample and maintain. GW3 also includes trend analysis of the data to evaluate the effectiveness of MNA. The cost of GW3 is estimated to be $1,587,524.

Alternative GW5 is the most expensive of the four alternatives retained, however it is the only alternative that includes active treatment of the contaminated groundwater. The FS included a range of costs, depending on type of *in situ* treatment and size of area to be treated. The cost of the treatment train option (chemical oxidation followed by enhanced biodegradation with an MNA polishing step) that EPA and VT DEC favors is $7,572,143.

State Acceptance

The State of Vermont has given its support for Alternative GW5: *In Situ* Treatment and MNA to address contaminated groundwater across the Site, and more specifically, the treatment train option involving chemical oxidation in the most contaminated portions of the plume and enhanced bioremediation in the lesser contaminated portions, followed by MNA. VT DEC has indicated to EPA that the State will reclassify the contaminated groundwater at the Site to Class IV (non-potable) until such time as Vermont Primary Groundwater Quality Enforcement Standards for drinking water are met.

Community Acceptance

No comments, written or oral, were received during the comment period. The community has expressed neither support for nor dissatisfaction with any component of the selected remedy.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The remedy selected for the Commerce Street Plume Superfund Site is a comprehensive remedy that utilizes source control and management of migration components to address risk from contamination at the Site. Source controls measures are required to address soil that presents unacceptable risks to human health. Vapor intrusion mitigation measures will be implemented to fully protect people who live and work at the Site from potential risk from inhalation of VOCs from contaminated groundwater. The management of migration component addresses contaminants in groundwater in the overburden aquifer that present unacceptable risks to human health. Of all the alternatives, the selected remedy best satisfies the statutory criteria for remedy selection.

The State's statutory policy is to protect all groundwater resources to maintain high-quality drinking water. EPA's remedy for the Site, which calls for restoration of groundwater to drinking water standards, is consistent with that goal.

The remedy set forth in this ROD addresses the following unacceptable risks:

- Potential future residential exposure to soil at 96 Commerce Street contaminated with chromium (presumed hexavalent), PAHs and arsenic that present an unacceptable risk to human health;

- Potential future exposure to contaminated groundwater that could be used as a

source for drinking/household uses and present an unacceptable risk to human health;

- Potential current and future exposure to utility and construction workers working in soils saturated with contaminated groundwater that present a potential unacceptable risk to human health; and

- Potential current and future exposure to volatile chemicals emanating to indoor air from contaminated groundwater that presents an unacceptable risk to human health.

2. Description of Remedial Components

The following alternatives comprise the selected remedy:

Alternative SO3: Excavation and Off-Site Disposal
Alternative VM3: Enhanced Vapor Mitigation
Alternative GW5: *In Situ* Treatment and Monitored Natural Attenuation

The selected remedy is consistent with EPA's preferred alternatives outlined in the August 2015 Proposed Plan. A detailed description of each component of the selected remedy is presented below.

Excavation and Off-Site Disposal of Soil

a. Pre-design Investigation

A pre-design investigation (PDI) will be performed in the area of the former unlined lagoon on the 96 Commerce Street property to fully delineate the extent of the impacted soil and determine background concentrations. The samples will be analyzed for total and hexavalent chromium in addition to PAHs and arsenic.

Wetlands are present between Commerce Street and Kirby Lane and to the east of the unnamed stream located near the eastern boundary of the Site, but not in the area of the former unlined lagoon. However, the PDI will include confirmatory wetland, wetland buffer zone and riparian buffer zone delineation. Delineation will also include confirmation of presence or absence of pre-contact archaeological sites in remedial work areas.

b. Soil Excavation Design

Following the PDI, a soil removal design will be prepared to specify the vertical and horizontal extents of the removal actions along with the backfilling, compaction, and restoration plans; any necessary side-wall and building stabilization procedures; destination disposal facility; and health and safety and loading protocols.

c. Soil Removal, Loading and Off-Site Disposal

Prior to soil removal, the rear of the parcel at 96 Commerce Street will be cleared of trees and brush as necessary to increase the area needed for construction activities. The soil may be temporarily stockpiled on the property and covered by polyethylene sheeting, if necessary. The soil will be identified and characterized to determine appropriate disposal designation(s), and disposed of off site in accordance with Vermont Hazardous Waste Regulations and RCRA at a licensed facility.

d. Site Restoration

Following the soil removal and off-site disposal, the excavation area(s) will be backfilled with soil delivered to the Site from an off-site source and habitat restored to previous conditions. If unavoidable impacts to any pre-contact archaeological sites occurred, a mitigation plan will be developed in consultation with the Vermont Division for Historic Preservation. Any impacts to protected resources will be mitigated to restore ecological functions and values to comply with wetland rules.

Enhanced Vapor Mitigation

a. Data Collection/Risk Analysis and Pre-Design

Further vapor intrusion studies are needed to confirm whether the existing vapor mitigation system installed by VT DEC at 830 South Brownell Road in 2014 sufficiently protects residents in that home from inhaling potentially harmful vapors emanating from contaminated groundwater. Additional indoor air data will be collected and a risk analysis performed.

Pre-design work will also include confirmatory wetland, wetland buffer zone and riparian buffer zone delineation. Delineation will also include confirmation of presence or absence of pre-contact archaeological sites in remedial work areas.

b. Construction

A system (e.g., activated carbon filter in treatment shed) will be constructed on site at 830 South Brownell Road to treat sump water prior to discharge to the ground surface and indirectly to groundwater. Additional mitigation measures (e.g., active venting, installation of vapor barrier) or other engineering controls will be constructed at 830 South Brownell Road if, after additional data collection and risk analysis, it is deemed necessary.

c. Long-term Monitoring and Maintenance

EPA, VT DEC and/or their representatives will inspect the vapor mitigation system routinely and will perform any maintenance to ensure that it is operational and functional. The performance of the existing system will also be monitored regularly to ensure that the remedy is protective of the residents. Monitoring activities may include screening basement air with an organic vapor meter; sampling water in the sump and for VOC analysis, etc.

d. Institutional Controls

Institutional controls consisting of a deed restriction and/or other enforceable mechanisms are necessary to require that residents at 830 South Brownell Road continue to operate the vapor mitigation system in accordance with EPA and VT DEC direction to ensure health and safety. This includes notifying EPA and/or VT DEC if the system stops working or if any other operational issues are noted. The deed restriction or other enforceable mechanism must also allow EPA, VT DEC and/or their representatives access to the property for equipment inspection and maintenance, and monitoring.

e. Additional Vapor Mitigation

The remedy calls for additional vapor mitigation in other buildings in the vicinity of the plume, if EPA determines at a future time that Site/plume conditions have changed and/or risk and toxicity parameters have changed, and EPA subsequently determines through a vapor intrusion study based on multiple lines of evidence (e.g., groundwater, sub-slab soil gas and/or indoor air data) and a risk analysis that a vapor intrusion pathway into a building exists that is a threat to human health. Vapor mitigation measures will include enhancement of any existing sump pump system by adding passive venting (and sump discharge treatment if necessary) or other appropriate measures (e.g., active venting, vapor barrier or other engineering controls), to be selected in a future decision

document as appropriate. Institutional controls will require continued operation of and access to any enhanced or new vapor mitigation system.

In Situ Treatment and Monitored Natural Attenuation of Groundwater

a. Pre-design Studies

Pre-design studies (bench scale and/or pilot tests) will be conducted to determine the specific course of action for *in situ* treatment. Bench-scale testing of chemical reagents and oxidants, and amendments and bacteria will be performed to maximize the effectiveness of the chemical treatment. After the bench scale tests are complete, the results will be used to perform pilot test(s) in the field. Performance monitoring for each pilot test will be performed during the test and approximately two months following the event to measure contaminant reduction and radius of influence as well as treatment efficacy. The performance monitoring will include sampling of the monitoring wells in the vicinity of the injections.

Pre-design work will also include confirmatory wetland, wetland buffer zone and riparian buffer zone delineation. Delineation will also include confirmation of presence or absence of pre-contact archaeological sites in remedial work areas.

b. *In Situ* Treatment Design

Based on the results of the pre-design studies, a treatment design will be developed with the selected process option (i.e., *in situ* chemical oxidation (ISCO) and/or *in situ* bioremediation (ISB)); delivery methods; types and volumes of amendments to be applied; locations and arrangement of injections; duration and schedule of the applications; and the application and performance monitoring required to determine effectiveness of the technology.

The remedial design will also include a health and safety plan to protect Site workers from the risks associated with the pressurized injection of reagents or amendments. A communications plan will be developed with town officials and nearby residents to ensure the safe transportation, storage and injection of these materials.

c. *In Situ* Treatment

In situ treatment (ISCO, ISB, or both) would be performed in the identified areas of the plume with the highest concentrations. It is assumed that the oxidants and/or amendments would be introduced to the source area by means of direct push drilling

techniques and injected into the lower portions of the overburden aquifer where the contamination has come to be located. Based on the conceptual design developed for the feasibility study, implementation of the active groundwater treatment is expected in four pulses, each lasting three weeks, over the course of two to three years, but is subject to change based on refinement during remedial design as well as during remedy implementation on the basis of field observations and consideration of diminishing returns.

Performance monitoring before, during and after each injection of oxidants and/or amendments will determine the effectiveness of the *in situ* treatment technology and ensure that the materials injected reach the areas targeted for treatment. The monitoring program will also include a series of sentinel monitoring locations to provide advance notice in the event that the injected materials (e.g., hydrogen peroxide, ozone, molasses) are migrating outside the treatment zones.

d. Monitored Natural Attenuation

The goal of this remedial action is to restore groundwater throughout the Site to high-quality drinking water. *In situ* treatment in the areas of highest VOC concentrations is expected to remove 90% or more of the contaminant mass that remains sorbed to the finer-grained materials in the overburden aquifer that are continuing sources of groundwater contamination. The remedy relies on naturally-occurring biological, physical and chemical attenuation processes in the subsurface and groundwater (collectively referred to as "natural attenuation") to reduce risk in the lesser contaminated portions of the plume until groundwater cleanup levels are met. Monitoring the result of these processes over time is an integral component of this remedial technology. Long-term, regular monitoring of VOCs and geochemical parameters will be conducted across the entire plume and will be used to analyze trends in temporal and spatial variations in plume chemistry and geometry and assess progress in meeting long-term remedial objectives.

The adequacy of the existing monitoring well network to evaluate the progress of MNA will be assessed during pre-design, after *in situ* treatment is complete and periodically thereafter (i.e., for five-year reviews) as the plume decreases in size and concentration over time. New wells will be installed as deemed necessary and unused wells will be abandoned.

MNA Lines of Evidence (LOE)

The selected remedy includes *in situ* chemical and biological treatment technologies that

are designed to greatly reduce the contamination currently in the aquifer. The bioremediation treatment will introduce substrates and nutrients that will create conditions that will enhance continued biodegradation and promote MNA which is the final, polishing step in a treatment train to achieve groundwater cleanup levels. Information that supports the feasibility of MNA includes:

- LOE1 - Historical trends in contaminant data showing decreasing concentration/mass

  - Historical data show the presence, albeit rare and at low concentrations, of reductive dechlorination daughter products (cis-1,2-DCE and vinyl chloride) from the attenuation of TCE, which is the primary human-health risk driver at the Site. The high concentrations of TCE, however, likely mask lower level daughter products due to elevated laboratory quantitation limits.

  - Concentrations of TCE have shown a slight decreasing trend when looking at the data between 2008 and 2012 at most locations, with the exception of one location in the western portion of the plume. The rate of decrease is slow but, along with the presence of daughter products, supports the natural occurrence of reductive dechlorination.

- LOE2 - Chemical and geochemical data that support attenuation

  - Historical geochemical results in selected monitoring wells within the core of the plume indicate that conditions suitable for reductive dechlorination are currently present. Oxidation-reduction potential (ORP) ranged from -338.9 mV (millivolts) to 201.4 mV with an average of -117.2 mV from 2008 through 2012. The optimal ORP for reductive dechlorination is below -100 mV. Similarly, dissolved oxygen ranged from 0.10 mg/L to 5.76 mg/L with an average of 0.80 mg/L from 2008 to 2012. The optimal dissolved oxygen for reductive dechlorination is below 1.0 mg/L. Additionally, the acidity of the aquifer is circumneutral with the pH ranging from 5.54 to 9.38 and averaging 7.14 from 2008 to 2012. The circumneutral pH data suggest that the environment is suitable for bacteria and is within the range typically desired by the bacteria to thrive, 6.5 to 8.0.

  - Conditions favorable to MNA will be altered to support ISCO processes; however, oxidants are inherently short-lived in the environment and once

the oxidant is used the aquifer will return to a condition similar to its current condition. Since ISCO is being proposed for the eastern hotspot only this impact will be felt in a relatively narrow swath of the Site-wide plume. Up- and cross-gradient of the eastern hotspot, conditions will remain favorable for MNA, particularly in those portions of the plume that are treated first with biostimulants and/or augmentation.

- LOE3 - Data documenting that degradation is occurring and provides an estimate of the rate

  - Additional work will be performed during the pre-design investigation phase of the remedy including: microcosm studies to determine residence time of the oxidants to be injected during the ISCO phase; MNA scoring analysis; statistical analysis of the trends in concentrations assuming that sufficient rounds have been performed; and determination of degradation rates. During these tests, the residence time of oxidants and biostimulants will be monitored to ensure selection of suitable design parameters that maximize the potential of each component of the treatment train.

  - Given the low gradients and flow velocities (~ 61 feet per year) at the Site, aquifer conditions likely would remain altered not more than 60 – 100 feet downgradient of the ISCO treatment area for 3 to 6 months after the last injection. This assumes use of permanganate or persulfate as the oxidant and that it is properly administered (i.e., aquifer is not "overdosed"). Other oxidants are more aggressive and could possibly have a longer impact on the aquifer.

  - There is a growing body of literature and evidence that suggests that persulfate may enhance natural attenuation of TCE, if designed and executed correctly.

e. Institutional Controls

Institutional controls such as a municipal ordinance and/or deed restrictions will be used on properties at the Site, and on properties in proximity to the Site (creating an off-site buffer zone around known areas of groundwater contamination), in order to limit the withdrawal of groundwater in the overburden aquifer, limit exposures to utility and construction workers and others when working in soil saturated with contaminated groundwater until groundwater cleanup levels are met, and prevent disturbance of on-going remedial actions. EPA's proposed area for ICs, based on current information, and

subject to potential change based on new information and/or understanding of the Site in the future, is shown on Figure 3. The objectives of the institutional controls shall be to ensure that no activities take place at the Site or in proximity to the Site that would either affect implementation of the selected remedy, cause exposures to hazardous substances or cause the contaminant plume to migrate.

In addition to a municipal ordinance and/or deed restrictions, the groundwater will be reclassified by VT ANR from Vermont Class III which is "suitable as a source of water for individual domestic water supply, irrigation, agricultural use and general industrial and commercial use" to Class IV which is "not suitable as a source of potable water but suitable for some agricultural, industrial and commercial use" until groundwater cleanup levels are met and the State's goal of restoration to high-quality drinking water is achieved. After EPA's issuance of the ROD, VT ANR will reclassify groundwater at the Site and in proximity to the Site. EPA anticipates that the extent of the new Class IV area will be similar to the area covered by other institutional controls and will provide an extra layer of protection. Vermont law requires that reclassification include a process for public participation and comment.

After the institutional controls have been implemented, compliance with the restrictions will be monitored and enforced by the State of Vermont to ensure that the institutional controls remain in effect. EPA and VT DEC will also evaluate periodically whether restrictions can be removed or modified as the overburden groundwater plume decreases in area and volume over time.

f. Long-term Monitoring

As discussed earlier, monitoring the results and progress of natural attenuation processes over time until groundwater cleanup levels are met is an integral component to the remedy selected for the Commerce Street Plume Superfund Site. Monitoring the potential for plume migration beyond the Site boundary, IC zone boundary and Class IV boundary, to the extent that they are different, is also critical. A performance monitoring program will be developed during pre-design that is expected to be more frequent at the boundaries, and, in the interior of the plume until groundwater conditions have reached a new equilibrium after the active (*in situ* treatment) portion of the groundwater remedy. Site-wide groundwater monitoring will occur not less than every five years, to support Five-Year Reviews.

Five-year Reviews

Contaminants will remain at the Site in groundwater above levels that allow for unlimited

use and unrestricted exposure for an extended period of time after implementation of the remedy. As such, CERCLA requires periodic (no less often than every five years after initiation of the remedial action) reviews of the remedy to ensure that it remains protective of human health and the environment. Five-year reviews will include evaluations of potential risks from exposure to VOCs through contact and ingestion of groundwater, and, the potential for vapor intrusion. Recommendations for improvements and follow-up actions will be made, as necessary.

Changes to the Remedy

The selected remedy may be modified as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences (ESD) or a Record of Decision Amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

The costs for operation and maintenance have been projected over 30 years, using the 7% discount rate per EPA guidance (*A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, July 2000). The cost of replacing equipment has been included as a recurring cost. The cost estimates also include contingencies to cover unknowns, unforeseen circumstances, or unanticipated conditions that were not possible to evaluate from the data on hand at the time the estimate was prepared. Contingencies are typically applied as a percentage of the total cost of construction or operation and maintenance activities cost, rather than applied to individual cost elements. Contingencies were factored into each component of the remedy, consistent with the ranges provided in EPA's aforementioned guidance.

The estimated costs for each component of the remedy are summarized in the table below.

Component	Capital Costs	Annual O&M [1]	Contingencies [2]	Total
SO3	369,205	0	225,954	595,159
VM3 [3]	28,200	110,121	19,091	157,412
GW5 [4]	4,420,325	767,042	2,384,776	7,572,143
Totals	**4,817,730**	**877,163**	**2,629,821**	**8,324,714**

[1] Total present worth for 30 years with 7% discount rate.
[2] Includes contingencies for remedial design; project management costs; construction management; scope and bid/construction.
[3] Includes only upgrades to existing vapor mitigation system at 830 South Brownell Road.
[4] Assumes active (*in situ*) treatment is ISCO followed by ISB.

A more detailed breakdown of the costs can be found in Tables L-2 thru L-4.

There are two major sources of uncertainty that could have an effect on the estimated costs. As indicated in the table, only costs associated with possible enhancements, as determined necessary after additional data collection and risk assessment, to the existing system in one home are included in the estimated cost for VM3. If future data collection, vapor intrusion studies and risk analysis show that additional residences or commercial buildings require vapor intrusion mitigation, those costs would be in addition to those included here.

The second source of uncertainty affects the cost of implementing the groundwater *in situ* treatment. For purposes of developing costs for the Feasibility Study, the active portion is assumed to be ISCO in those portions of the plume where TCE concentrations are greater than 50,000 µg/L, followed by ISB in portions where TCE concentrations are greater than 500 µg/L, and is subject to refinement during remedial design.

The information in the cost tables is based on the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost, as permitted by EPA guidance.

4. Expected Outcomes of the Selected Remedy

An expected outcome of the selected remedy is that the soil in the area of the former unlined lagoon at 96 Commerce Street (Lot 07:019:011000) will no longer present an unacceptable risk to human health from direct exposure (ingestion, dermal contact, inhalation of dust) immediately upon excavation and will be suitable for future residential use.

The selected remedy is also expected to protect residents at 830 South Brownell Road (Lot 07:003:023000) from the potential health hazards associated with inhaling vapors emanating from contaminated groundwater below that basement and that has flooded that basement. The selected remedy will similarly protect persons within other buildings within the vicinity of the plume, if EPA determines based on future data collection, vapor intrusion study, and risk analysis that a vapor intrusion pathway exists that threatens human health. The remedy requires that any sump water is treated before it is discharged to the ground surface and indirectly to groundwater. A deed restriction will ensure that any vapor mitigation system(s) constructed remains operational and allows EPA and VT DEC access to perform maintenance and testing to ensure ongoing efficacy of the system.

Another expected outcome of the selected remedy is that groundwater at the Commerce Street Plume Site will not present a future unacceptable risk to human health from direct exposure (ingestion, dermal contact, inhalation) and will meet Vermont's goal of aquifer restoration to high-quality drinking water. Groundwater is expected to be restored to federal and state drinking water standards or other risk-based levels in 50 to 75 years. *In situ* treatment is expected to remove as much as 90% of the VOC mass in the overburden aquifer and naturally-occurring biological, physical and chemical attenuation processes will continue to act on the contaminants that remain until groundwater cleanup levels are achieved. Institutional controls such as a municipal ordinance and/or deed restrictions, as well as the reclassification of the groundwater from Vermont Class III (potable) to Class IV (non-potable) will limit the withdrawal of groundwater in the overburden aquifer and will limit harmful current and future exposures to utility and construction workers and others when working in soils saturated with contaminated groundwater. Monitoring at the outer edges of the plume will confirm that it is not migrating beyond compliance boundaries.

The effectiveness of the groundwater remedy will be determined based upon attainment of the cleanup levels outlined in Table L-1, as well as any additional site-related Contaminants of Concern (COCs) added through subsequent decision documents. A monitoring program will be implemented in order to evaluate remedy performance and progress towards attainment. The details of the monitoring program will be established during the remedial design phase and will include the preparation of a long-term monitoring plan, but initial monitoring is expected to include evaluation of all Site-related contaminants including VOCs and metals. Monitoring scope and frequency could change over time based on technical analysis of the remedy, optimization studies, revised conceptual site model, or other information, as determined by EPA and VT DEC.

The determination that all cleanup levels have been met should consider historical and current monitoring data, contaminant distribution, trend analysis, and the appropriateness of the compliance monitoring program (i.e., locations, frequency of monitoring, sampling parameter). After all groundwater cleanup levels have been met as determined by EPA and VT DEC consistent with Agency guidance and VT Groundwater Protection Rules, 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 the COCs remaining in groundwater at the Site (if detected).

a. Groundwater Cleanup Levels

   The cleanup levels for all COCs in groundwater were selected based on Maximum Contaminant Levels (MCLs) and non-zero MCLGs established under the Safe

Drinking Water Act, or more stringent State drinking water standards (if identified as an ARAR). For those COCs that do not have a federal/state ARAR at the time this document was developed, a Site-specific, risk-based cleanup level was calculated. If a value described by any of the methods described above was not capable of being detected with good precision and accuracy, or was below what was deemed to be the background value, then the practical quantification limit or background value was selected as the cleanup level. The selected cleanup levels are shown in Table L-1. It should be noted that the groundwater remediation at this Site addresses contaminants related to the Site only.

b. Soil Cleanup Levels

There are no promulgated standards for soil. Cleanup levels were calculated based on carcinogenic (1×10^{-6}) and non-carcinogenic risk (HI = 1) for residential exposure and are shown in Table L-1.

c. Vapor Intrusion Screening Levels

In June 2015, EPA issued the *Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air* and updated the vapor intrusion screening levels (VISLs) calculator to develop media-specific risk-based VISLs for groundwater, soil gas and indoor air. These VISLs are generally updated periodically to reflect any update in chemical toxicity and other contributing factors.

Future risk analyses and determinations regarding the need for additional vapor mitigation at 830 South Brownell Road and in other buildings at the Site will be based on the most recent VISLs available at that time.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Commerce Street Plume Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment and will comply with ARARs while at the same time being cost effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element.

1. ***The Selected Remedy is Protective of Human Health and the Environment.***

The selected remedy will reduce exposure levels to protective ARAR levels or, in the absence of protective ARAR levels, to within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} for carcinogenic risk and below the HI of 1 for non-carcinogens in soil and groundwater as outlined in Table L-1 for the purposes of this CERCLA remediation. It should be noted that the groundwater remediation at this Site addresses contaminants related to the Site only.

The groundwater at the Commerce Street Plume Superfund Site is highly contaminated. The highest TCE concentrations in the overburden aquifer are 10,000 times the regulatory limit for drinking water. By treating the more contaminated zones of the plume with *in situ* technologies and monitoring natural degradation processes, the selected remedy will restore the groundwater to the State of Vermont's goal of high-quality drinking water. In the interim, institutional controls will limit the withdrawal of groundwater and exposure to soils saturated with contaminated groundwater until cleanup levels are achieved.

Excavation and off-site disposal of soil at 96 Commerce Street will eliminate the threat to human health from residential exposure to contamination in the area of the former unlined lagoon.

A deed restriction or other enforceable mechanism that requires the homeowner at 830 South Brownell Road to continue to operate the vapor mitigation system installed by VT DEC in 2014, in its existing capacity or as modified or replaced by EPA as deemed necessary based on future data collection and risk analysis, will protect residents from potential exposures to vapor emanating from contaminated groundwater. The deed restriction or other enforceable mechanism will also require that EPA, VT DEC and/or their representatives be allowed access to the vapor mitigation system for inspection, maintenance and oversight. The remedy also calls for vapor mitigation systems to be installed in other buildings at the Site, should future data collection, vapor intrusion studies and risk analysis indicate a risk to human health.

The selected response action addresses low-level threat wastes at the Site by removing contaminated soil and treating the contaminants in the finer-grained material in the overburden aquifer that act as an ongoing source of groundwater contamination. Long term monitoring and institutional controls for groundwater and vapor mitigation will ensure that the remedy remains protective until cleanup levels are met. There are no principal threat wastes at the Commerce Street Plume Site.

2. *The Selected Remedy Complies with ARARs.*

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the Site. The ARARs and TBCs are found in the tables in Appendix D to this ROD.

3. *The Selected Remedy is Cost-Effective.*

The selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria – long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

The estimated present worth cost of the three components that comprise the selected remedy is $8,324,714. Excavation and off-site disposal was the most expensive soil alternative considered, however, given the relatively small volume of material, it will eliminate the threat permanently, and does not rely on future maintenance or compliance with deed restrictions. The vapor mitigation component relies to the maximum extent possible on the existing system at 830 South Brownell Road, installed in 2014.

In situ treatment of the groundwater accounts for approximately 90% of the cost of the selected remedy. Although degradation is occurring naturally and would continue under any groundwater alternative, by focusing active treatment on those portions of the plume where contamination in the finer-grained materials in the overburden aquifer is an ongoing source and adding biostimulants, the restoration time is reduced from 115 - 250 years down to 50 - 75 years. With the implementation of the active (*in situ*) component, the area and volume of and the concentrations contained within the groundwater plume are expected to decrease more quickly.

4. *The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable.*

From those alternatives that attain or, as appropriate, waive ARARs and that are protective of

human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which of the identified alternatives provide the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

The selected remedy utilizes permanent solutions to address the human health risks posed by the Site. Soil is removed and taken to an appropriate disposal facility, allowing for unrestricted future residential use. Contamination in groundwater will be permanently removed, albeit over a long period of time, ultimately allowing for unrestricted use as drinking water and other household uses. The concern for utility and construction workers from exposure to soil saturated with contaminated groundwater, and, the health risk from inhaling vapors emanating from the plume across the entire Site will also be permanently addressed over time, as contaminant concentrations in groundwater are reduced.

5. ***The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element.***

The statutory preference for utilizing treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous substances as a principal element is satisfied by the following components of the selected remedy:

- Removing contaminated soil from the Site and taking it to a licensed facility.
- Treating groundwater with *in situ* technologies and monitored natural attenuation until cleanup levels are met, and, monitoring the plume at the boundaries (Site, IC zone, Class IV) to ensure that it does not migrate.

6. ***Five-Year Reviews of the Selected Remedy are Required.***

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure in groundwater for a long period of time, a review will be conducted within five years after initiation of the remedial action, and every

five years after that, to ensure that the remedy continues to provide adequate protection of human health and the environment.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGES

There are no significant changes from the alternatives presented in the August 2015 Proposed Plan. There are two minor changes, both of which are reflected in Table L-1. Cadmium was identified as a chemical of concern and a groundwater cleanup level was selected. The 10^{-6} risk-based, residential cleanup level for arsenic in soil is 0.68 mg/kg (not 0.67 mg/kg).

O. STATE ROLE

The Vermont Department of Environmental Conservation has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessments and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate state environmental and facility siting laws and regulations. The State of Vermont concurs with all components of the remedy for the Commerce Street Plume Superfund Site. A copy of the State's letter is attached as Appendix A.

RESPONSIVENESS SUMMARY

The purpose of the Responsiveness Summary is to provide a concise response to any issues raised during the public comment period by stakeholders in the community regarding the proposed remedial alternative and any other general concerns about the Site.

No written comments were received during the 30-day public comment period which extended from August 6, 2015 through September 4, 2015.

On August 12, 2015, EPA and VT DEC held a public informational meeting which was followed by a public hearing on the proposed remedial alternative (the "Proposed Plan") at Town Hall in Williston, VT. No oral comments were offered during the public hearing by any of the approximately 20 members of the public in attendance.

Below is a summary of the actions undertaken by EPA to notify the community of their opportunity to review and comment on the proposed remedial alternatives.

- On July 29, 2015 EPA mailed a letter to approximately 70 parties that own property on or near the Site, providing a copy of the Proposed Plan and notice of the August 12th informational meeting, public hearing, and a drop-in session to allow for one-on-one discussions with Agency personnel regarding potential impacts of the proposed remedial alternative on individual parcels. Similar notice was sent to Mitec Technologies, Inc.

- On July 30, 2015, EPA published notice of the Proposed Plan in the Williston Observer and announced dates of the comment period and public hearing to accept oral comments.

- On August 6, 2015, EPA made the Proposed Plan and supporting Administrative Record available at the Alling Memorial Library in Williston, VT, and the EPA Records Center in Boston, MA.

- On August 8, 2015, EPA mailed postcards to over 400 parties announcing the public meeting and public hearing on the Proposed Plan.

The outreach materials (letters, postcards) and a transcript of the hearing are included in the Administrative Record (Appendix F).

Appendix A

Vermont Department of Environmental Protection

Letter of Concurrence

State of Vermont
VT Dept Environmental Conservation

AGENCY OF NATURAL RESOURCES

28 September 2015

Nancy Barmakian, Acting Director
Office of Site Remediation and Restoration
USEPA Region 1
5 Post Office Square
Suite 100 (OSRR07-4)
Boston, MA 02109

Dear Ms. Barmakian

The State of Vermont, Department of Environmental Conservation (VTDEC) has reviewed the US EPA September 2015 Proposed Plan and the Record of Decision, to remediate the Commerce Street Plume Superfund Site. The VT DEC concurs with the preferred response actions outlined in the proposed plan and ROD, which consists of the following:

Contaminated Shallow Soils

- Excavation of approximately 630 cubic yards of contaminated soil in the area of a former wastewater lagoon located behind the former Mitec manufacturing facility located at 96 Commerce Street.

Contaminated Groundwater

- In-situ Chemical Oxidation (ISCO) of contaminated groundwater and soils through the injection of chemical oxidants into the most contaminated portions of the plume.
- Following completion of the ISCO, conduct in-situ active bioremediation. This may involve the injection of nutrients or other amendments and bioaugmentation.
- Monitored Natural Attenuation upon completion of the active bioremediation.
- Long Term monitoring to assess effectiveness of MNA and any plume migration.
- Implementing Institutional Controls (e.g. deed restrictions, municipal ordinance, State reclassification of groundwater) to limit the withdrawal of groundwater and limit the exposure of utility workers who may come into contact with soils saturated with contaminated groundwater until remediation is complete.

Vapor

- Implement Institutional Controls to require the continued operation of a vapor mitigation system in one residence.

- Install and operate a treatment system to treat contaminated groundwater as part of the vapor mitigation system.

This concurrence is predicated on obtaining the necessary funds from the Legislature. The VT DEC is committed to work with the Legislature to establish the required level and system of funding to meet the financial obligation at this site. The VT DEC intends to fulfill its obligations under CERCLA to the best of its abilities, given the funding constraints that may exist over the life of the project.

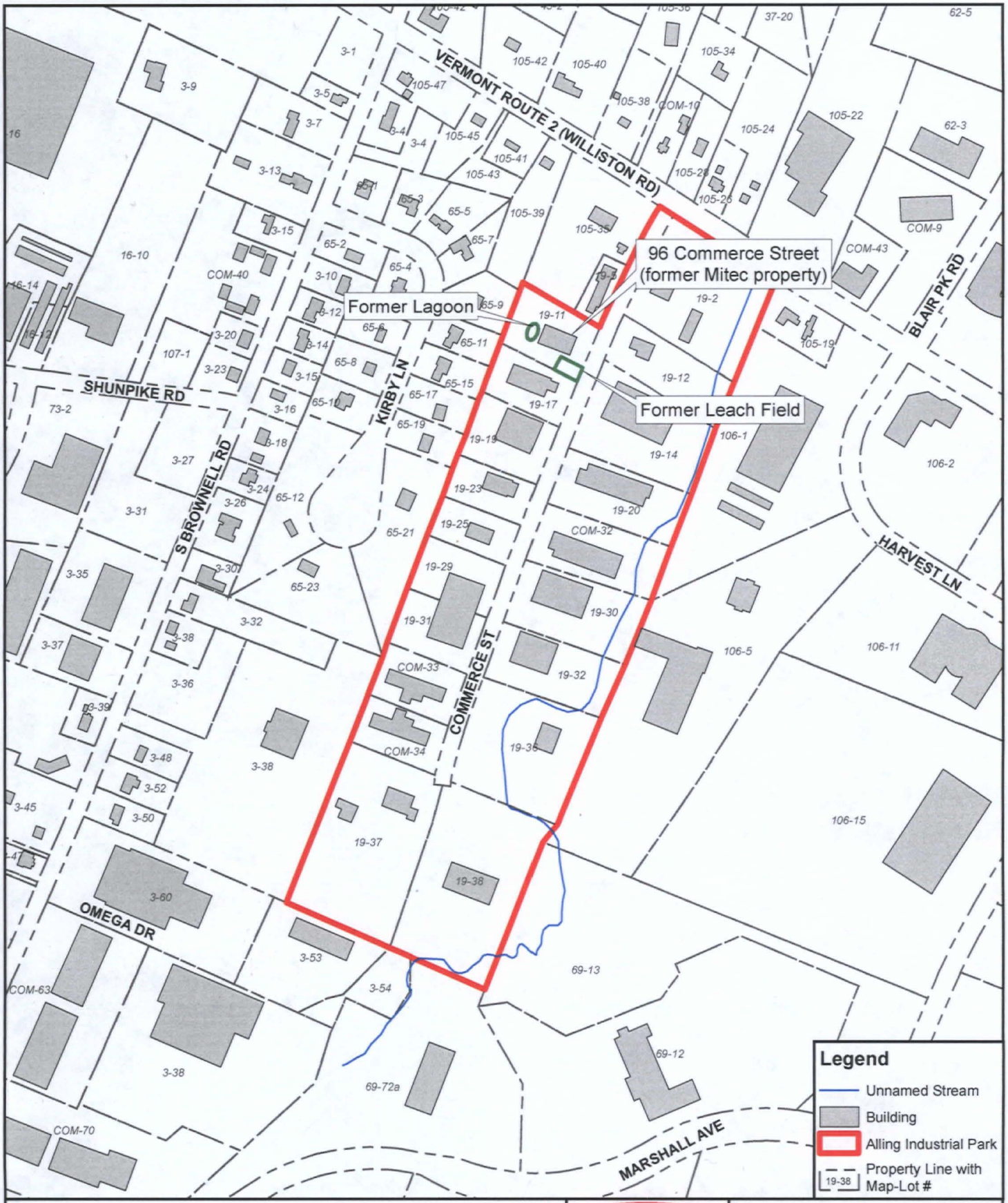
The VT DEC looks forward to its continued partnership with EPA and the successful implementation of this project.

Sincerely,

Alyssa Schuren, Commissioner
Department of Environmental Conservation

Appendix B

Figures and Tables



Notes:

1. Site features are depicted for display purposes only.

0 200 400 800

Feet

1 inch = 400 feet

N

Nobis

Engineering a Sustainable Future

Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
T(603) 224-4182
www.nobiseng.com
Client-Focused, Employee-Owned

FIGURE 1

STUDY AREA

COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

Notes:

1. Location of all features is approximate. Map is for reference purposes only. Nobis Engineering Inc. makes no claims, warranties, representations, expressed or implied, relating to the completeness, accuracy, or reliability of the data shown.

2. Groundwater TCE contours are a generalized combination of the shallow, intermediate, and deep interval aquifers. The contours are based on maximum TCE concentrations obtained during groundwater sampling events between 2008 and 2012. This is one interpretation of the data, others are possible.

0 150 300
Feet

1 inch = 300 feet

N

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FIGURE 2

OVERBURDEN TCE PLUME

COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

96 Commerce Street
(former Mitec Systems property)

VERMONT ROUTE 2 (WILLISTON RD)
KIRBY LN
LOIS LN
COLTON PL
SHUNPIKE RD
KRUPP DR
S BROWNELL RD
COMMERCE ST
HARVEST LN
OMEGA DR
MARSHALL AVE

Notes:

1. Extent of groundwater impacts based on TCE concentrations observed during the October 2012 groundwater sampling round and represents the total spatial extent from the shallow, intermediate, and deep intervals. TCE was the most widespread contaminant found.

0 150 300 600
Feet
1 inch = 300 feet

N

Legend
- Unnamed Stream
- Drainage Conduit
- Extent of Groundwater Impact (TCE > 5µg/L)
- Building
- Property Boundary
- Groundwater Restriction (Drinking and other household use)
- Vapor Mitigation Restriction

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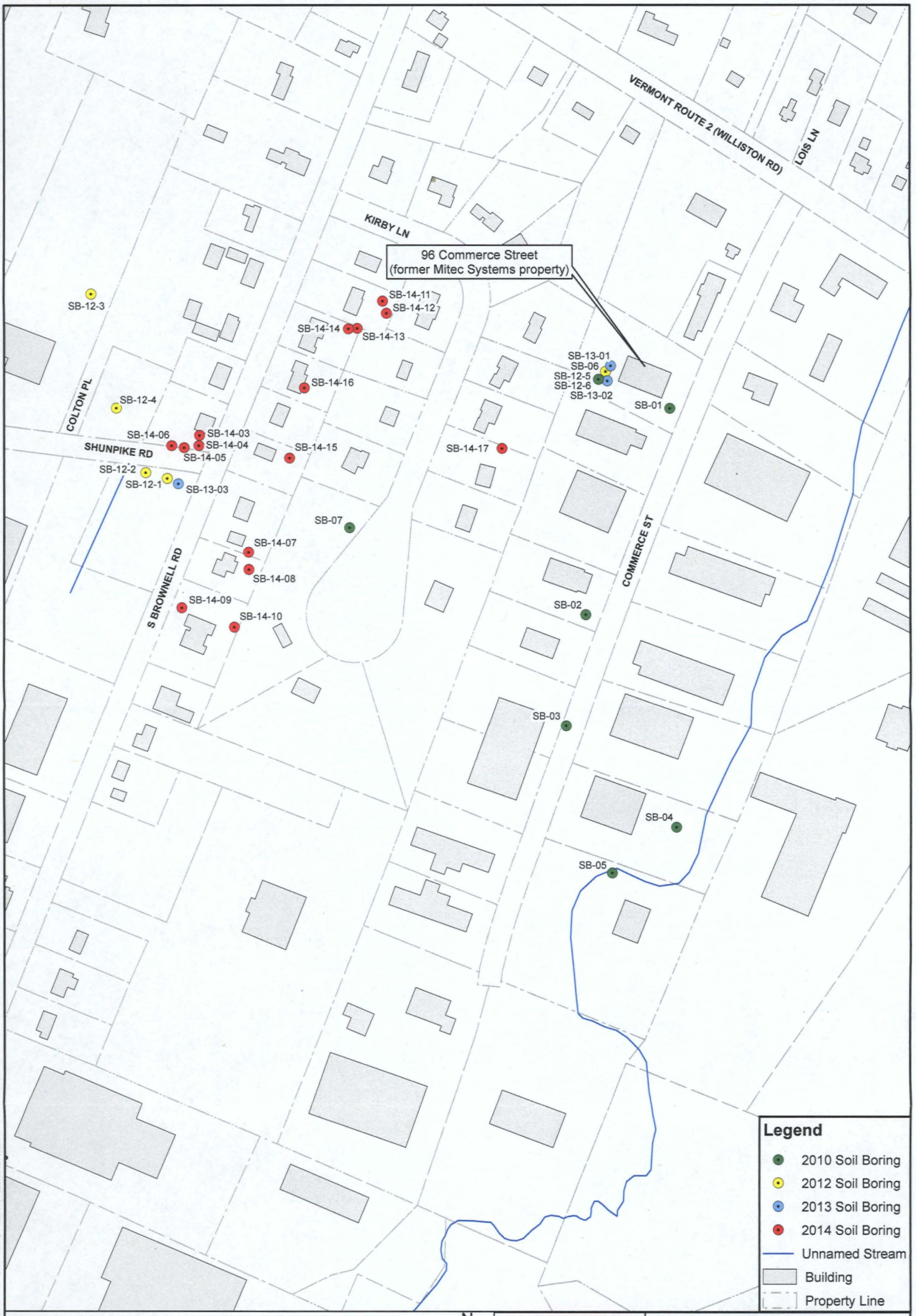
FIGURE 3

INSTITUTIONAL CONTROLS
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: DG	CHECKED BY: SH
PROJECT NO. 80036	DATE: SEPTEMBER 2015



Notes:

1. Site features are depicted for display purposes only.

2. Soil borings were advanced by various drilling contractors and overseen by Nobis Engineering, Inc. during the years indicated in the legend.

0 50 100 200 300

Feet

1 inch = 200 feet

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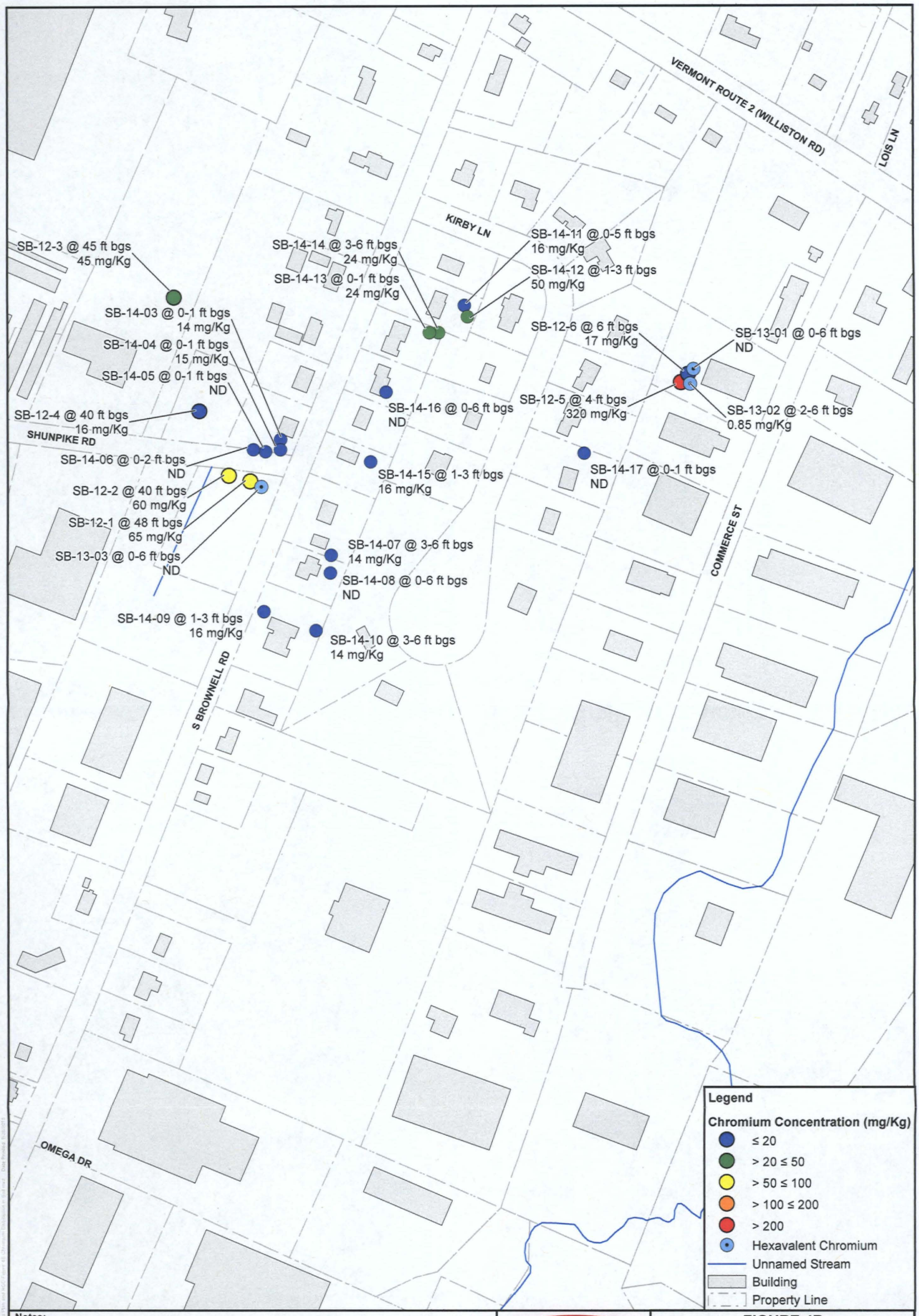
FIGURE 4A

SOIL BORING LOCATIONS
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: SH
PROJECT NO. 80036	DATE: SEPTEMBER 2015



Notes:

1. Boring labels indicate the maximum total chromium (Cr) in soil concentrations in miligrams per kilogram (mg/Kg) in the soil boirng at the depth reported in feet below ground surface (ft bgs). 2013 results represent hexavalent chromium concentrations. Soil samples were collected during soil boring programs performed in August 2012 and December 2013. ND indicates that chromium was not detected in the soil boring.

0 100 200 400
Feet

1 inch = 200 feet

N

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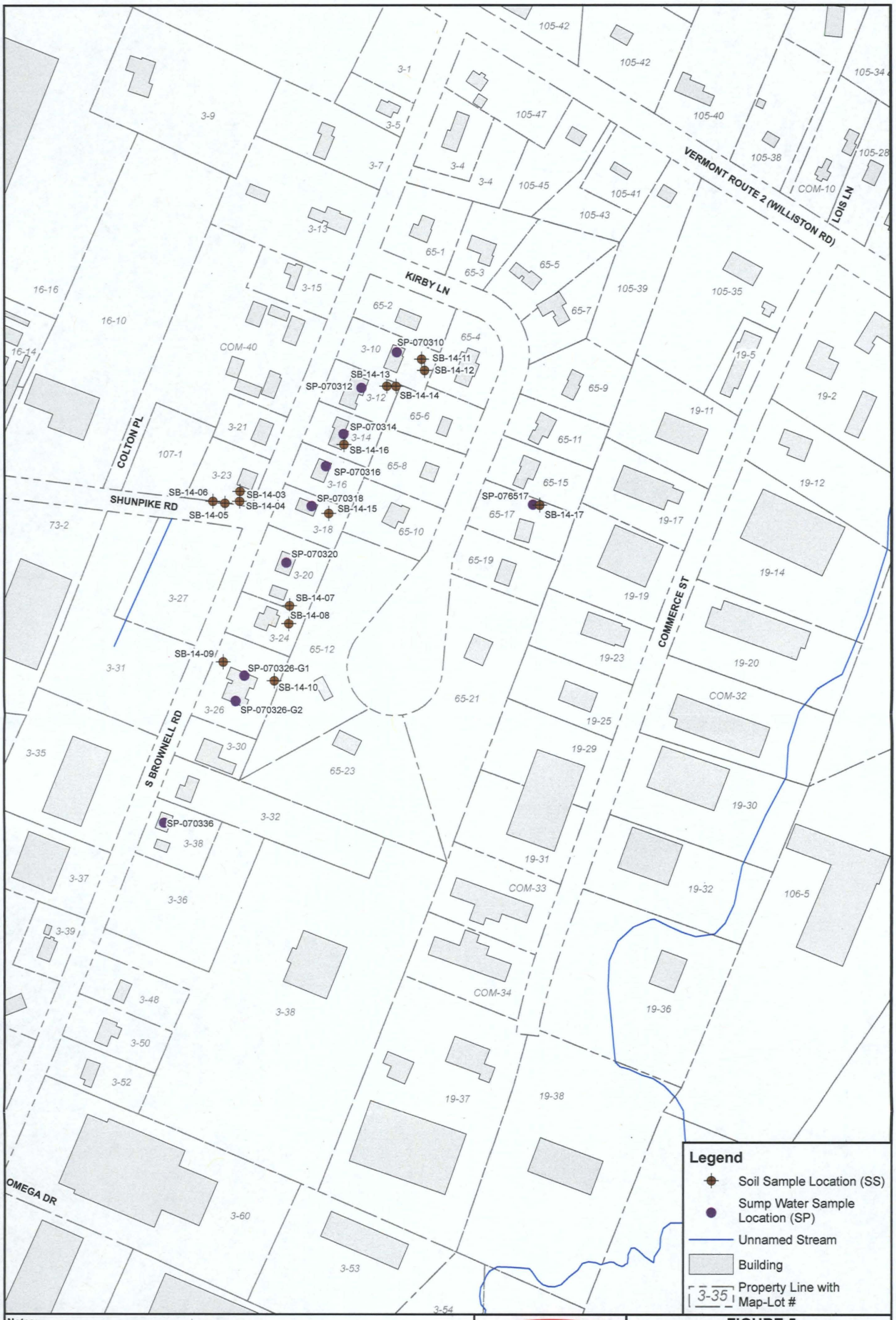
FIGURE 4B

CHROMIUM DISTRIBUTION IN SOIL
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: JL
PROJECT NO. 80036	DATE: SEPTEMBER 2015



Notes:

1. Location of all features is approximate. Map is for reference purposes only. Nobis Engineering, Inc. makes no claims, warranties, representations, expressed or implied, relating to the completeness, accuracy, or reliability of the data shown.

2. Sump water and surficial soil samples collected by Nobis Engineering, Inc. on June 30, 2014 and July 1, 2014.

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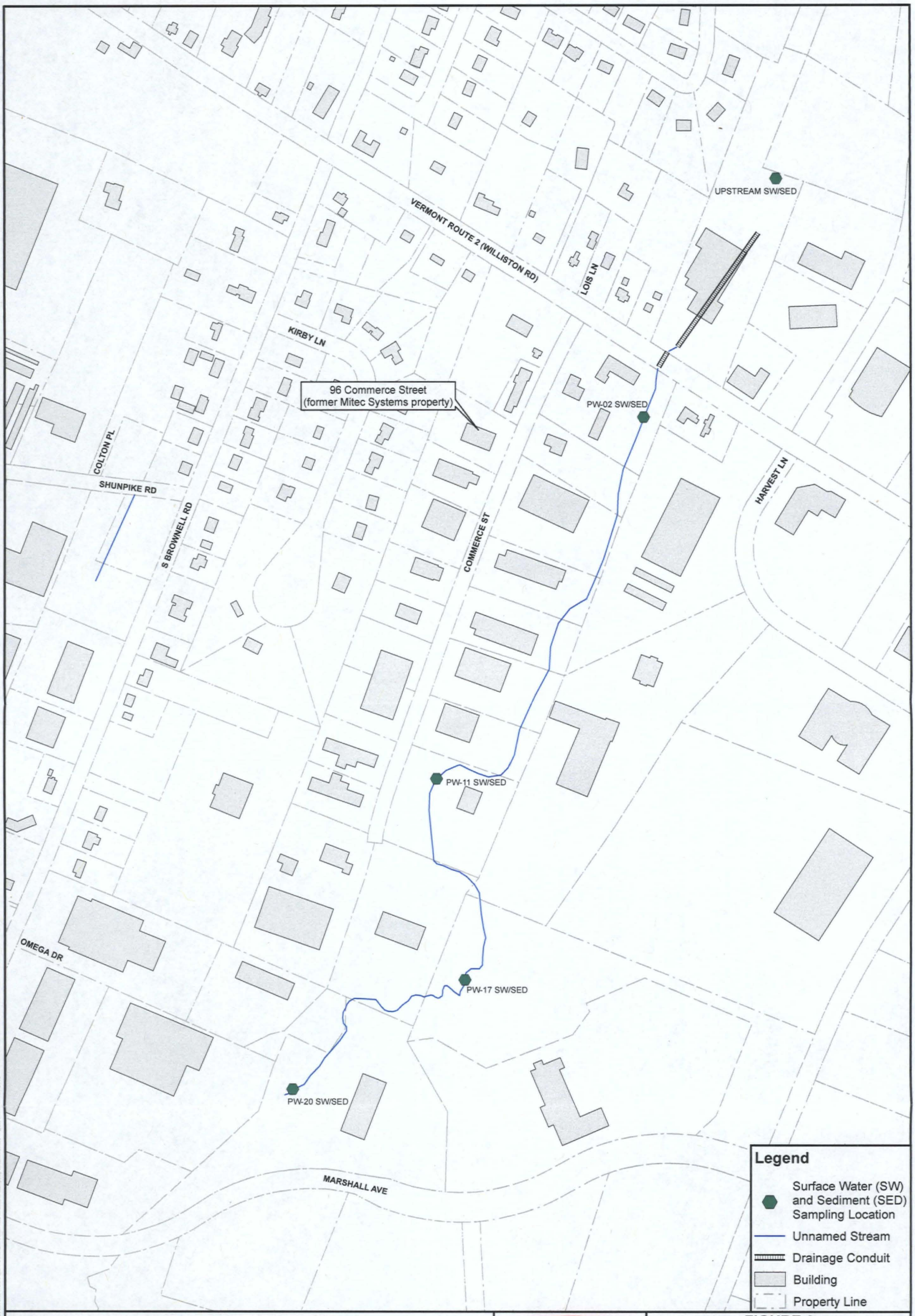
FIGURE 5

RESIDENTIAL SOIL AND SUMP INVESTIGATION LOCATIONS
COMMERCE STREET PLUME SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: NZ	CHECKED BY: SH
PROJECT NO. 80036	DATE: SEPTEMBER 2015



Notes:

1. Surface water and sediment samples were collected colocated with the pore water samples locations displayed on Figure 2-3.

2. Surface water and sediment samples collected by Nobis Engineering, Inc. between September 11, 2012 and September 14, 2012.

0 150 300 600
Feet
1 inch = 300 feet

N

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FIGURE 6

SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS
COMMERCE STREET PLUME SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: SH
PROJECT NO. 80036	DATE: SEPTEMBER 2015

VERMONT ROUTE 2 (WILLISTON RD)
LOIS LN
KIRBY LN
COLTON PL
SHUNPIKE RD
S BROWNELL RD
COMMERCE ST
HARVEST LN
OMEGA DR
MARSHALL AVE
Western Portion of the Plume
Eastern Portion of the Plume

VP-51 0.5 U
VP-53 0.5 U
VP-32 0.5 U
MW-11S 1 UJ
VP-02 0.5 U
VP-33 0.5 U
VP-03 2
VP-31 1
AL-12 5 U
PW-01 5 U
VP-52 0.5 U
MI-01 5 U
VP-08 1.5
VP-04 0.9
PW-02 5 U
VP-06 0.4
VP-57 1 U
VP-10 0.5 U
MI-02 5 U
VP-09 1.5
VP-05 0.18
VP-25 0.5 U
AL-14 5 U
VP-07 2.1
MI-08 5 U
VP-50 950
VP-01 6.1
VP-11 0.2
BF-4 5 U
VP-49 99
WP-05 0.71
WP-09 590
VP-24 1200
MW-08S 4900 J
BW-13S 5 U
VP-13 0.6
VP-34 0.5 U
VP-26 0.26
VP-14 0.5 U
AL-15 4.8 J
VP-12 0.4
PW-03 5 U
VP-48 0.5 U
ARC-3 3.2 J
VP-15 0.5 U
VP-47 0.5 U
VP-27 0.5 U
VP-16 0.5 U
PW-04 3.7 J
VP-17 0.5 U
VP-45 525
VP-28 0.5 U
WP-08 0.82
WP-01 0.5 U
PW-05 5 U
ASI-23S 5 U
VP-36 380
VP-35 0.5 U
WP-07 0.5 U
VP-19 0.2
WP-02 4.4
PW-06 9.1 J
ASI-14S 5 U
VP-21 0.5 U
VP-20 0.5 U
PW-07 5 U
VP-44 0.5 U
VP-43 0.5 U
VP-18 0.5 U
PW-10 5 U
PW-08 41
PW-09 5 U
VP-29 0.5 U
PW-11 1100 D
VP-22 5.7
VP-37 0.5 U
VP-54 0.5 U
PW-12 5 U
PW-13 5 U
VP-38 6100
VP-30 0.5 U
VP-42 0.5 U
PW-14 5 U
VP-55 1 U
VP-23 0.5 U
PW-15 5 U
VP-41 0.5 U
WP-03 14
PW-16 5 U
VP-39 0.1
OE-2B 5 U
VP-40 0.5 U
WP-04 1.2
PW-17 5 U
PW-18 5 U
VP-56 1 U
PW-19 5 U
PW-20 5 U

Legend

- Shallow Groundwater Sample
- Groundwater Profile Sample
- Porewater Sample
- Plume Division
- Unnamed Stream
- Drainage Conduit

TCE Concentration (µg/L)

- > 5 ≤ 50
- > 50 ≤ 500
- > 500 ≤ 5,000
- > 5,000 ≤ 50,000

Notes:

1. Concentrations shown are the most recent shallow groundwater (0 to 20 feet bgs) data collected from the monitoring wells or the maximum concentration data collected during groundwater vertical profiling.

2. U = TCE not detected above sample-specific detection limit. J = Result is estimated.

0 150 300 600
Feet
1 inch = 300 feet

N

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FIGURE 7A

SHALLOW OVERBURDEN GROUNDWATER TCE CONCENTRATIONS
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: JL
PROJECT NO. 80036	DATE: SEPTEMBER 2015

VERMONT ROUTE 2 (WILLISTON RD)
LOIS LN
KIRBY LN
COLTON PL
SHUNPIKE RD
S BROWNELL RD
COMMERCE ST
HARVEST LN
OMEGA DR
MARSHALL AVE

VP-51 0.5 U
VP-53 0.5 U
VP-32 0.5 U
VP-02 0.5 U
VP-33 0.5 U
VP-31 3.4
VP-03 2.3
VP-04 37
VP-08 10
VP-06 74
VP-52 0.5 U
VP-25 16
VP-10 30
VP-01 57
VP-09 18
VP-05 4.9
VP-07 29
VP-57 640
VP-50 790
MW-02M 7.6
WP-06 13000
VP-49 440
WP-05 160
VP-24 3920
AL-1 5000
VP-13 270
VP-11 269
VP-34 0.5 U
MW-08M 7200 J
VP-26 900
VP-14 116
BM-3D 170 D
VP-12 544
AL-2 16
VP-47 211
VP-48 1900
VP-15 69
VP-27 720
MW-09M 56 J
VP-16 850
VP-17 914
VP-45 104
VP-28 1100
WP-08 3900
VP-19 1510
WP-01 7200
VP-36 13000
ASI-23D2 3300
WP-07 0.5 U
VP-35 0.5 U
ASI-14D2 3200 D
WP-02 940
VP-21 1210
VP-20 41900
VP-44 2.7
Western Portion of the Plume
VP-43 63
Eastern Portion of the Plume
VP-18 2740
MW-06M 84000 J
ASI-02D2 460 D
VP-29 2.4
VP-54 2600
VP-22 261
VP-37 0.5 U
ASI-03D2 8900 D
VP-38 1700
VP-30 0.5 U
VP-23 463
VP-55 1 U
VP-42 72
MW-07M 260 J
VP-41 0.5 U
WP-03 1300
VP-39 1130
WP-04 110
VP-40 100
VP-56 430

Legend

- Intermediate Groundwater Sample
- Groundwater Profile Sample
- Plume Division
- Unnamed Stream
- Drainage Conduit
- Building

TCE Concentration (µg/L)

- > 5 ≤ 50
- > 50 ≤ 500
- > 500 ≤ 5,000
- > 5,000 ≤ 50,000

Notes:

1. Concentrations shown are the most recent intermediate groundwater (20 and 30 feet bgs) data collected from the monitoring wells or the maximum concentration collected during groundwater profiling.

2. U = TCE not detected above sample-specific detection limit. J = Result is estimated. D = result is from a dilution of the sample.

N

0 150 300 600

Feet

1 inch = 300 feet

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FIGURE 7B

INTERMEDIATE OVERBURDEN GROUNDWATER TCE CONCENTRATIONS
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: JL
PROJECT NO. 80036	DATE: SEPTEMBER 2015

VERMONT ROUTE 2 (WILLISTON RD)

LOIS LN

KIRBY LN

COLTON PL

SHUNPIKE RD

S BROWNELL RD

COMMERCE ST

HARVEST LN

OMEGA DR

MARSHALL AVE

VP-51 0.5 U
VP-63 0.5 U
VP-32 0.5 U
VP-02 0.5 U
VP-33 0.5 U
AIP-01 13
VP-31 10
MW-01D 1 UJ
VP-03 1.9
VP-08 23
VP-04 200
VP-06 121
VP-52 0.5 U
VP-25 20
VP-10 254
MW-03D 320 J
VP-09 206
VP-05 0.5 U
VP-57 13
VP-01 229
VP-07 0.3
VP-50 18
WP-06 0.78
VP-49 390
VP-24 41
VP-26 5700
ASI-16D2 5400
VP-14 5980
VP-13 1525
VP-11 1590
VP-34 0.5 U
VP-12 146
VP-47 1370
VP-48 3900
ASI-11D2 1700 D
VP-15 20000
VP-27 1400
ASI-15D2 5700
VP-16 61000
VP-17 4400
MW-09D 40 J
MW-04D 55000 J
VP-28 4900
MW-05D 22000 J
WP-01 58000
MW-05D2 1 UJ
VP-36 3600
VP-35 0.5 U
VP-19 29000
WP-02 59
VP-21 0.4
VP-18 5400
VP-20 44000
ASI-05D2 1 UJ
VP-44 0.5 U
VP-43 805
MW-06D 47000 J
VP-22 118
MW-10D 40.8 J
VP-29 0.5 U
VP-54 10000
VP-37 0.5 U
VP-38 0.5 U
ASI-04D2 1 UJ
VP-30 0.5 U
VP-42 36
VP-23 4.5
VP-41 0.5 U
WP-03 0.5 U
VP-39 380
OE-2A 5 U
VP-56 1 U

Western Portion of the Plume

Eastern Portion of the Plume

Legend

- Deep Groundwater Sample
- Groundwater Profile Sample
- Plume Division
- Unnamed Stream
- Drainage Conduit
- Building

TCE Concentration (µg/L)

- > 5 ≤ 50
- > 50 ≤ 500
- > 500 ≤ 5,000
- > 5,000 ≤ 50,000
- > 50,000

Notes:

1. Concentrations shown are the most recent deep groundwater (>30 feet bgs) data collected from the monitoring wells or the maximum concentration data collected during groundwater profiling.

2. U = TCE not detected above sample-specific detection limit. J = Result is estimated.

0 150 300 600
Feet
1 inch = 300 feet

N

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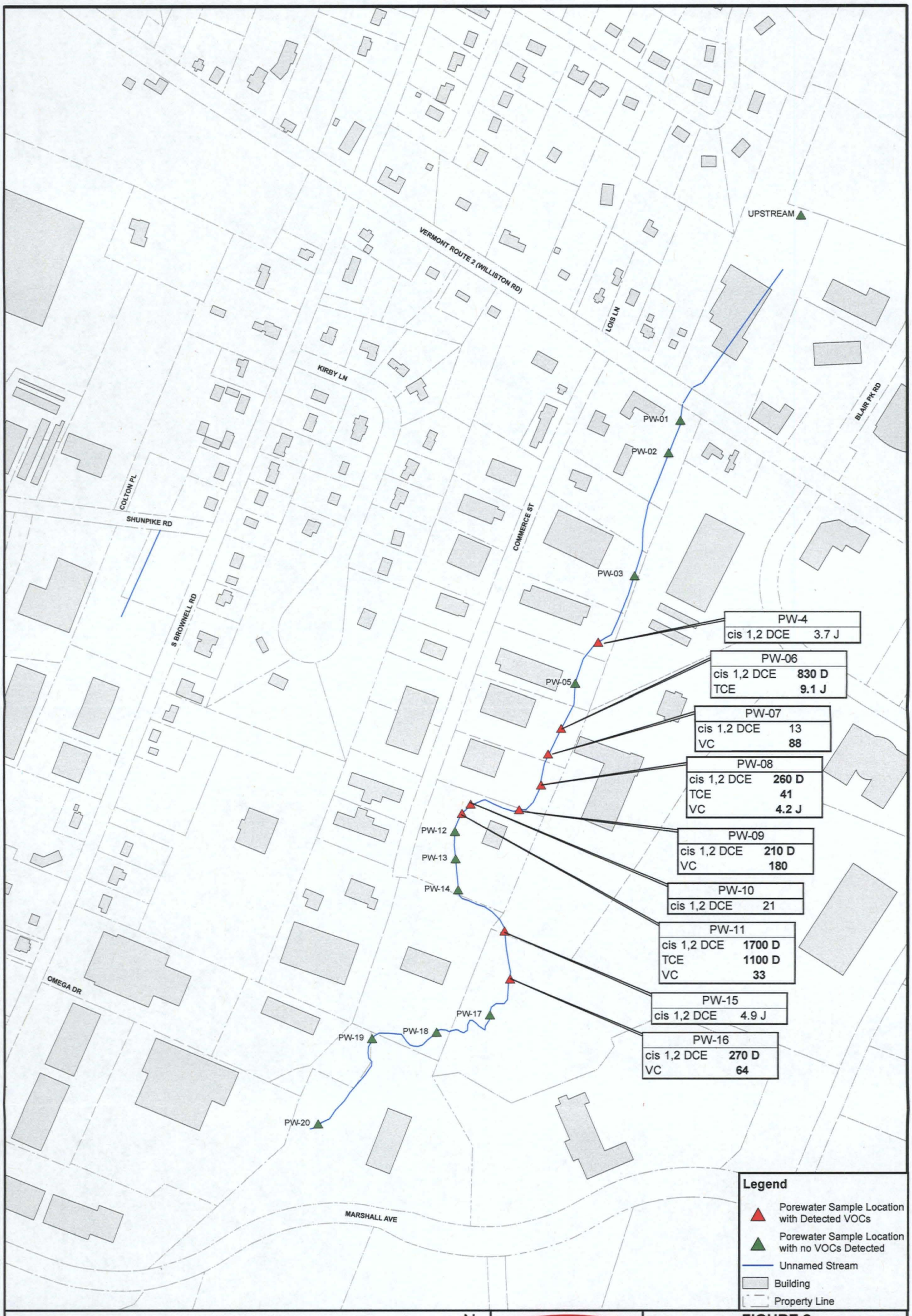
FIGURE 7C

DEEP OVERBURDEN
GROUNDWATER TCE CONCENTRATIONS
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: JL
PROJECT NO. 80036	DATE: SEPTEMBER 2015



Notes:

1. Results for selected VOCs detected in porewater are shown. Sampling occurred in 2010. **Bold** values indicate an exceedance of applicable criterial. All units are micrograms per liter (µg/L)
2. J = Result was estimated.
D = Result obtained from a dilution of the sample.
3. cis 1,2 DCE = cis 1,2 Dichloroethylene
TCE = Trichloroethylene

0 150 300 600
Feet
1 inch = 300 feet

N

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FIGURE 8

POREWATER SAMPLING RESULTS
COMMERCE STREET PLUME
SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JH	CHECKED BY: SH
PROJECT NO. 80036	DATE: SEPTEMBER 2015

TABLE G-1
HUMAN HEALTH CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
COMMERCE STREET PLUME SUPERFUND SITE
WILLISTON, VERMONT

Detected Chemicals	COPCs for each Exposure Medium and Receptors						
	Sediment for Protection of Receptors	Surface Water for Protection of Receptors	Shallow[1] Groundwater for Protection of Construction Workers	Shallow[2] Groundwater for Protection of Indoor Air	Groundwater for Protection of Drinking Water	Soil at 96 Commerce Street for Residents	Soil at Properties along Shunpike Road and South Brownell Road for Residents
2,3,7,8-TCDD TEQ							
1,1,2-Trichloroethane					√		
1,1'-Biphenyl							
1,2,4-Trichlorobenzene							
1,2-Dibromo-3-chloropropane				√			
1,2-Dichloroethane					√		
1,2-Dichloropropane							
1,3-Dichlorobenzene							
4-Nitrophenol	√						
4,6-Dinitro-2-methylphenol							
Bis(2-ethylhexyl)phthalate							
Chloroform			√	√			
cis-1,2-Dichloroethene		√			√		
Methane					√		
Methylene chloride					√		
N-nitroso-di-n-propylamine							
Tetrachloroethene				√			
trans-1,2-Dichloroethene							
Trichloroethene		√	√	√	√		√
Vinyl Chloride		√			√		
PAHs							
Benzo(a)anthracene	√					√	
Benzo(a)pyrene	√		√			√	
Benzo(b)fluoranthene	√					√	
Dibenz(a,h)anthracene	√						
Indeno(1,2,3-cd)pyrene	√						
Naphthalene			√				
Metals							
Aluminum					√	√	√
Antimony			√				
Arsenic	√		√		√	√	√
Barium							
Cadmium			√				
Chromium	√		√		√	√	√
Cobalt	√		√		√	√	√
Copper							
Iron	√		√		√	√	√
Lead					√		
Manganese			√		√	√	√
Mercury							
Nickel					√		
Thallium			√		√		
Vanadium					√		

1) Shallow groundwater defined as 0-10 feet below ground surface, measured at top of the well screen.

2) Shallow groundwater defined as 0-15 feet below ground surface, measured at top of the well screen.

Table G-2
Summary of Cancer Risks and Noncancer Hazard Indices
Commerce Street Plume Superfund Site
Williston, Vermont

Media	Exposure Area	Scenario Timeframe	Receptor	RME							
				CR>1E-04 or HI>1	Total CR[a]	Major Contributors to Total CR (Individual CR >1E-06)	Individual COPC CR	Total NC HI	Organ-Specific HI Above 1.0	Major Contributors to Total HI (Individual HQ > 1.0)	Individual COPC HQ
Sediment	Sediment unnamed stream	Current	Adult River Recreational Visitor	No	5.6E-07	---	---	0.0043	---	---	---
			Child River Recreational Visitor	No	5.1E-06	Dibenz(a,h)anthracene	1.4E-06	0.041	---	---	---
						Chromium	2.0E-06				
Surface Water	Surface Water Unnamed Stream	Current	Adult River Recreational Visitor	No	8.5E-07	---	---	0.0075	---	---	---
			Child River Recreational Visitor	No	8.6E-06	Vinyl chloride	8.5E-06	0.018	---	---	---
Groundwater	Shallow Groundater in Construction Trenches	Current	Construction Worker	Yes	2.0E-06	---	---	3.0	Immune System	Trichloroethylene	2.1
	Site	Future	Age-Adjusted Resident	Yes	9.2E-02	1,2-Dichloroethane	6.5E-06	NE	---	---	
						Methylene chloride	9.2E-04				
						Trichloroethylene	8.9E-02				
						Vinyl Chloride	1.9E-04				
						Arsenic	1.8E-04				
						Chromium	1.1E-03				
			Adult Resident	Yes	NE	---		2778	Liver	Methylene chloride	3.5
										Vinyl Chloride	0.057
									Kidney	cis-1,2-Dichloroethylene	4.9
										1,2-Dichloroethylene	0.075
									Immune System	Trichloroethylene	2765
									Thyroid	Cobalt	0.96
			Child Resident	Yes	NE	---		3181	Liver	Methylene chloride	5.5
										Vinyl Chloride	0.082
									Kidney	cis-1,2-Dichloroethylene	8.1
										1,2-Dichloroethane	0.079
									Immune System	Trichloroethylene	3159
									Skin	Arsenic	1.5
									Thyroid	Cobalt	1.6
									Gastrointestinal	Iron	1.3

Notes:

[a] Note that for conservatism, total chromium results are based on hexavalent chromium toxicity criteria.

COPC	Contaminant of Potential Concern
CR	Cancer Risk
CTE	Central Tendency Exposure
HI	Hazard Index
HQ	Hazard Quotient
NC	Noncancer
NE	Not Evaluated
RME	Reasonable Maximum Exposure
	Total Cancer Risks are above 1E-04 or Hazard Indices above 1.
	Total Cancer Risks fall in the range of 1E-04 to 1E-06.

Table G-3. Risks of the maximum concentration in 0-10 ft bgs soil at 96 Commerce Street, assuming chromium is hexavalent.

		Residential Soil RSL			96 Commerce St. (2012 & 2013)		Risk		Target Tissue
		HQ		ILCR					
Chemical	Units	(0.1)	(1.0)	(1.0E-06)	Conc.	Location	ILCR	HQ	for HQ
Trichloroethene	mg/kg	0.412	4.120	0.943	NA				
Fluoranthene	mg/kg	232	2,320		0.700	SB-12-5		3.0E-04	kidney,blood
Benz(a)anthracene	mg/kg			0.153	0.370	SB-12-5	2.4E-06		
Benzo(a)pyrene	mg/kg			0.0153	0.320	SB-12-5	2.1E-05		
Benzo(b)fluoranthene	mg/kg			0.153	0.360	SB-12-5	2.4E-06		
Benzo(k)fluoranthene	mg/kg			1.53	0.300	SB-12-5	2.0E-07		
Chrysene	mg/kg			15.3	0.410	SB-12-5	2.7E-08		
Pyrene	mg/kg	174	1,740		0.540	SB-12-5		3.1E-04	kidney
Aluminum	mg/kg	7,740	77,400		14000	SB-12-5		1.8E-01	CNS
Arsenic	mg/kg	3.44	34.4	0.670	4.4	SB-12-5	6.6E-06	1.3E-01	skin
Barium	mg/kg	1,530	15,300		28	SB-12-5		1.8E-03	kidney
Cadmium	mg/kg	7	70		4.2	SB-12-5		6.0E-02	kidney
Chromium (+6)	mg/kg	23.4	234	0.301	320	SB-13-2	1.1E-03	1.4E+00	NR
Cobalt	mg/kg	2.34	23.4		6.1	SB-12-5		2.6E-01	thyroid
Copper	mg/kg	313	3,130		140	SB-12-5		4.5E-02	NR
Iron	mg/kg	5,480	54,800		15000	SB-12-5		2.7E-01	GI
Lead [a]	mg/kg		400 [a]		16	SB-12-5		[a]	[a]
Manganese	mg/kg	180	1,800		260	SB-12-5		1.4E-01	CNS
Nickel	mg/kg	155	1,550		18	SB-12-5		1.2E-02	BW
Vanadium	mg/kg	39.3	393		14	SB-12-5		3.6E-02	hair
Zinc	mg/kg	2,350	23,500		67	SB-12-5		2.9E-03	blood
						Total Risk:	1.1E-03	2.5E+00	

Data are for soil depths of 0-10 ft below ground surface (bgs)
Only chemicals detected at least once at any depth are tabulated.
Highlighted concentrations exceed RSLs for HQ =0.1 or ILCR = 1E-06.
RSL = EPA Regional Screening Level
HQ = Soil Concentration/(RSL for HQ = 1)
ILCR = (Soil Concentration/RSL for ILCR = 1E-06) x 1E-06
ILCR = Incremental Lifetime Cancer Risk
[a] The RSL for lead is a policy based acceptable level for residents
HQ = Hazard Quotient
HI = Hazard Index
GI = gastrointestinal
CNS = Central Nervous System
BW = Body Weight
IS = immune system
NA = Not Analyzed
NR = Not Reported on IRIS database

HI (CNS)=	3.3E-01
HI(skin)=	1.3E-01
HI (kidney)=	1.3E-01
HI (thyroid)=	6.2E-02
HI (GI)=	2.7E-01
HI (BW)=	2.7E-01
HI (hair)=	1.2E-02
HI (blood)=	3.6E-02
HI (chromium) =	1.4E+00
HI (copper) =	4.5E-02

Table L-1
Groundwater and Soil Cleanup Levels

Chemical	Cleanup Level	Basis for Selection
Groundwater – VOCs		
1,2 Dichloroethane	5 µg/L	MCL†
cis-1,2 Dichloroethylene	70 µg/L	MCL
Methylene Chloride	5 µg/L	MCL
Tetrachloroethylene *	5 µg/L	MCL
Trichloroethylene	5 µg/L	MCL
Vinyl Chloride	2 µg/L	MCL
Groundwater – Metals		
Arsenic	10 µg/L	MCL
Total Chromium	100 µg/L	MCL
Cadmium	5 µg/L	MCL
Cobalt	6 µg/L	Risk-based (HQ=1, residential)
Iron	14,000 µg/L	Risk-based (HQ=1, residential)
Soils – PAHs (for 96 Commerce Street only)		
Benzo(a)anthracene**	0.15 mg/Kg	Risk-based (10^{-6}, residential)
Benzo(a)pyrene**	0.015 mg/Kg	Risk-based (10^{-6}, residential)
Benzo(b)fluoranthene**	0.15 mg/Kg	Risk-based (10^{-6}, residential)
Soils – Metals (for 96 Commerce Street only)		
Hexavalent Chromium	0.3 mg/kg	Risk-based (10^{-6}, residential)
Arsenic**	0.68 mg/kg	Risk-based (10^{-6}, residential)

† Maximum Contaminant Level (MCL) per federal and equivalent state drinking water standards.

* Direct contact to and inhalation of shallow groundwater with TCE concentrations in excess of 2.3 µg/L pose a risk to the construction/utility worker. EPA is selecting the MCL for TCE as the cleanup level as a matter of policy, and based on Site-specific conditions. Specifically, the TCE plume is generally at depths ranging from 10 to 15 feet below the water table, and, the exposure assumptions (8 hrs/day, 5 days/per week, for 6 months) are highly conservative.

** Or background, as determined during pre-remedial design soil sampling, whichever is higher. Cleanup to background will be recorded in a future decision document, as appropriate.

Table L-2
Cost Detail
Alternative SO3: Excavation and Off-Site Disposal
Commerce Street Plume Superfund Site
Williston, Vermont

ALTERNATIVE SO3: EXCAVATION AND OFF-SITE DISPOSAL

Site: Commerce Street Plume Superfund Site
Location: Williston, Vermont
Phase: Feasibility Study (-30% to +50%)
Base Year: 2015
Date: April 2015

Description: The Soil Excavation and Off-Site Disposal action includes the excavation, loading, transport, and off-site disposal of contaminated soil from 96 Commerce Street (former Mitec Systems property). The soil is presumed to contain RCRA characteristic hazardous waste. This action includes re-grading with clean fill and restoring vegetation.

Description	Qty.	Units	Unit Cost	Cost	Notes
Capital Costs					
Soil Excavation and Off-Site Disposal (former Mitec Systems property)					
Pre-Design Soil Confirmation Sampling	1.5	day	$ 3,500	$ 5,250	(15 borings over 1.5 days with Geoprobe)
Analytical sampling (Total and Hexavalent Chromium)	45	ea	$ 65	$ 2,925	3 samples per boring
Mobilization / Demobilization	1	ls	$ 5,000	$ 5,000	
Clearing and Grubbing of excavation area	1	ls	$ 6,500	$ 6,500	
Temporary Facilities	1	ls	$ 1,000	$ 1,000	
Erosion and Sediment Control	440	ft	$ 12	$ 5,280	
Soil Excavation	1	day	$ 12,500	$ 12,500	
Transportation and Disposal	945	tons	$ 325	$ 307,125	Assumes 630 CY as hazardous waste (Chromium)
Clean Fill	945	tons	$ 25	$ 23,625	
Institutional Controls (Deed Restrictions and/or Activity Use Restrictions)	0	ea	$ 8,000	$ -	
	Total Before Contingency and other factors			**$ 369,205**	

Table L-2
Cost Detail
Alternative SO3: Excavation and Off-Site Disposal
Commerce Street Plume Superfund Site
Williston, Vermont
Page 2 of 2

Description	Qty.	Units	Unit Cost	Cost	Notes
Contingency (30%)	30%			$ 110,762	
			Subtotal	**$ 479,967**	
Engineering Design	10%			$ 47,997	
Project Management	6%			$ 28,798	
Construction Management (Field Oversight and Reporting)	8%			$ 38,397	
			Total Capital Costs:	**$ 595,158**	
Annualized O&M Costs					
Groundwater Monitoring				$ -	
Analytical Costs				$ -	
Routine Maintenance				$ -	**Notes:**
Site Inspections				$ -	Annual O&M Costs shown are average annualized costs over the period 0-30 years. See Appendix D of the Feasibility Study for yearly O&M cost detail.
Annual Reporting				$ -	
Five-Year Review Cost				$ 5,000	
Contingency (10%)				$ 500	
Project Management (5%)				$ 250	
			Total Annual O&M Cost	**$ 5,750**	

Cost type	Year	Total Non-Discounted Cost	Total Annual O&M Cost	Discount Rate	PRESENT VALUE	
Present Value Analysis						
Capital Cost	0	$ 595,158			$ 595,158	
Annual O&M Cost	1-30	$ 172,500	$ 5,750	7%	$ 62,037	From O&M Cost Sheets in Appendix D of the Feasibility Study
					$ 657,196	

Table L-3
Cost Detail
Alternative VM3: Enhanced Vapor Mitigation
Commerce Street Plume Superfund Site
Williston, Vermont

ALTERNATIVE VM3: ENHANCED VAPOR MITIGATION

Site: Commerce Street Plume Superfund Site
Location: Williston, Vermont
Phase: Feasibility Study (-30% to +50%)
Base Year: 2015
Date: April 2015

Description: This alternative includes all the elements of Alternative VM2 and the installation of additional vapor mitigation to supplement or replace the existing system at 830 So. Brownell Road. This alternative also includes the installation of vapor mitigation or engineering controls at other properties if warranted based on samples collected in conjunction with future 5-year reviews. For estimating purposes, costs for one active system at 830 So. Brownell Road was assumed for this evaluation.

Description	Qty.	Units	Unit Cost	Cost	Notes
Capital Costs					
Carbon System	1	ls	$ 1,200	$ 1,200	
Pre-design investigation and risk analysis	1	ls	$ 12,000	$ 12,000	
Vapor barrier	1	ls	$ 3,500	$ 3,500	
Active venting system	1	ls	$ 3,500	$ 3,500	
Institutional Controls (Deed Restrictions and/or Activity Use Restrictions)	1	ea	$ 8,000	$ 8,000	
	Total Before Contingency and other factors			**$ 28,200**	
Contingency (30%)	30%			$ 8,460	
			Subtotal	**$ 36,660**	
Engineering Design	9%			$ 3,299	
Project Management	8%			$ 2,933	
Construction Management (Field Oversight and Reporting)	12%			$ 4,399	
			Total Capital Costs:	**$ 47,291**	
Annualized O&M Costs					**Notes:**
Groundwater Monitoring				$ 1,000	Annual O&M Costs shown are average annualized costs over
Analytical Costs				$ -	the period 0-30 years. See Appendix D of the Feasibility Study for
Routine Maintenance				$ 1,500	yearly O&M cost detail.
Site Inspections				$ 1,000	
Annual Reporting				$ -	
Five-Year Review Cost				$ 5,000	
Contingency (10%)				$ 850	
Project Management (5%)				$ 425	
			Total Annual O&M Cost	**$ 9,775**	

Cost type	Year	Total Non-Discounted Cost	Total Annual O&M Cost	Discount Rate	PRESENT VALUE	
Present Value Analysis						
Capital Cost	0	$ 47,291			$ 47,291	
Annual O&M Cost	1-30	$ 293,250	$ 9,775	7%	$ 110,121	From O&M Cost Sheets in Appendix D of the Feasibility Study
					$ 157,412	

Table L-4
Cost Detail
Alternative GW5: *In Situ* Treatment (ISCO and ISB Barriers) and Monitored Natural Attenuation
Commerce Street Plume Superfund Site
Williston, Vermont

ALTERNATIVE GW5: IN SITU GROUNDWATER TREATMENT (ISCO, ISB ZONES) AND MONITORED NATURAL ATTENUATION

Site: Commerce Street Plume Superfund Site
Location: Williston, Vermont
Phase: Feasibility Study (-30% to +50%)
Base Year: 2015
Date: April 2015

Description: This alternative addresses the site-wide dissolved-phase plume with MNA and institutional controls, as described in Alternative GW3. In addition, portions of the plume with TCE concentrations > 50,000 ppb will receive targeted chemical treatment and TCE > 500 ppb will receive targeted biological treatment through wells drilled into the saturated zone. Chemical oxidant injected into the subsurface either destroys compounds or converts them to less-toxic substances through a series of oxidation reactions. Injection of biostimulants, carbon sources, nutrients and naturally-occurring or bio-engineered bacteria into the subsurface stimulates or supplements natural attenuation processes. This alternative will require bench- and pilot-scale tests during remedial design to determine design parameters, which oxidants are suitable and whether on-going biodegradation is aerobic or anaerobic. Either treatment may be used alone, or together in a treatment train.

Description	Qty.	Units	Unit Cost	Cost	Notes
ISCO Portion - Eastern Area with TCE >50,000 µg/L: 12 foot thickness over 54,000 SF Area and ISB Treatment Barriers of TCE >500 µg/L (120,000 SF for East and West Areas)					
ISB Bench Scale					
- Sample Collection	1	ea	$ 7,500	$ 7,500	
- Microcosm Studies	1	ea	$ 35,000	$ 35,000	
- Reporting	1	ea	$ 12,000	$ 12,000	
ISB Pilot Study					
- Sample/Water Collection	1	ea	$ 7,500	$ 7,500	
- Mobilization and Site Prep.	1	ea	$ 10,000	$ 10,000	
- Creation of Cultures	1	ea	$ 25,000	$ 25,000	
- Installation of Injection Points	1	wk	$ 15,000	$ 15,000	
- Batching, Injection, and Monitoring	1	wk	$ 37,800	$ 37,800	
- Sample Analysis	25	ea	$ 1,000	$ 25,000	
- Decon and Site Restoration	1	ea	$ 15,000	$ 15,000	
- Reporting	1	ls	$ 35,000	$ 35,000	
				$ 224,800	**Bench and Pilot Studies Subtotal**
ISB Treatment					
Mobilization (East and West Areas)	2	ea	$ 15,000	$ 30,000	2 Mobilizations
Temporary Facilities and Work Area Setup	2	ea	$ 10,000	$ 20,000	
Aquifer Amendments to adjust pH, DO, and ORP	250	gal	$ 100	$ 25,000	Includes Shipping
Cultures/Bacteria	600	L	$ 210	$ 126,000	Includes Shipping
Electron Donor - Sodium Lactate	60,000	lbs	$ 3.0	$ 180,000	Includes Shipping
Electron Donor - LactOil	165,000	lbs	$ 3.5	$ 577,500	Includes Shipping
On Site Batching and Preparation	3	wk	$ 37,800	$ 113,400	
ISB Injection Points (Direct Inject with Geoprobe)	6	wk	$ 45,000	$ 270,000	2 events, 3 weeks each, 3 Rigs
Treatment Monitoring and Sample Collection During Injections	6	wk	$ 37,800	$ 226,800	
Sample Analysis	50	ea	$ 1,000	$ 50,000	
Site Restoration	2	ea	$ 10,000	$ 20,000	

Table L-4
Cost Detail
Alternative GW5: *In Situ* Treatment (ISCO and ISB Barriers) and Monitored Natural Attenuation
Commerce Street Plume Superfund Site
Williston, Vermont
Page 2 of 2

Description	Qty.	Units	Unit Cost	Cost	Notes
ISCO Portion - Eastern Area with TCE >50,000 µg/L: 12 foot thickness over 54,000 SF Area and ISB Treatment Barriers of TCE >500 µg/L (120,000 SF for East and West Areas)					
Decon and Demobilization	2	ea	$ 15,000	$ 30,000	
IDW Disposal	2	ea	$ 10,000	$ 20,000	
Post Injection Sample Collection (2 rounds)	2	wk	$ 37,800	$ 75,600	
Post Injection Sample Analysis (2 rounds)	100	ea	$ 1,000	$ 100,000	
				$ 1,864,300	**Bio Treatment Zone Subtotal**
Institutional Controls	1	ls	$ 8,000	$ 8,000	
			Total Before Contingency and other factors	**$ 2,097,100**	
Contingency (30%)	30%			$ 629,130	
			Subtotal	**$ 2,726,230**	
Engineering Design	8%			$ 218,098	
Project Management	5%			$ 136,312	
Construction Management (Field Oversight and Reporting)	7%			$ 190,836	
			Total ISB Barrier Capitol Costs	**$ 3,271,476**	
			Total ISCO Capital Costs	**$ 3,533,625**	**Refer to Table 5-7 of the Feasibility Study**
			ISCO and ISB Barrier Capital Costs	**$ 6,805,101**	
Annualized O&M Costs					**Notes:**
Groundwater Monitoring				$ 19,250	Annual O&M Costs shown are average
Analytical Costs				$ 11,010	annualized costs over the period 0-30 years.
Routine Maintenance				$ 400	See Appendix D of the Feasibility Study for
Site Inspections				$ -	yearly O&M cost detail.
Annual Reporting				$ 3,333	
Five-Year Review Cost				$ 5,000	
Contingency (10%)				$ 3,899	
Project Management (5%)				$ 1,950	
			Total Annual O&M Cost	**$ 44,842**	

Cost type	Year	Total Non-Discounted Cost	Total Annual O&M Cost	Discount Rate	PRESENT VALUE
Present Value Analysis					
Capital Cost	0	$ 6,805,101			$ 6,805,101
Annual O&M Cost	1-30	$ 1,345,270	$ 44,842	7%	$ 767,042
					$ 7,572,143

Appendix C

Glossary of Terms and Acronyms

Glossary of Terms and Acronyms

1 x 10-4	1 in 10,000
1 x 10-6	1 in 1,000,000
AIP	Alling Industrial Park
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethylene
COPC	chemical of potential concern
CSM	conceptual site model
DNAPL	dense non-aqueous phase liquid
ELCR	excess lifetime cancer risk
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
HI	hazard index
HHRA	human-health risk assessment
HQ	hazard quotient
IC	institutional control
In situ	in place
ISB	*in situ* bioremediation
ISCO	*in situ* chemical oxidation
LOE	lines of evidence
mg/kg	milligrams per kilogram
Mitec Systems	Mitec Systems Corporation
MNA	Monitored Natural Attenuation
NAPL	non-aqueous phase liquid
NPL	National Priorities List

O&M	operation and maintenance
PAHs	polycyclic aromatic hydrocarbons
PCE	tetrachloroethylene
ppb	parts per billion
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
RME	reasonable maximum exposure
ROD	Record of Decision
RSL	regional screening level
SVOC	semi-volatile organic compound
TCE	trichloroethylene
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
VI	vapor intrusion
VISL	vapor intrusion screen level
VOC	volatile organic compound
VT ANR	Vermont Agency of Natural Resources
VT DEC	Vermont Department of Environmental Conservation

Appendix D

Applicable and Relevant and Appropriate (ARARs) Tables

Table D-1
Location-Specific ARARs
Commerce Street Plume Superfund Site
Williston, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TAKEN TO COMPLY WITH ARARs		
			Groundwater	Soil	Vapor
STATE ARARs and TBCs					
10 VSA Chapter 37, Vermont Wetlands Protection And Water Resources Management Act; Environmental Protection Rules, Chapter 30, Vermont Wetland Rules	Applicable	These standards establish criteria for delineating Class One and Class Two wetlands, which are considered significant wetlands, and sets forth allowed uses for these wetlands. Jurisdiction under the rules includes a 100-foot and 50-foot buffer zone to Class One and Class Two wetlands, respectively. The uses must not have undue adverse impacts on the significant functions of the wetland. Class Three wetlands are defined, but are not protected under these rules (they are addressed under Title 10 VSA Chapter 151, below).	No Class I wetlands occur on-site and Class II wetlands are limited to the area between Commerce Street and Kirby Lane and to the east of the unnamed stream. Wetlands will be further delineated before work begins. Any incidental work, such as the installation of new wells, within the buffer zone or wetlands, will be implemented to protect wetlands, mitigate any loss, and restore ecological functions and values.	No Class I wetlands occur on-site and Class II wetlands are limited to the area between Commerce Street and Kirby Lane and to the east of the unnamed stream. A confirmatory wetland and buffer zone delineation will be performed prior to work in the vicinity. Alteration of any Class II wetlands will be mitigated, as required, to restore ecological functions and values.	No Class I wetlands occur on-site and Class II wetlands are limited to the area between Commerce Street and Kirby Lane and to the east of the unnamed stream. Wetlands will be further delineated before work begins. Although unexpected, if work is within the buffer zone or wetlands, work will be implemented to protect wetlands, mitigate any loss, and restore ecological functions and values.
10 VSA Chapter 151, Vermont's Land Use and Development Law (Act 250); Act 250 Rules (October 1, 2013)	Relevant and Appropriate	Issues to be addressed in assessing compliance with Act 250 include substantive environmental and facility siting requirements associated with: • any resulting undue water and air pollution, including construction-related dust and protection of headwaters (criterion 1) • compliance with all standards for disposal of wastes (criterion 1(B)); • impacts on floodways (criterion 1(D)); • impacts on streams (criterion 1(E)); • impact on state-regulated wetlands (Class One, Two, and Three); (criterion 1(G)); • any resulting undue erosion control or reduction in capacity of land to hold water (criterion 4); • impact on rare and natural areas, historic sites (criterion 8(A)); • impact on necessary wildlife habitat and endangered species (criterion 8(B)); • extraction of earth resources (criterion 9(D) and (E)); • energy conservation (criterion 9(F)); and • public investments (roads) (criterion 9(K)).	The remedy includes in situ treatment of the impacted groundwater. Installation of new monitoring and injection wills will be done in compliance with this ARAR. As necessary, erosion control measures will be implemented to prevent impacts to streams, floodways, wetlands, etc. Measures will be used to limit airborne dust. Impacts on habitats, resources, and public investments will be minimized through engineered controls.	The remedy requires soil removal. Erosion control measures will be implemented to prevent impacts to streams, floodways, wetlands, etc. Measures will be used to limit airborne dust. Impacts on habitats, resources, and public investments will be minimized through engineered controls.	Only minimal soil disturbance to build a water discharge treatment system or enhanced/new vapor mitigation system(s) is anticipated. As necessary, erosion control measures will be implemented to prevent impacts to streams, floodways, wetlands, etc. Measures will be used to limit airborne dust. Impacts on habitats, resources, and public investments will be minimized through engineered controls.
Vermont Historic Preservation Law, 22 VSA §§ 743(4), 761, 763, and 767.	Applicable	Places controls on actions conducted by the state that may impact historic, scientific, or archaeological sites and data. The Vermont Division of Historic Preservation has identified a high probability for signifcant pre-contact archaeological sites.	The remedy includes in situ treatment of the impacted groundwater. Installation of new monitoring wells, will be completed in compliance with this ARAR, as work is further delineated, in consultation with the Vermont Division of Historic Preservation.	The remedy requires soil removal. The area of excavation has already been disturbed by former owners and subject to a removal action by the State of Vermont. Work will will be completed in compliance with this ARAR, as work is further delineated, in consultation with the Vermont Division of Historic Preservation.	Only minimal soil disturbance to build a water discharge treatment system or enhanced/new vapor mitigation system(s) is anticipated. Work will be completed in compliance with this ARAR, as work is further delineated, in consultation with the Vermont Division of Historic Preservation.
Vermont ANR Guidance on Riparian Buffers (December 9, 2005)	To Be Considered	This guidance provides technical information on the functions and values of riparian buffers, as well as describing acceptable activities within buffer zones. It recommends the establishment of 100 foot buffer zones to streams under circumstances where there is an increased risk of erosion and/or potential for overland flow of pollutants. Where Class II wetlands are contiguous to a waterbody, buffer widths of greater than 50 feet may be recommended based on case-specific application of this Guidance. This Guidance will also be used to recommend buffers for Class III wetlands contiguous to waterbodies, as necessary to maintain the functions and values of the riparian area. This guidance will be a TBC if any work occurs in riparian buffer zones, as further delineated.	An unnamed stream with riparian buffer zone exists on-site, which will be further delineated before work begins. Any incidental work in the riparian buffer zone, such as the installation of new monitoring or injection wells, will be implemented to protect the water quality of the adjacent waterway.	An unnamed stream with riparian buffer zone exists on-site, which will be further delineated before work begins. Work within the riparian buffer zone will be implemented to protect the water quality of the adjacent waterway.	An unnamed stream with riparian buffer zone exists on-site, which will be further delineated before work begins. Work within the riparian buffer zone will be implemented to protect the water quality of the adjacent waterway.
FEDERAL ARARs					
National Historic Preservation Act (NHPA), Section 106, 16 USC 470 *et seq*., 36 CFR Part 800	Applicable	Section 106 of the NHPA of 1966 requires EPA to take into account the effect of all of its actions on historic properties. In consultation with the State Historic Preservation Officer (SHPO) EPA is to identify potential adverse effects on historic properties and seek ways to avoid, minimize or mitigate any such effects on historic properties.	The remedy includes in situ treatment of the impacted groundwater. Installation of new monitoring wells, will be completed in compliance with this ARAR, as work is further delineated, in consultation with the Vermont Division of Historic Preservation.	The remedy requires soil removal. The area of excavation has already been disturbed by former owners and subject to removal action by the State of Vermont. Work will will be completed in compliance with this ARAR, as work is further delineated, in consultation with the Vermont Division of Historic Preservation.	Only minimal soil disturbance to build a water discharge treatment system or enhanced/new vapor mitigation system(s) is anticipated. Work will be completed in compliance with this ARAR, as work is further delineated, in consultation with the Vermont Division of Historic Preservation.

Table D-2
Chemical-Specific ARARs
Commerce Street Plume Superfund Site
Williston, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TAKEN TO COMPLY WITH ARARs		
			Groundwater	Soil	Vapor
STATE ARARs and TBCs					
Environmental Protection Rule Chapter 12, Section 12-702 and Table 1 of Appendix 1 (Primary Groundwater Quality Enforcement Standards), promulgated under the authority of 10 VSA Chapter 48, Section 1390-1394.	Applicable	Establishes groundwater classes and standards for groundwater quality. Management criteria for each groundwater class as well as primary standards for groundwater protection are established. Promulgated Primary Groundwater Quality Enforcement Standards are based on promulgated federal Maximum Contaminant Levels (MCL), and VT Department of Health Drinking Water Health Advisories if no federal MCL was adopted. (Preventative Action Limits also listed in Table 1 are not an ARAR).	Primary Groundwater Quality Enforcement Standards are equivalent to MCLs for contaminants of concern at the Site. MCLs were used to determine cleanup levels. In situ treatment of the impacted groundwater is expected to achieve cleanup levels within 50 to 75 years.	N/A	N/A
Environmental Protection Rule, Chapter 12, Final Pre-Rulingmaking Draft, Groundwater Protection Rule and Strategy, last revised on 8/13/15	To Be Considered	Proposed regulatory changes to Environmental Protection Rule Chapter 12 to, among other things, establish classes of groundwater, a process for groundwater classification, and newly proposed Primary Groundwater Quality Enforcement Standards.	In situ treatment of the impacted groundwater is expected to achieve cleanup levels within 50 to 75 years. Cleanup levels are based on federal MCLs. New standards, including any new Primary Groundwater Quality Enforcement Standards, based on new scientific information or awareness will be reviewed at least every five years under CERCLA Section 121(c) to assure that human health and the environment are being protected by the remedial action.	N/A	N/A
VT Department of Environmental Conservation Investigation and Remediation of Contaminated Properties Procedures (IRCPP), April 2012	To Be Considered	ICRPP includes numeric, health based soil and vapor remedial chemical concentration screening values for soil and vapor intrusion.	N/A	Soil cleanup levels are based on EPA risk criterion. ICRPP screening values will serve as additional TBC.	Vapor cleanup levels are based on EPA risk criterion. ICRPP vapor screening values will serve as additonal TBC.
FEDERAL ARARs and TBCs					
Federal Safe Drinking Water Act - Maximum Contaminant Levels (MCLs), National Primary Drinking Water Regulations, 40 CFR 141 Subparts B and G	Relevant and appropriate	These standards protect drinking water quality by limiting the levels of specific contaminants that can adversely affect public health and are known or anticipated to occur in public water systems. MCLs are the highest level of a contaminant that is allowed in drinking water and were used as cleanup standards.	Used to determine cleanup levels, which were based on MCLs. The remedy includes in situ treatment of the impacted groundwater to achieve cleanup levels within 50 to 75 years.	N/A	N/A
Oral Slope Factor (SF) for Cancer Ingestion Effects, EPA Integrated Risk Information System (IRIS)	To Be Considered	SFs are used to compute the incremental cancer risk from exposure to contaminants and represent the most up-to-date information on cancer risk from IRIS. An upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent. Used for EPA risk assessments.	SFs were used to evaluate carcinogenic health risks associated with site-related contaminants.	SFs were used to evaluate carcinogenic health risks associated with site-related contaminants.	SFs were used to evaluate carcinogenic health risks associated with site-related contaminants.
Inhalation Unit Risk (IUR) for Inhalation Cancer Effects, EPA IRIS	To Be Considered	IURs are used to compute the incremental cancer risk from exposure to contaminants and represent the most up-to-date information on cancer risk from IRIS. The upper bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 ug/m^3 in air. Used for EPA risk assessments.	IURs were used to evaluate carcinogenic health risks associated with site-related contaminants.	IURs were used to evaluate carcinogenic health risks associated with site-related contaminants.	IURs were used to evaluate carcinogenic health risks associated with site-related contaminants.

Table D-2
Chemical-Specific ARARs
Commerce Street Plume Superfund Site
Williston, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TAKEN TO COMPLY WITH ARARs		
			Groundwater	Soil	Vapor
Oral Reference Dose (RfD) for Non-Cancer Ingestion Effects, EPA IRIS	To Be Considered	RfDs are used to compute the incremental non-cancer risk from exposure to contaminants and represent the most up-to-date information on cancer risk from IRIS. An estimate (with an uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Used for EPA risk assessments.	RfDs were used to evaluate non-carcinogenic health risks associated with site-related contaminants.	RfDs were used to evaluate non-carcinogenic health risks associated with site-related contaminants.	RfDs were used to evaluate non-carcinogenic health risks associated with site-related contaminants.
Inhalation Reference Concentration (RfC) for Inhalation Non-Cancer Effects, EPA IRIS	To Be Considered	RfCs are used to compute the incremental non-cancer risk from exposure to contaminants and represent the most up-to-date information on cancer risk from IRIS. An estimate (with an uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Used for EPA risk assessments.	RfCs were used to evaluate non-carcinogenic health risks associated with site-related contaminants.	RfCs were used to evaluate non-carcinogenic health risks associated with site-related contaminants.	RfCs were used to evaluate non-carcinogenic health risks associated with site-related contaminants.
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.	These guidelines for assessing cancer risks were also used to evaluate risk.	These guidelines for assessing cancer risks were also used to evaluate risk.	These guidelines for assessing cancer risks were also used to evaluate risk.
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 in children.	These guidelines were used for evaluating cancer risks in children.	These guidelines were used for evaluating cancer risks in children.	These guidelines were used for evaluating cancer risks in children.
Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER Publication 9200.2-154 (June 2015)	To Be Considered	This guidance will be followed to analyze and address any potential vapor intrusion at the Site.	N/A	N/A	No chemical-specific ARAR exists with respect to exposure to vapor. Vapor cleanup level based on EPA risk criterion. Guidance on assessment and mitigation of vapor intrustion to serve as TBC.

Table D-3
Action-Specific ARARs
Commerce Street Plume Superfund Site
Williston, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TAKEN TO COMPLY WITH ARARs		
			Groundwater	Soil	Vapor
STATE ARARs					
Environmental Protection Rule, Chapter 13, Water Pollution Control Permit Regulations (Vermont National Pollutant Discharge Elimination System (NPDES) Regulations)	Applicable	The regulations establish requirements for discharges to surface waters, compliance with NPDES standards.	Although the remedy involves in situ treatment through underground injections, it does not involve discharges to surface waters or streams. Any water brought to the surface will be batched and disposed of in compliance with ARARs.	The remedy includes soil removal and off-site disposal. Discharge to surface waters or streams is not expected. Any dewatering will be filtered and treated appropriately prior to discharge, or disposed of off-site.	The remedy does not involve any discharges to streams.
10 VSA Chapter 47, Vermont Water Pollution Control; Environmental Protection Rule, Chapter 29a, Vermont Water Quality Standards in Appendix C	Applicable	Establishes water quality standards for surface waters and applies to remedies that call for monitoring surface water bodies on and off of the Site.	Although the remedy involves in situ treatment through underground injections, it does not involve discharges to surface waters or streams. Any water brought to the surface will be batched and disposed of in compliance with ARARs.	The remedy includes soil removal and off-site disposal. Discharge to surface waters or streams is not expected. Any dewatering will be filtered and treated appropriately prior to discharge, or disposed of off-site.	The remedy does not involve any discharges to streams.
10 VSA Chapter 23; Vermont Air Pollution Control Act; Environmental Protection Rule Chapter 5, Air Pollution Control Regulations, including 5-231(4) and 5-241(1) for dust.	Applicable	Lists prohibited activities and regulatory requirements affecting air quality and establishes primary and secondary ambient air quality standards.	The remedy requires in situ treatment and MNA through underground water injection wells and monitoring wells. Proceedures will be implemented to minimize airborne dust if new wells are installed.	The remedy includes soil removal using heavy equipment and trucks for transportation of the material. No idling policies will be instituted during the work days. Methods will be used to limit airborne dust.	Installation of the water treatment system building or enhanced/new vapor mitigation system(s), as deemed necessary based on further risk analysis, will use methods to limit airborne dust.
10 VSA Chapter 47, Water Pollution Control § 1259(a)	Applicable	VT DEC requires treatment to primary groundwater standards specified in Environmental Protection Rule 12 for discharge to a water of the state.	This ARAR does not apply to the injection of chemical reagents and biological stimulants for purposes of remediation.	The remedy includes soil removal and off-site disposal. Any dewatering will be filtered and treated appropriately prior to discharge, or disposed of off-site.	The remedy requires construction of a treatment system for contaminated sump pump water at 830 South Brownell Road. Sump water will be treated to primary groundwater standards prior to discharge to the ground.
Environmental Protection Rule, Chapter 11, Underground Injection Control Regulations	Relevant and Appropriate	Substantive requirements for injection of substances into groundwater for *in situ* groundwater treatment.	In situ treatment wells installed as a part of a response action pursuant to CERCLA are not regulated under Section 11-303 of this regulation, however, the remedy will be completed in compliance with the substantive requirements of this ARAR.	N/A	N/A
10 VSA Chapter 159, Vermont Waste Management Act; Environmental Protection Rule, Chapter 7, Vermont Hazardous Waste Management Regulations, Subchapter 2, Identifiation and Listing of Hazardous Waste	Applicable	Establishes requirements for the identification of hazardous waste based on characteristics and listing. Incorporates requirements of the federal Resource Conservation and Recovery Act regulations, 40 CFR 261.	Only minimal RCRA waste is expected to be generated. Investigation, monitoring and injection well derived waste (e.g. purge water, contaminated soils from new wells, etc.) will be identified, characterized, prior to transportation and disposal at a licensed facility.	The remedy includes soil removal and off-site disposal of RCRA waste. Prior to transportation and disposal, waste will be identified and characterized in accordance with this ARAR.	The remedy involves vapor mitigation and is not anticipated to involve RCRA waste. However, any incidental RCRA waste generated, if any, will be collected, characterized, prior to shipment and disposal at an approved facility.
10 VSA Chapter 159, Vermont Waste Management Act; Environmental Protection Rule, Chapter 7, Vermont Hazardous Waste Management Regulations, Subchapter 3, Hazardous Waste Generator Standards	Applicable	Establishes requirements for generators of hazardous wastes. Incorporates requirements of the federal Resource Conservation and Recovery Act regulations, 40 CFR 262.	Only minimal RCRA waste is expected to be generated (investigation, monitoring and injection well derived waste (e.g. purge water, contaminated soils from new wells, etc.)). If RCRA waste is generated, the substantive requirements of these generator rules will be followed.	The remedy includes soil removal and off-site disposal of RCRA waste. The substantive requirements of these generator rules will be followed.	The remedy involves vapor mitigation and is not anticipated to involve RCRA waste. However, if any incidental RCRA waste is generated, the substantive requirements of these generator rules will be followed.

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TAKEN TO COMPLY WITH ARARs		
			Groundwater	Soil	Vapor
10 VSA Chapter 159, Vermont Waste Management Act; Environmental Protection Rule, Chapter 7, Vermont Hazardous Waste Management Regulations, Subchapter 5, Requirements for Hazardous Waste Storage, Treatment and Disposal Facilities.	Applicable	Establishes requirements for the design, construction, operation, and maintenance of hazardous waste treatment, storage, and disposal facilities. Incorporates requirements of the federal Resource Conservation and Recovery Act regulations, 40 CFR 264, including 40 CFR 264 Subpart G, Closure and Post-Closure.	Only minimal RCRA waste is expected to be generated (investigation, monitoring and injection well derived waste (e.g. purge water, contaminated soils from new wells, etc.)). If RCRA waste is generated, waste storage, treatment and disposal requirements will be followed.	The remedy includes soil removal and off-site disposal of RCRA waste. The remedy will comply with these storage, treatment and disposal regulations, specifically including the closure requirements of this ARAR through the removal of all RCRA contaminants at 96 Commerce Street.	The remedy involves vapor mitigation and is not anticipated to involve RCRA waste. However, if any incidental RCRA waste is generated, waste storage, treatment and disposal requirements will be followed.
FEDERAL ARARs and TBCs					
Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901, et seq., RCRA Regulations, 40 CFR Part 261, 262, 264, including 40 CFR 264 Subpart G Closure and Post Closure.	Applicable	Vermont is delegated to implement these regulations through its Hazardous Waste Management Regulations (see above).	Only minimal RCRA waste is expected to be generated (investigation, monitoring and injection well derived waste (e.g. purge water, contaminated soils from new wells, etc.)). RCRA waste will be identified and characterized as prescribed; generator and waste storage, treatment and disposal requirements will be followed.	The remedy includes soil removal and off-site disposal of RCRA waste. Waste will be identified and characterized as prescribed; generator rules will be followed; generator, waste storage, treatment and disposal requirements will be followed, specifically including the removal of all contaminated soil under closure requirements.	The remedy involves vapor mitigation and is not anticipated to involve RCRA waste. However, if any incidental RCRA waste is generated, waste will be identified and characterized as prescribed; generator, and waste storage, treatment and disposal requirements will be followed.
RCRA (40 CFR 265, Subpart Q - Chemical, Physical and Biological Treatment	Relevant and Appropriate	Standards apply to facilities where hazardous wastes are treated by chemical, physical, or biological methods.	The remedy includes in situ treatment through underground injections of chemical reagents and biological stimulants. Therefore, the remedy will be completed in compliance with the substantive requirements of this ARAR.	The remedy requires soil excavation and removal and does not involve any chemical, physical or biological treatment. Therefore this ARAR is not relevant and appropriate.	N/A
Clean Water Act, Section 402 - National Pollution Discharge Elimination System (NPDES), 40 CFR 122-125, 131	Applicable	The CWA contains discharge limitation, monitoring requirements for discharges into surface waters. The regulations would be applicable to remedial strategies involving discharge to surface waters.	Although the remedy involves in situ treatment through underground injections, it does not involve discharges to surface waters or streams. Any water brought to the surface will be batched and disposed of in compliance with ARARs.	The remedy includes soil removal and off-site disposal. Discharge to surface waters or streams is not expected. Any dewatering will be filtered and treated appropriately prior to discharge, or disposed of off-site.	The remedy does not involve any discharges to streams.
Clean Water Act, Section 304(a), National Recommended Water Quality Criteria (NRWQC), 40 CFR 131.11	Relevant and Appropriate	NRWQC are provided by EPA for chemicals for the protection of human health and the protection of acquatic life.	Although the remedy involves in situ treatment through underground injections, it does not involve discharges to surface waters or streams. Any water brought to the surface will be batched and disposed of in compliance with ARARs.	The remedy includes soil removal and off-site disposal. Discharge to surface waters or streams is not expected. Any dewatering will be filtered and treated appropriately prior to discharge, or disposed of off-site.	The remedy does not involve any discharges to streams.
Underground Injection Control Program, 40 CFR 144, 146, 147.	Relevant and Appropriate	Vermont is delegated to implement these regulations through its Underground Injection Control regulatons (see above).	In situ treatment wells installed as a part of a response action pursuant to CERCLA are not regulated under Vermont UIC regulations, however, the remedy will be completed in compliance with the substantive requirements of this ARAR.	N/A	N/A
Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Final OSWER Directive, Publication EPA/540/R-99/009. April 1999.	To Be Considered	Includes proceedural requirements for the use of monitored natural attenuation as a remedial component.	The remedy requires in situ remediation coupled with MNA. This guidance will be used to guide the MNA program under the remedy.	N/A	N/A

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TAKEN TO COMPLY WITH ARARs		
			Groundwater	Soil	Vapor
Performance Monitoring of MNA Remedies for VOCs in Ground Water, EPA/600/R-04/027, April 2004.	To Be Considered	Includes proceedural requirements for the use of monitored natural attenuation of VOCs as a remedial component.	The remedy requires in situ remediation coupled with MNA. This guidance will be used to guide the MNA program under the remedy.	N/A	N/A
An Approach for Evaluating the Progress of Natural Attenuation, EPA 600/R-11/204, December 2011	To Be Considered	Includes proceedural requirements for evaluation of attenuation under monitored natural attenuation remedy.	The remedy requires in situ remediation coupled with MNA. This guidance will be used to guide the MNA program under the remedy.	N/A	N/A

Appendix E

References

References

HSI GeoTrans, Inc., 2000. *Site Investigation Report, Alling Industrial Park, Williston, Vermont.* June.

Nobis Engineering, Inc., 2015a. *Feasibility Study, Commerce Street Plume Superfund Site, Williston, Vermont.* July.

Nobis Engineering, Inc., 2015b. *Remedial Investigation, Commerce Street Plume Superfund Site, Williston, Vermont, Volume I.* July.

Nobis Engineering, Inc., 2015c. *Remedial Investigation, Commerce Street Plume Superfund Site, Williston, Vermont, Volume II, HHRA and SLERA.* July.

Vermont Department of Environmental Conservation (VT DEC), 2014. E-mail interview with Cathy Kashanski. January.

Appendix F

Administrative Record Index and Guidance Documents

Commerce Street Plume
NPL Site Administrative Record
Record of Decision (ROD)

Index

ROD Dated September 2015
Released: October 2015

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record for the Commerce Street Plume Superfund Site, Williston, Vermont, Record of Decision (ROD), signed September 2015. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This Administrative Record replaces the administrative record file for the Commerce Street Plume Superfund Site, Williston, Vermont, Record of Decision (ROD) Proposed Plan, released August 2015.

The administrative record file is available for review at:

EPA New England OSRR Records and Information Center
1st Floor, 5 Post Office Square, Suite 100 (OSRR 02-3),
Boston, MA 02109-3912
(by appointment)
617-918-1440 (phone)
617-918-1223 (fax)
www.epa.gov/region01/superfund/resource/records.htm

Dorothy Alling Memorial Library
21 Library Lane
Williston, VT 05495
802-878-4918
http://www.williston.lib.vt.us/

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Please note that the compact disc(s) (CD) containing this Administrative Record may include index data and other metadata (hereinafter collectively referred to as metadata) to allow the user to conduct index searches and key word searches across all the files contained on the CD. All the information that appears in the metadata, including any dates associated with creation of the indexing data, is not part of the Administrative Record for the Site under CERCLA and shall not be construed as relevant to the documents that comprise the Administrative Record. This metadata is provided as a convenience for the user and is not part of the Administrative Record.

Questions about this administrative record file should be directed to EPA's remedial project manager, Karen Lumino, lumino.karen@epa.gov, 617-918-1348.

Phase 01: SITE ASSESSMENT

292060 TRIP REPORT--SITE INSPECTION (SI)

Author: BRIAN FITZGERALD, VT AEC
Addressee: DAVID GEE, MITEC ELECTRONIC
Doc Type: REPORT
SITE INSPECTION (SI)
Doc Date: 07/05/1984 **# of Pages:** 2
File Break: 01.06

292068 COMPLAINT - STATE OF VERMONT VS. MITEC SYSTEMS CORPORATION

Author:
Addressee:
Doc Type: REPORT
Doc Date: 08/01/1984 **# of Pages:** 6
File Break: 01.06

292092 MITEC SAMPLING RESULTS

Author: CEDERIC SANBORN, VT AGENCY
Addressee: RICHARD VALENTINETTI, NONE
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 01/21/1985 **# of Pages:** 2
File Break: 01.06

292093 LAB REPORT FOR SAMPLING AT MITEC LAGOON

Author: , VT DEPT OF WATER RESOURCE
Addressee:
Doc Type: SAMPLING DATA
Doc Date: 06/04/1985 **# of Pages:** 1
File Break: 01.06

292064 DRAFT REPORT ON INVESTIGATIONS OF CONTAMINATION EMANATING FROM THE ALLING INDUSTRIAL PARK

Author: , VT AEC
Addressee:
Doc Type: REPORT
Doc Date: 03/31/1986 **# of Pages:** 89
File Break: 01.06

Phase 01: SITE ASSESSMENT

292069 **PRELIMINARY ASSESSMENT (PA)**

Author: RICHARD G DINITTO, NUS CORP
Addressee: BRIAN MACKENZIE, NUS CORP
Doc Type: PRELIMINARY ASSESSMENT (PA)
REPORT
Doc Date: 03/19/1987 **# of Pages:** 13
File Break: 01.06

292074 **SYNOPSIS OF A SITE INVESTIGATION (SI)**

Author: LINDA GUERE, VT ANR/HAZARDO
Addressee:
Doc Type: REPORT
SITE INSPECTION (SI)
Doc Date: 02/09/1990 **# of Pages:** 9
File Break: 01.06

292075 **FINAL SCREENING SITE INSPECTION (SI)**

Author: JAMES ELLIOTT, NUS CORP
Addressee:
Doc Type: REPORT
SITE INSPECTION (SI)
Doc Date: 10/22/1990 **# of Pages:** 60
File Break: 01.06

292095 **SITE INSPECTION (SI) - ALLING INDUSTRIAL PARK**

Author: , TRC COMPANIES INC
Addressee:
Doc Type: REPORT
SITE INSPECTION (SI)
Doc Date: 07/13/1993 **# of Pages:** 50
File Break: 01.06

Phase 01: SITE ASSESSMENT

292076 LETTER REGARDING CONTAMINANTS AT MITEC PROPERTY IN THE ALLING INDUSTRIAL PARK IN WILLISTON

Author: STANLEY CORNEILLE, VT DEPT O
Addressee: JEFF NICK, J L DAVIS REALTY
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 09/27/1994 **# of Pages:** 2
File Break: 01.06

292077 SITE INVESTIGATION (SI) - ALLING INDUSTRIAL PARK - WILLISTON VERMONT - APRIL TO SEPTEMBER 1996

Author: , BINKERD ENVIRONMENTAL
Addressee: , INCHCAPE TESTING SERVICES - AQUATEC LABO
, VT DEPT OF ENVIRONMENTAL CONSERVATION
Doc Type: REPORT
SITE INSPECTION (SI)

Doc Date: 10/01/1996 **# of Pages:** 150
File Break: 01.06

292079 FINAL SITE INSPECTION (SI) PRIORITIZATION REPORT FOR MITEC

Author: , ROY F WESTON INC
Addressee:
Doc Type: REPORT
SITE INSPECTION (SI)

Doc Date: 09/09/1998 **# of Pages:** 37
File Break: 01.06

577657 FINAL SITE INSPECTION (SI) PRIORITIZATION REPORT FOR EMCO

Author: , ROY F WESTON INC
Addressee:
Doc Type: REPORT
SITE INSPECTION (SI)

Doc Date: 09/09/1998 **# of Pages:** 35
File Break: 01.06

Phase 01: SITE ASSESSMENT

292081 **LIMITED GROUNDWATER INVESTIGATION**

Author: , JOHNSON COMPANY INC
Addressee: , VT DEPT OF ENVIRONMENTAL CONSERVATION
Doc Type: REPORT
Doc Date: 07/01/1999 **# of Pages:** 99
File Break: 01.06

248028 **SITE INVESTIGATION (SI) REPORT**

Author: , HSI GEOTRANS
Addressee: , MITEC TELECOM INC
Doc Type: REPORT
SITE INSPECTION (SI)
Doc Date: 07/25/2000 **# of Pages:** 172
File Break: 01.03

292084 **EXPANDED SITE INSPECTION (SI) FINAL SUMMARY TRIP REPORT FOR MITEC**

Author: , WESTON SOLUTIONS INC
Addressee: , US EPA REGION 1
Doc Type: REPORT
SITE INSPECTION (SI)
Doc Date: 09/18/2003 **# of Pages:** 75
File Break: 01.06

292090 **WETLAND AND HABITAT ASSESSMENT**

Author: , NORMANDEAU ASSOCIATES IN
Addressee: , WESTON SOLUTIONS INC
Doc Type: REPORT
Doc Date: 07/01/2004 **# of Pages:** 41
File Break: 01.06

Phase 03: REMEDIAL INVESTIGATION (RI)

580577 **FLOOD INSURANCE RATE MAP (FIRM)**

Author:
Addressee:
Doc Type: MAP
Doc Date: 01/01/1111 **# of Pages:** 1
File Break: 03.01

580576 **LETTER REGARDING REQUEST FOR EPA ID # FOR MITEC SYSTEMS CORP.**

Author: ANNE DIELENSNYDER, VT AGEN
Addressee: MARY JANE ODONNELL, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 03/08/1984 **# of Pages:** 2
File Break: 03.01

495805 **LETTER REGARDING SOIL AND GROUNDWATER IN A FORMER LAGOON**

Author: JOHN STUART, ESSEX (VT) RESID
Addressee: DAVID GEE, MITEC ELECTRONICS LTD.
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 02/28/1985 **# of Pages:** 3
File Break: 03.01

495386 **LETTER REGARDING LAGOON EXCAVATION**

Author: CEDERIC SANBORN, VT AGENCY
Addressee: JOHN STUART, ESSEX (VT) RESIDENT
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 05/08/1985 **# of Pages:** 2
File Break: 03.01

Phase 03: REMEDIAL INVESTIGATION (RI)

495810 **LETTER REGARDING FINAL RESOLUTION OF MITEC**

Author: CEDERIC SANBORN, VT AGENCY
Addressee: JOHN A MALTER, VT DEPT OF ENVIRONMENTAL C
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
MEMO

Doc Date: 11/05/1985 **# of Pages:** 2
File Break: 03.01

495811 **MEMO REGARDING CONTAMINATION EMANANTING FROM ALLING INDUSTRIAL PARK**

Author: CEDERIC SANBORN, VT AGENCY
Addressee: GORDON GEBAUER, NONE
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
MEMO

Doc Date: 05/09/1986 **# of Pages:** 2
File Break: 03.01

495319 **SITE ASSESSMENT REPORT FOR BOVE/FAGAN ICE CREAM DISTRIBUTORS INC, 12 COMMERCE STREET, WILLISTON VT**

Author: , GRIFFIN INTERNATIONAL
Addressee: , BOVE/FAGAN ICE CREAM DISTRIBUTORS INC
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
REPORT

Doc Date: 04/01/1996 **# of Pages:** 23
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

577654 **LETTER REGARDING ALLING INDUSTRIAL PARK - DISCRETE INTERVAL SAMPLING RESULTS**

Author: STEVEN LAROSA, HEINDEL & NC
Addressee: MICHAEL SMITH, VERMONT DEPARTMENT OF ENV
Doc Type: CORRESPONDENCE
EMAIL
SAMPLING DATA
Doc Date: 08/02/2000 **# of Pages:** 50
File Break: 03.02

495809 **LETTER REGARDING MITEC SITE INVESTIGATION**

Author: GEORGE DESCH, VT AGENCY OF
Addressee:
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 08/23/2000 **# of Pages:** 5
File Break: 03.01

472475 **STRATIGRAPHIC INVESTIGATION REPORT**

Author: , HAGER GEOSCIENCE INC
Addressee: , NOBIS ENGINEERING INC
Doc Type: REMEDIAL INVESTIGATION (RI)
REPORT
Doc Date: 08/01/2010 **# of Pages:** 72
File Break: 03.06

496836 **REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) 2010 DATA SUMMARY**

Author: , NOBIS ENGINEERING INC
Addressee: , US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 06/01/2011 **# of Pages:** 376
File Break: 03.06

Phase 03: REMEDIAL INVESTIGATION (RI)

505653 **2011 DATA SUMMARY - REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)**

Author: , NOBIS ENGINEERING INC
Addressee: , US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA

Doc Date: 11/01/2011 **# of Pages:** 626
File Break: 03.06

505654 **MEMO WITH COMMENTS ON 11/23/2011 NOBIS DRAFT 2011 DATA SUMMARY REPORT FOR THE COMMERCE STREET PLUME SITE**

Author: MICHAEL SMITH, VERMONT DEP
Addressee: KAREN LUMINO, US EPA REGION 1
STEPHEN MANGION, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 12/16/2011 **# of Pages:** 4
File Break: 03.06

551136 **DRAFT SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT (SLERA) (05/30/2012 TRANSMITTAL LETTER ATTACHED)**

Author: , TECHLAW INC
Addressee: , US EPA REGION 1 - OFFICE OF ENVIRO MEASURE
Doc Type: REPORT

Doc Date: 05/01/2012 **# of Pages:** 146
File Break: 03.10

579669 **EMAIL REGARDING VAPOR INTRUSION (VI) STUDY (EMAIL HISTORY ATTACHED)**

Author: KAREN LUMINO, US EPA REGION
Addressee: MICHAEL B SMITH, VT DEPT OF ENVIRONMENTAL
Doc Type: CORRESPONDENCE
EMAIL

Doc Date: 07/24/2012 **# of Pages:** 2
File Break: 03.01

Phase 03: REMEDIAL INVESTIGATION (RI)

550228 **LABORATORY REPORT OF VOLATILE ORGANIC ANALYSIS (VOA) IN WATER (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED) [MARGINALIA]**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 09/20/2012 **# of Pages:** 29
File Break: 03.02

550229 **LABORATORY REPORT OF VOLATILE ORGANIC ANALYSIS (VOA) IN SOIL HIGH LEVEL METHOD (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED) [MARGINALIA]**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 09/24/2012 **# of Pages:** 27
File Break: 03.02

550230 **LABORATORY RESULTS OF BASE / NEUTRALS AND ACIDS (BNA) IN SOILS MEDIUM LEVEL (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED) [MARGINALIA]**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 09/26/2012 **# of Pages:** 30
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

561882 **LETTER REGARDING TIER 1 MODIFIED DATA VALIDATION, CASE NO. E012S, SAMPLE DELIVERY GROUP (SDG) NO.: 12080026, 12080027, 12080028**

Author: GAIL DERUZZO, NOBIS ENGINEE
Addressee: KAREN LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
DATA VALIDATION REPORT
LETTER
SAMPLING DATA

Doc Date: 09/27/2012 **# of Pages:** 83
File Break: 03.02

550231 **LABORATORY RESULTS OF DIRECT MERCURY ANALYSIS IN SOIL (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED)**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA

Doc Date: 10/03/2012 **# of Pages:** 8
File Break: 03.02

550207 **FINAL TECHNICAL MEMORANDUM REGARDING AQUATIC INVERTEBRATE, SEDIMENT, AND SURFACE WATER SAMPLING IN UNNAMED STREAM**

Author:
Addressee:
Doc Type: CORRESPONDENCE
MEMO
REPORT

Doc Date: 10/04/2012 **# of Pages:** 60
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

550232 **LABORATORY RESULTS OF ION CHROMATOGRAPHY ANIONS (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED)**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 10/05/2012 **# of Pages:** 13
File Break: 03.02

550233 **LABORATORY RESULTS OF TOTAL MERCURY IN WATER (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED)**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 10/05/2012 **# of Pages:** 6
File Break: 03.02

550227 **ANALYTICAL REPORT OF INORGANICS AND MISCELLANEOUS (09/18/2012 CHAIN OF CUSTODY RECORD ATTACHED)**

Author: , ALPHA ANALYTICAL LABORATI
Addressee: , US EPA
Doc Type: REPORT
SAMPLING DATA
Doc Date: 10/08/2012 **# of Pages:** 23
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

550234 **LABORATORY RESULTS OF METALS IN SOIL MEDIUM LEVEL BY INDUCTIVELY COUPLED PLASMA (ICP) (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED)**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 10/15/2012 **# of Pages:** 14
File Break: 03.02

550235 **LABORATORY RESULTS OF TOTAL RECOVERABLE METALS IN WATER BY INDUCTIVELY COUPLED PLASMA (ICP) (09/14/2012 CHAIN OF CUSTODY RECORD ATTACHED)**

Author: DAN BOUDREAU, US EPA REGION
Addressee: BART HOSKINS, US EPA REGION 1 - OFFICE OF ENV
KAREN LUMINO, US EPA REGION 1
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
Doc Date: 10/15/2012 **# of Pages:** 8
File Break: 03.02

551144 **EPA RESPONSES TO VT DEPT OF ENVIRONMENTAL CONSERVATION (DEC) DRAFT COMMENTS REGARDING 'ROUND 2' VAPOR INTRUSTION STUDY**

Author: , US EPA REGION 1
Addressee:
Doc Type: PUBLIC (AND OTHER) COMMENTS
Doc Date: 05/01/2013 **# of Pages:** 7
File Break: 03.01

579668 **MEMO REGARDING COMMENTS ON DRAFT VAPOR INTRUSION (VI) / INDOOR AIR INVESTIGATION**

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 05/17/2013 **# of Pages:** 5
File Break: 03.04

Phase 03: REMEDIAL INVESTIGATION (RI)

579667 **MEMO REGARDING COMMENTS ON DRAFT REMEDIAL INVESTIGATION (RI)**

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO

Doc Date: 07/25/2013 **# of Pages:** 15
File Break: 03.06

550206 **FINAL TECHNICAL MEMORANDUM REGARDING REFINING SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT (SLERA)**

Author:
Addressee:
Doc Type: CORRESPONDENCE
MEMO
REPORT
RISK/HEALTH ASSESSMENT

Doc Date: 08/08/2013 **# of Pages:** 32
File Break: 03.10

551142 **MEMO REGARDING VAPOR INTRUSION INVESTIGATION**

Author: MARGARET MCDONOUGH, US EI
Addressee: KAREN LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
SAMPLING DATA

Doc Date: 12/18/2013 **# of Pages:** 5
File Break: 03.01

577653 **EMAIL REGARDING UNNAMED STREAM STATE ENDANGERED OR THREATENED SPECIES (EMAIL HISTORY AND SHORT MUDDY BROOK REPORT ATTACHED)**

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL

Doc Date: 01/10/2014 **# of Pages:** 13
File Break: 03.01

Phase 03: REMEDIAL INVESTIGATION (RI)

561883 SITE INVESTIGATION (SI) REPORT (TRANSMITTAL LETTER ATTACHED)

Author: , LINCOLN APPLIED GEOLOGY IN
Addressee: MICHAEL B SMITH, VT DEPT OF ENVIRONMENTAL
Doc Type: REPORT
Doc Date: 02/11/2014 **# of Pages:** 87
File Break: 03.06

581104 [REDACTED] VAPOR INTRUSION ASSESSMENT REPORT, 830 SOUTH BROWNELL ROAD (TRANSMITTAL LETTER ATTACHED)

Author: DAGAN MURRAY, LINCOLN APPL
Addressee: MICHAEL B SMITH, VT DEPT OF ENVIRONMENTAL
Doc Type: REPORT
SAMPLING DATA
Doc Date: 05/23/2014 **# of Pages:** 47
File Break: 03.02

579695 EMAIL REGARDING EMERGENCY ACTIONS BEING TAKEN AT SITE (SUMP WATER SAMPLE ATTACHMENT NOT INCLUDED)

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN M LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 07/11/2014 **# of Pages:** 1
File Break: 03.01

581105 [REDACTED] INDOOR AIR SAMPLING REPORT, 830 SOUTH BROWNELL ROAD (TRANSMITTAL LETTER ATTACHED)

Author: DAGAN MURRAY, LINCOLN APPL
Addressee: MICHAEL B SMITH, VT DEPT OF ENVIRONMENTAL
Doc Type: REPORT
SAMPLING DATA
Doc Date: 08/06/2014 **# of Pages:** 32
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

579671 **MEMO REGARDING REVIEW OF REFINED SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT (SLERA)**

Author: STEVE FISKE, VT DEPT OF ENVIR
Addressee: MICHAEL B SMITH, VT DEPT OF ENVIRONMENTAL
Doc Type: CORRESPONDENCE
MEMO

Doc Date: 08/19/2014 **# of Pages:** 4
File Break: 03.10

579670 **EPA RESPONSES TO DRAFT WORKING NOTES ON HUMAN HEALTH RISK ASSESSMENT (HHRA)**

Author: , US EPA REGION 1
Addressee: RAZELLE HOFFMAN-CONTOIS, VT DEPT OF HEALT
Doc Type: REPORT

Doc Date: 12/19/2014 **# of Pages:** 17
File Break: 03.10

580732 **INDOOR AIR SAMPLING REPORT FOR 830 BROWNELL ROAD, WILLISTON, VT**

Author: ALEX SHERRIN, US EPA REGION
Addressee:
Doc Type: CORRESPONDENCE
MEMO
REPORT

Doc Date: 01/07/2015 **# of Pages:** 5
File Break: 03.02

579666 **MEMO REGARDING COMMENTS ON DRAFT FINAL REMEDIAL INVESTIGATION (RI)**

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO

Doc Date: 06/10/2015 **# of Pages:** 3
File Break: 03.06

Phase 03: REMEDIAL INVESTIGATION (RI)

579692 **REMEDIAL INVESTIGATION (RI) REPORT, VOLUME 2 OF 2 - HUMAN HEALTH RISK ASSESSMENT (HHRA) AND SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT (SLERA)**

Author: , NOBIS ENGINEERING INC
Addressee: , US EPA REGION 1
Doc Type: REMEDIAL INVESTIGATION (RI)
REPORT
Doc Date: 07/01/2015 **# of Pages:** 465
File Break: 03.06

581107 **REMEDIAL INVESTIGATION (RI), VOLUME 1 OF 2**

Author: , NOBIS ENGINEERING INC
Addressee: , US EPA REGION 1
Doc Type: REMEDIAL INVESTIGATION (RI)
REPORT
Doc Date: 07/01/2015 **# of Pages:** 784
File Break: 03.06

580784 **MEMO CONCERNING ANALYSIS OF RCRA TOXICITY OF SOIL AT 96 COMMERCE STREET**

Author: KAREN LUMINO, US EPA REGION
Addressee:
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 07/27/2015 **# of Pages:** 1
File Break: 03.01

580758 **PUBLIC HEALTH ASSESSMENT (PHA)**

Author: , AGENCY FOR TOXIC SUBSTANC
Addressee:
Doc Type: REPORT
RISK/HEALTH ASSESSMENT
Doc Date: 07/29/2015 **# of Pages:** 51
File Break: 03.09

Phase 03: REMEDIAL INVESTIGATION (RI)

579693 **LETTER REGARDING DRAFT GROUNDWATER USE AND VALUE DETERMINATION (GWUVD)**

Author: CHUCK SCHWER, VT DEPT OF EN
Addressee: ANNI LOUGHLIN, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 07/30/2015 **# of Pages:** 9
File Break: 03.04

Phase 04: FEASIBILITY STUDY (FS)

579696 **EMAIL REGARDING COMMENTS ON 06/24/2015 DRAFT PROPOSED PLAN**

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN M LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL

Doc Date: 06/26/2015 **# of Pages:** 1
File Break: 04.09

580733 **PROPOSED PLAN**

Author: , US EPA REGION 1
Addressee:
Doc Type: PROPOSED PLAN
PUBLIC INFORMATION
REPORT

Doc Date: 07/01/2015 **# of Pages:** 21
File Break: 04.09

581110 **FEASIBILITY STUDY (FS)**

Author: , NOBIS ENGINEERING INC
Addressee: , US EPA REGION 1
Doc Type: FEASIBILITY STUDY (FS)
REPORT

Doc Date: 07/01/2015 **# of Pages:** 304
File Break: 04.06

Phase 04: FEASIBILITY STUDY (FS)

579697 EMAIL REGARDING REVIEW OF 07/01/2015 DRAFT FINAL FEASIBILITY STUDY (FS) (07/24/2015 EMAIL TRANSMITTAL ATTACHED)

Author: MICHAEL B SMITH, VT DEPT OF E
Addressee: KAREN M LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL

Doc Date: 07/16/2015 **# of Pages:** 1
File Break: 04.06

Phase 05: RECORD OF DECISION (ROD)

582995 LETTER REGARDING CONCURRENCE WITH PROPOSED PLAN AND RECORD OF DECISION (ROD)

Author: ALYSSA B SCHUREN, VERMONT I
Addressee: NANCY BARMAKIAN, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 09/28/2015 **# of Pages:** 2
File Break: 05.04

582994 RECORD OF DECISION (ROD)

Author: , US EPA REGION 1
Addressee:
Doc Type: DECISION DOCUMENT
RECORD OF DECISION (ROD)
REPORT

Doc Date: 09/30/2015 **# of Pages:** 138
File Break: 05.04

Phase 10: ENFORCEMENT/NEGOTIATION

461469 SETTLEMENT AGREEMENT FOR RECOVERY OF PAST RESPONSE COSTS AND REMEDIAL INVESTIGATION (RI) COSTS, CERCLA DOCKET NO. 01-2008-0062

Author: , US EPA REGION 1
Addressee: , MITEC TELECOM INC
Doc Type: ENFORCEMENT & SETTLEMENT

Doc Date: 09/16/2009 **# of Pages:** 14
File Break: 10.05

Phase 10: ENFORCEMENT/NEGOTIATION

463912 **RESPONSIVENESS SUMMARY FOR CERCLA SECTION 122(H) AGREEMENT WITH MITEC TELECOM, INC.**

Author: JAMES T OWENS, US EPA REGION
Addressee:
Doc Type: ENFORCEMENT & SETTLEMENT

Doc Date: 02/19/2010 **# of Pages:** 1
File Break: 10.05

Phase 11: POTENTIALLY RESPONSIBLE PARTY

495380 **104 INFORMATION REQUEST RESPONSIVE TO QUESTIONS 6(E) (ENVIRONMENTAL INVESTIGATIONS) AND 7(B) (REMEDIAL ACTIVITIES) - MITEC TELECOM**

Author: , US EPA REGION 1
Addressee:
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER

Doc Date: 01/01/1111 **# of Pages:** 139
File Break: 11.09

495290 **104 INFORMATION REQUEST RESPONSE - ALLING APPLICATION FOR SEWER CONNECTION**

Author: FRANK ALLING, ALLING REALTY
Addressee: JOHN HEINS, WILLISTON (VT) RESIDENT
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER

Doc Date: 08/16/1984 **# of Pages:** 4
File Break: 11.09

495292 **104 INFORMATION REQUEST RESPONSE - INTERIM DRAFT REPORT ON INVESTIGATIONS OF CONTAMINATION EMANATING FROM THE ALLING INDUSTRIAL PARK**

Author: JOHN AMADON, AGENCY OF ENV
Addressee:
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
REPORT

Doc Date: 08/01/1985 **# of Pages:** 7
File Break: 11.09

Phase 11: POTENTIALLY RESPONSIBLE PARTY

464115 **104 INFORMATION REQUEST RESPONSE - VT DEPT OF ENVIRONMENTAL CONSERVATION (DEC) APPROVAL TO VENT AND SEAL RESIDENTIAL BASEMENT SUMPS - MITEC TELECOM INC**

Author: MICHAEL B SMITH, VT AGENCY
Addressee: JOEL BEHRSING, JOHNSON COMPANY INC
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER

Doc Date: 06/11/1997 **# of Pages:** 1
File Break: 11.09

464117 **104 INFORMATION REQUEST RESPONSE - LETTER REGARDING RESULTS OF SOIL PILE SAMPLING AND ANALYSIS - MITEC TELECOM INC (LABORATORY ANALYSIS AND REPORTS ATTACHED)**

Author: ROGER C BINKERD, BINKERD EN
Addressee: FRANK ALLING, ALLING REALTY CORPORATION
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER

Doc Date: 12/21/1998 **# of Pages:** 8
File Break: 11.09

495283 **104 INFORMATION REQUEST RESPONSE-MITEC TELECOM RESPONSE TO QUESTION 4(B), 05/26/1998 LETTER REGARDING 15 COMMERCE STREET TENANTS**

Author: FRANK ALLING, ALLING REALTY
Addressee: JOHN KLESCH, NONE
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER

Doc Date: 03/22/2004 **# of Pages:** 10
File Break: 11.09

Phase 11: POTENTIALLY RESPONSIBLE PARTY

579694 POTENTIALLY INTERESTED PARTY (PIP) LETTERS - EPA'S PROPOSED CLEANUP PLAN

Author: KAREN M LUMINO, US EPA REGI(
Addressee: MEYER BENTOB, BIOPHAGE PHARMA INC
JEFFREY MANDEL, MITEC TECHNOLOGIES INC
PAUL MCMANUS, WILLISTON (VT) - RESIDENT OF
ALFRED R SENECAL JR, OMEGA REAL ESTATE ASS(
Doc Type: CORRESPONDENCE
LETTER
PIP LETTER

Doc Date: 07/29/2015 **# of Pages:** 16
File Break: 11.09

Phase 13: COMMUNITY RELATIONS

577656 ANNOUNCEMENT OF AN INFORMATIONAL MEETING ON 01/11/2005

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
PUBLIC INFORMATION

Doc Date: 01/11/2005 **# of Pages:** 1
File Break: 13.04

579698 EMAIL REGARDING PROPOSED PLAN, PUBLIC INFORMATIONAL MEETING AND FORMAL HEARING

Author: KAREN M LUMINO, US EPA REGI(
Addressee: RICK MCGUIRE, WILLISTON (VT) TOWN OF
Doc Type: CORRESPONDENCE
EMAIL

Doc Date: 07/04/2015 **# of Pages:** 1
File Break: 13.01

Phase 13: COMMUNITY RELATIONS

579690 PUBLIC NOTICE: SAVE THE DATE CARD FOR PUBLIC INFORMATIONAL MEETING AND PUBLIC HEARING 08/12/2015 (MAILING LIST ATTACHED)

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
PUBLIC INFORMATION
Doc Date: 07/27/2015 **# of Pages:** 21
File Break: 13.04

579699 PUBLIC NOTICE AS APPEARING IN WILLISTON OBSERVER: PUBLIC INFORMATION MEETING TO DISCUSS THE PROPOSED PLAN

Author: KAREN M LUMINO, US EPA REGI(
Addressee: RICK MCGUIRE, WILLISTON (VT) TOWN OF
Doc Type: MEETING RECORD
PUBLIC INFORMATION
Doc Date: 07/30/2015 **# of Pages:** 2
File Break: 13.04

581100 NEWS ARTICLE: EPA PROPOSES CLEAN UP PLAN FOR WILLISTON SUPERFUND SITE

Author: STEPHANIE CHOATE, WILLISTON
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
Doc Date: 07/30/2015 **# of Pages:** 2
File Break: 13.03

582524 MITEC TECHNOLOGIES POTENTIALLY INTERESTED PARTY (PIP) LETTER -- PROOF OF DELIVERY

Author: KAREN LUMINO, US EPA REGION
Addressee: JEFFREY MANDEL, MITEC TECHNOLOGIES INC
Doc Type: FORM
Doc Date: 07/30/2015 **# of Pages:** 2
File Break: 13.01

Phase 13: COMMUNITY RELATIONS

582978 PUBLIC HEARING SIGN-IN SHEET

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 08/12/2015 **# of Pages:** 1
File Break: 13.04

582979 PRESENTATION AT PUBLIC INFORMATIONAL MEETING

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 08/12/2015 **# of Pages:** 28
File Break: 13.04

582977 TRANSCRIPT OF 08/12/2015 PUBLIC HEARING

Author: JOANN Q CARSON, ACCURATE C(
Addressee:
Doc Type: MEETING RECORD
Doc Date: 08/31/2015 **# of Pages:** 8
File Break: 13.04

Phase 16: NATURAL RESOURCE TRUSTEE

577655 LETTER REGARDING RESPONSE TO EPA'S REVIEW ON REMEDIAL INVESTIGATION (RI) - NATURAL RESOURCES

Author: JAMES P DUGGAN , VT DIVISION
Addressee: KAREN M LUMINO, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 02/17/2015 **# of Pages:** 4
File Break: 16.01

Phase 16: NATURAL RESOURCE TRUSTEE

579691 LETTERS REGARDING NOTIFICATION OF PROPOSED PLAN

Author: ANNI LOUGHLIN, US EPA REGION
Addressee: KENNETH FINKELSTEIN, US NATIONAL OCEANIC A
DAVID K MEARS, VERMONT DEPARTMENT OF ENV
ANDREW RADDANT, US DEPT OF INTERIOR
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 07/30/2015 **# of Pages:** 3
File Break: 16.01

Phase 17: SITE MANAGEMENT RECORDS

486014 AERIAL PHOTOGRAPHIC ANALYSIS OF COMMERCE STREET PLUME SITE, VOL. 1 OF 2

Author: , NATIONAL EXPOSURE RESEAR
Addressee:
Doc Type: PHOTOGRAPH

Doc Date: 12/01/2008 **# of Pages:** 28
File Break: 17.04

552409 AERIAL PHOTOGRAPHIC ANALYSIS OF COMMERCE STREET PLUME SITE, VOL. 2 OF 2

Author: , NATIONAL EXPOSURE RESEAR
Addressee:
Doc Type: PHOTOGRAPH

Doc Date: 12/01/2008 **# of Pages:** 13
File Break: 17.04

580734 A CITIZEN'S GUIDE TO BIOREMEDIATION

Author: , US EPA
Addressee:
Doc Type: PUBLIC INFORMATION
REPORT

Doc Date: 09/01/2012 **# of Pages:** 2
File Break: 17.07

Phase 17: SITE MANAGEMENT RECORDS

580735 **A CITIZEN'S GUIDE TO IN SITU CHEMICAL OXIDATION**

Author: , US EPA
Addressee:
Doc Type: PUBLIC INFORMATION REPORT

Doc Date: 09/01/2012 **# of Pages:** 2
File Break: 17.07

Number of Documents in Administrative Record: 92

Selected Key Guidance Documents

EPA Guidance Documents may be reviewed at the OSRR Records and Information Center in Boston, MA

DOCNUMBER	DOCDATE	TITLE	OSWEREPAID
2002	01-Oct-88	INTERIM FINAL GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA.	OSWER #9355.3-01
C473	01-Aug-97	RULES OF THUMB FOR SUPERFUND REMEDY SELECTION (EPA 540-R-97-013)	OSWER 9355.0-69
C512	21-Apr-99	FINAL OSWER DIRECTIVE "USE OF MONITORED NATURAL ATTENUATION AT SUPERFUND, RCRA CORRECTIVE ACTION, AND UNDERGROUND STORAGE TANK SITES"	OSWER 9200.4-17P
C525	01-Jul-99	GUIDE TO PREPARING SUPERFUND PROPOSED PLANS RECORDS OF DECISION AND OTHER REMEDY SELECTION DECISION DOCUMENTS	OSWER 9200.1-23 P
C905	01-Dec-11	AN APPROACH FOR EVALUATING THE PROGRESS OF NATURAL ATTENUATION IN GROUNDWATER	EPA 600/R-11/204
C1008	01-Apr-12	INVESTIGATION AND REMEDIATION OF CONTAMINATED PROPERTIES PROCEDURE	
C1009	01-Apr-04	PERFORMANCE MONITORING OF MNA REMEDIES FOR VOCS IN GROUND WATER	EPA/600/R-04/027
C1010	01-Jun-15	OSWER TECHNICAL GUIDE FOR ASSESSING AND MITIGATING THE VAPOR INTRUSION PATHW	OSWER 9200.2-154