

FINAL
LIMITED VAPOR INTRUSION INVESTIGATION

Cumberland Farms, Inc.
Store No. 1836 - North Windham, Maine

Prepared for:

Maine Department of Environmental Protection
Augusta, Maine

Prepared by:



MACTEC Engineering and Consulting, Inc.
511 Congress St.
Portland, ME 04101

February 8, 2011

MACTEC PROJECT: 3612102157

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LIST OF ACRONYMS

APH	Air Petroleum Hydrocarbons
AOC	Area of Concern
bgs	below ground surface
CFI	Cumberland Farms Incorporated
CSM	Conceptual Site Model
DRO	Diesel Range Organics
ECS	Environmental Compliance Services, Inc.
GRO	Gasoline Range Organics
MACTEC	MACTEC Engineering and Consulting, Inc.
MEDEP	Maine Department of Environmental Protection
mg/kg	milligram per killogram
MGS	Maine Geological Services
PID	photoionization detector
ppm	parts per million
Site	Cumberland Farms, Inc. North Windham Site (Store No. 1836)
SOP	Standard Operating Procedure
SSQAPP	Site-Specific Quality Assurance Project Plan
µg/L	micrograms per liter
UST	underground storage tank
USEPA	United States Environmental Protection Agency
VI	Vapor Intrusion
VOC	volatile organic compound
VPH	Volatile Petroleum Hydrocarbons

1.0 INTRODUCTION/OBJECTIVES

The Maine Department of Environmental Protection (MEDEP) is evaluating the potential for vapor intrusion (VI) at gasoline stations in the State of Maine. As part of the evaluation, the MEDEP conducted investigations at a number of Cumberland Farms, Inc. (CFI) owned gasoline stations. MACTEC Engineering and Consulting, Inc. (MACTEC) has been contracted to conduct this Limited VI Investigation at the CFI North Windham Station under Contract Number 20100708-164, dated July 8, 2010, between the MEDEP and MACTEC. The purpose of the investigations was to evaluate the potential presence of residual soil and or groundwater contamination at the Site and, if present, the potential for it to result in vapor intrusion of contaminants into nearby buildings.

This VI investigation Report covers work conducted at the Cumberland Farms North Windham site (Site), located at 749 Roosevelt Trail, North Windham, Maine (Store No. 1836). This report consists of:

Section 1: Introduction/Objectives

Section 2: Site Background and Conceptual Site Model

Section 3: Methodologies

Section 4: Results

Section 5: Conclusions

Section 6: References

2.0 SITE BACKGROUND AND CONCEPTUAL SITE MODEL

A conceptual site model (CSM) includes an evaluation of potential source areas, potential contaminants of concern, potential migration and exposure pathways and potential receptors. The CSM is based on information developed as part of a Phase I Environmental Site Assessment conducted by MACTEC (MACTEC, 2010a).

Site Setting. The general topographic relief of the Site is minimal. The Site elevation is approximately 100 feet above mean sea level, with the immediate Site gradient remaining flat. The surrounding topography is flat.

The majority of the Site is covered by pavement and grass, promoting rain water to runoff to storm drains located on the property. These storm drains connect to town owned storm drains located on Roosevelt Trail. There were no apparent low areas located on the Site that would be expected to contain standing water during wet periods. No surface water bodies were observed or identified on, or within a quarter-mile radius of the Site.

The Site and surrounding area are serviced by public water supply. The Site is mapped as being above a significant sand and gravel aquifer (Maine Geological Survey [MGS], 1998). Groundwater flow is to the northeast, towards Little Sebago Lake. Groundwater at the Site was encountered at between 13 feet and 15 feet below ground surface (bgs).

Based on the Maine Geological Survey, North Windham Quadrangle (MGS, 1998) bedrock surface beneath the Site is anticipated to range between 37 feet and 54 feet below ground surface. Based on the bedrock mapping completed by Arthur M Hussey in 1987 and taken from the North Windham Quadrangle Bedrock Geologic Map of Maine from 1987 (MGS, 1997a), the bedrock formation beneath the Site is mapped as:

- Granitoid Rock; including two-mica granite, granodiorite, quartz diorite and granitic pegmatite.

Soils at the Site were described using the surficial geologic mapping conducted by Bolduc, Thompson and Meglioli 1997, and taken from the Surficial Geology of the North Windham Quadrangle, Maine from 1997 (MGS, 1997b). Site soil is mapped as:

- A Glaciomarine Delta - Sand and gravel deposited in the sea at the glacier margin during marine submergence (i.e. deltas formed at the glacier margins). Locally overlies or is inter-stratified with the Presumpscot Formation.

Site Operational History. The Site has operated as a gasoline station since at least 1984. Site remediation occurred in 1996 and 2005 during product piping replacement and tank closure activities. In July 1996, CFI upgraded the product and vent piping, dispensers, submersible pumps and leak detection equipment at the Site (MEDEP, 1996). The steel piping was removed and found to be in excellent condition, but minor corrosion was observed on the above ground portion of the piping. Photoionization detector (PID) headspace readings collected from the stockpiled soil ranged from 112 parts per million (ppm) (from the bottom of the pipe trench between the dispensers) to 2,918 ppm (under the south dispenser). A soil sample was collected from six feet bgs below the south dispenser, and did not indicate characteristics of petroleum saturation. The MEDEP noted in Spill Report P-0456-1996 that there was contaminated soil above the MEDEP notification level. Mr. Nathan Thompson, MEDEP Response Services, issued a clean-up action of "... no remedial action is necessary at the Site" (MEDEP, 1996). In May 2005, Environmental Compliance Services, Inc. (ECS) conducted an Environmental Site Assessment (ECS, 2005). Four underground storage tanks (USTs) were removed from the Site, and a visual inspection of the single-walled fiberglass tanks was conducted. "All four tanks were found to be in very good condition. No perforations were observed during the inspection of the tanks". ECS observed some minor diesel contamination in the soil. Approximately 7.6 tons of contaminated soil was removed from the Site. The maximum PID reading was 91.25 ppm using MEDEP set points for diesel range organics (DRO). Confirmatory soil samples were collected from the excavation for off-Site analysis. Analysis of soil sample SS-10, located in the northwest corner of the UST excavation, detected gasoline range organics (GRO) at 4.2 milligrams per kilogram (mg/kg). GRO was not detected above the laboratory method detection limit in other on-Site soil samples collected.

There are several sites with documented environmental conditions located in close proximity to the Site (i.e. within 500 feet). Many of these properties are noted as being at potential up-gradient or cross-gradient locations. It is unknown if releases at these properties (primarily petroleum products) has impacted the Site groundwater or vapor conditions. These properties include reported leaking USTs at gasoline stations and commercial businesses (one approximately 350 feet upgradient).

As a result of the geologic setting of the Site and information concerning past operations at the property, a conceptual model of the Site with the following considerations was developed:

- Based on previous excavations and current borings, shallow overburden consist of fill material composed of medium coarse sand, miscellaneous building debris and pea stone to a depth of approximately 11 feet below ground surface. The Site is located on a mapped significant sand and gravel aquifer. Bedrock is anticipated between 37 feet and 54 feet below ground surface.
- Groundwater at the Site was encountered between 13 and 15 feet below ground surface, and is interpreted to flow towards the northeast.
- Operations at the Site and vicinity included the use of gasoline products from (at a minimum) 1984 to the present.

Potential Source Areas of Concern (AOCs) and Contaminants of Concern. The Phase I identified three Recognized Environmental Conditions (RECs) at the Site; 1) the potential presence of petroleum products in site media resulting from the current USTs and product piping lines, or spills to the ground surface; 2) residual contamination potentially remaining at the historic USTs and product piping lines; and 3) potential for contamination from an adjacent gasoline stations. Based on these RECs, MACTEC identified two potential AOCs at the Site:

AOC 1 – Potential Contamination from UST Replacement. Based on available information the historic USTs that were removed were located approximately 20 feet southwest from the current UST location. During the 2005 UST replacement, soil collected from the excavation contained GRO at a concentration of 4.2 milligrams per kilogram.

AOC 2 – Potential Contamination from Product Piping Line Replacement. The product piping lines were replaced 1996. During the line replacement, PID headspace readings were collected from the stockpiled soil and ranged from 112 ppm (from the bottom of the pipe trench between the dispensers) to 2,918 ppm (under the south dispenser).

Potential Migration Pathways. Potential migration paths at the Site include:

1. Petroleum related contaminants remaining in subsurface soils from historic product piping lines and USTs may have impacted groundwater under the Site. Volatile organic contaminants in groundwater that partition to soil vapor may migrate via the vadose zone to overlying buildings. Pathways for entry into buildings include utility trenches and migration through the building sub-slab backfill material.

2. If volatile organic compounds (VOCs) are present in Site soil and groundwater from the past use of fuels and or solvents, these contaminants could also migrate via the vadose zone as soil vapor to overlying buildings.

Potential Exposure Pathways. Potential exposure pathways include inhalation of soil vapor and indoor air, ingestion/dermal contact of soil, and/or ingestion of and dermal contact with groundwater.

Potential Receptors. Potential receptors include future site workers who might come in contact with soil, groundwater and soil vapor, and customers and adjacent residents that inhale indoor air if contaminated. The area is serviced by public water and although ingestion of groundwater is unlikely, it has been included as a potential future exposure route.

3.0 METHODOLOGIES

To evaluate the potential migration pathways and exposure routes identified in the CSM, a limited VI field investigation was conducted. The field work was conducted in accordance with the standard operating procedures (SOPs) listed in the Site-Specific Quality Assurance Project Plan (SSQAPP) (MACTEC, 2010b).

The field program was designed to evaluate the potential for vapor intrusion as a result of residual contamination at the two identified AOCs. Sample locations are shown on Figure 3.1.

The field work consisted of the following items:

- Completion of six direct push (Geoprobe) soil borings (some completed as microwells);
- Installation of five microwells;
- Collection of five groundwater samples;
- Installation of four soil vapor implants; and
- Collection of one sub-slab soil vapor sample from inside the facility.

Geoprobe Soil Sampling. Continuous soil samples were collected at six locations using direct push methods to characterize subsurface soils at potential source areas, as well as at microwell locations. Soil characteristics (such as soil type, moisture, color) and PID field screening results were recorded on a field data record (included in Appendix A). Potential for historic soil contamination was located at the fuel dispensers and the USTs. Given the location of underground utilities, borings were completed as close to the potential source areas as deemed safe. Due to the lack of observable petroleum, and the lack of PID readings above background above the water table, soil samples were not collected from the Site.

Geoprobe Microwell Installation. Upon the completion of soil sampling, five groundwater microwells were installed in the direct push soil borings (Figure 3.1). The objective of the microwell locations were to provide triangulation for estimating groundwater flow direction and gradient and to investigate shallow groundwater conditions in the source and outside the source areas. Drilling observations and microwell diagrams were recorded on field data records (included in Appendix A). Microwell locations are shown on Figure 3.1. Water levels are reported in Table 3.1.

Geoprobe Groundwater Sampling. Upon the completion of the microwell installations, five groundwater samples were collected through tubing installed to the top of the water table. Groundwater samples were submitted to an off-site laboratory for MA Volatile Petroleum Hydrocarbons (VPH) analysis. One groundwater sample in the vicinity of the septic tank was also submitted for VOC analysis by United States Environmental Protection Agency (USEPA) Method 8260. Upon completion of sampling, one round of water level elevation measurements was collected.

Soil Vapor Sampling Implants. Soil vapor samples were collected at four exterior locations to determine the vertical and lateral extent of soil vapor contamination and to evaluate the potential for vapor intrusion into nearby buildings. Soil vapor implants were installed in the following locations: two locations adjacent to the potential soil source areas (SV-02 at AOC 1 and SV-01 at AOC 2); one location approximately 20 feet from AOC 1 and 20 feet from AOC 2 (SV-05); and, one location within an underground utility trench using a hand screw auger (SV-03). With the exception of the soil vapor implants installed in the utility trenches, the implants were installed approximately two feet above the groundwater table (the water table was encountered at approximately 13 feet bgs). SV-03 was installed at approximately 4 feet bgs. Helium leak tests were conducted during sampling to evaluate the integrity of the vapor implant surface seal. Leaks greater than 2 % were not noted (10% to 20% leaks are acceptable in some states). In addition, similar concentrations of carbon dioxide and oxygen were noted in the pre-sample and post sample measurements. The samples were shipped to Alpha Analytical for analyses of Air Petroleum Hydrocarbons (APH) by MA APH method. The samples were also analyzed for carbon dioxide, and oxygen. In addition, three samples (plus duplicate) were analyzed for chlorinated VOCs by USEPA Method TO-15.

Sub-Slab Soil Vapor Sample. One sample was collected from below the concrete slab of the Site building to evaluate the potential presence of contaminants in soil vapor below the Site building. The sample was shipped to Alpha Analytical for analyses of APH by MA APH method, as well as for carbon dioxide and oxygen.

Survey. Sampling locations were surveyed by the MEDEP using a global positioning system with sub-meter accuracy. Vertical elevations of the microwells were surveyed by the MEDEP and MACTEC using an assumed site specific datum elevation of 100.00 feet.

4.0 RESULTS

This section of the report highlights field sampling results and findings, including a discussion of quality assurance and quality control.

4.1 QUALITY ASSURANCE

The laboratory did not report any data quality issues. One duplicate soil vapor sample was collected using a “T” in the soil vapor tubing. Results of the duplicate were comparable to the original sample, indicating good quality control (the relative percent difference between the sample and duplicate was 10 % or less). In addition, leak tests were conducted using helium as a tracer gas. Leaks greater than two percent were not noted, indicating good soil vapor seals (although Maine does not currently list an acceptable breakthrough concentration in its guidance, New York Guidance lists a breakthrough concentration of less than 10% as acceptable). Carbon dioxide measurements collected both before and after sampling were also similar, another indication that leaks within the vapor probe sample train were not significant and that the data quality was acceptable.

4.2 SOURCE AREA SOIL

Shallow overburden at the Site consists of fine to coarse sand. Contaminated “source area” soils were not encountered during the investigation. Three borings (SB-1, SB-2, and SB-3) were completed in the vicinity of the current and historic UST (AOC-1). PID readings above background and visible or olfactory signs of contamination were not noted above the water table. The boring completed nearest the fuel dispensers (AOC-2), SB-2 was located outside the historic source area, and visual, olfactory, and PID evidence of contamination was not noted above the water table. Based on these observations, MACTEC and MEDEP determined that soil samples were not to be collected for off-site analysis.

4.3 GROUNDWATER

Based on water level measurements collected, groundwater flow at the Site is to the northeast (Table 3.1 and Figure 4.1). GW-1 and GW-2 are located in the vicinity of AOC-1. GW-2 is also in the vicinity of, but slightly upgradient from AOC-2. Groundwater samples were collected from four boring locations. Although GW-6 is located downgradient of AOC-2, a groundwater sample was not collected from this location due to the previously anticipated groundwater flow direction to the southwest towards the Sebago Lake Basin (mirrowells were removed and sampling crew departed prior to calculation of flow direction). In addition, soil PID readings were not noted at this location below the water table.

Analytical results are presented on Table 3.2. Analytical detections were not reported in the upgradient sample GW-5, or in the down and slightly cross-gradient sample GW-4. Sample GW-1 was collected from within the historic UST tank grave. Individual VOCs were not detected in this groundwater sample; however petroleum hydrocarbon fractions were detected at concentrations above the Tier 1 Statewide Groundwater and Drinking Water Remediation Guidelines.

Fuel related VOCs and petroleum hydrocarbon fractions were detected in the groundwater sample from GW-2. Ethylbenzene (detected at 63 micrograms per liter ($\mu\text{g/L}$) compared to the MEG of $30\mu\text{g/L}$) and naphthalene (detected at $23\mu\text{g/L}$ compared to the MEG of $10\mu\text{g/L}$) were detected above their associated MEG. Petroleum hydrocarbon fractions were also detected above MEGs. Detected compounds and fractions did not exceed the Massachusetts GW-2 standard for the protection of overlying buildings from potential vapor intrusion.

4.4 SOIL VAPOR

For comparative purposes, concentrations of parameters detected in the soil vapor samples were compared to the MEDEP residential multi-contaminant chronic soil gas target values (assumes an attenuation factor of 0.02). Soil vapor results are reported on Table 3.3.

Individual fuel related VOCs were not detected in sample SV-1, located within the historic UST tank grave, and only low concentrations (below guidance values) of hydrocarbon fractions were detected. Several fuel related VOCs and petroleum hydrocarbon fractions were detected in sample

SV-2, although only ethylbenzene and C5-C8 Aliphatic hydrocarbon range were detected at concentrations above the target values. At distances further away from the source and towards the occupied building within the underground utility corridor, detected concentrations were lower in SV-3, although C5-C8 Aliphatic hydrocarbon range still exceeded the soil vapor residential target value. In addition, although low concentrations of fuel related VOCs and petroleum hydrocarbon fractions were detected in upgradient soil vapor sample SV-5 (25 feet upgradient of SV-2), with the exception of 1,3-butadiene, compounds were not detected above the residential soil gas target value. 1,3-butadiene was only detected in two samples, SV-2 and SV-5, and was only detected above the target value in SV-5.

Compounds were not detected above the residential soil gas target value in the soil vapor sample from below the Site building (SV-6). Concentrations detected in SV-6 were much lower than the concentrations detected in the other soil vapor samples collected closer to the source area.

There is no clear correlation or relationship between soil vapor concentrations and the measurements of carbon dioxide, oxygen, methane, and PID readings. This may simply reflect the relatively low concentrations of contaminants present.

5.0 CONCLUSIONS

This section summarizes the Site geology, groundwater movement, analytical results, correlation of analytical results and media, and recommendations.

Shallow overburden at the Site consists of fine to coarse sand. Groundwater was encountered at approximately 13 feet bgs in the vicinity of the former USTs and the fuel islands. Groundwater flow was interpreted to flow to the northeast.

Low concentrations of fuel related compounds were detected in groundwater and soil vapor at the Site. Due to the sandy overburden, preferential pathways for soil vapor migration (i.e. sandy utility bedding) were not identified at the Site.

Although concentrations of C5-C8 aromatic hydrocarbons and C9-C10 aliphatic hydrocarbons detected in groundwater sample GW-1 slightly exceeded drinking water standards, these compounds were not detected in soil vapor collected two feet above the water table at concentrations above the residential soil gas target values. Ethylbenzene and C5-C8 aromatic hydrocarbons also slightly exceeded drinking water standards in groundwater from GW-2. These compounds were detected in the soil vapor sample collected two feet above the water table at concentrations above the residential soil gas target value. Concentrations of detected compounds diminished with distance away from the source areas (fuel dispensers and USTs). This is likely due to both dispersion and aerobic degradation. Concentrations of C5-C8 aromatic hydrocarbons detected in the shallow utility corridor sample SV-03 slightly exceeded the residential target value, and concentrations of fuel related compounds were not detected in the sub-slab soil vapor sample SV-6 at concentrations above the residential target value.

Although oxygen concentrations increased and carbon dioxide concentrations decreased in the shallower soil vapor samples compared to the deeper soil vapor samples, a clear relationship between contamination and oxygen and carbon dioxide concentrations could not be formed. This may be due to the general low concentrations of contaminants detected.

In addition, although field and laboratory measurements of oxygen were fairly consistent, the field instrument used to measure carbon dioxide was not capable of accurately quantifying the higher concentrations present at the Site.

Although groundwater samples were not collected downgradient of the dispensers, PID readings at boring SB-6 (GW-6) and soil vapor detections at SV-3 do not indicate the potential for a direct exposure pathway downgradient of this source.

Results of the investigation do not indicate a significant source of fuel contamination at the Site. Although compounds or ranges of compounds were detected in soil vapor above the residential target value, the targets are based on attenuation through a buildings slab, and the higher concentrations were detected in the deeper exterior soil vapor samples. Results from the sub-slab vapor sample did not exceed the residential target value.

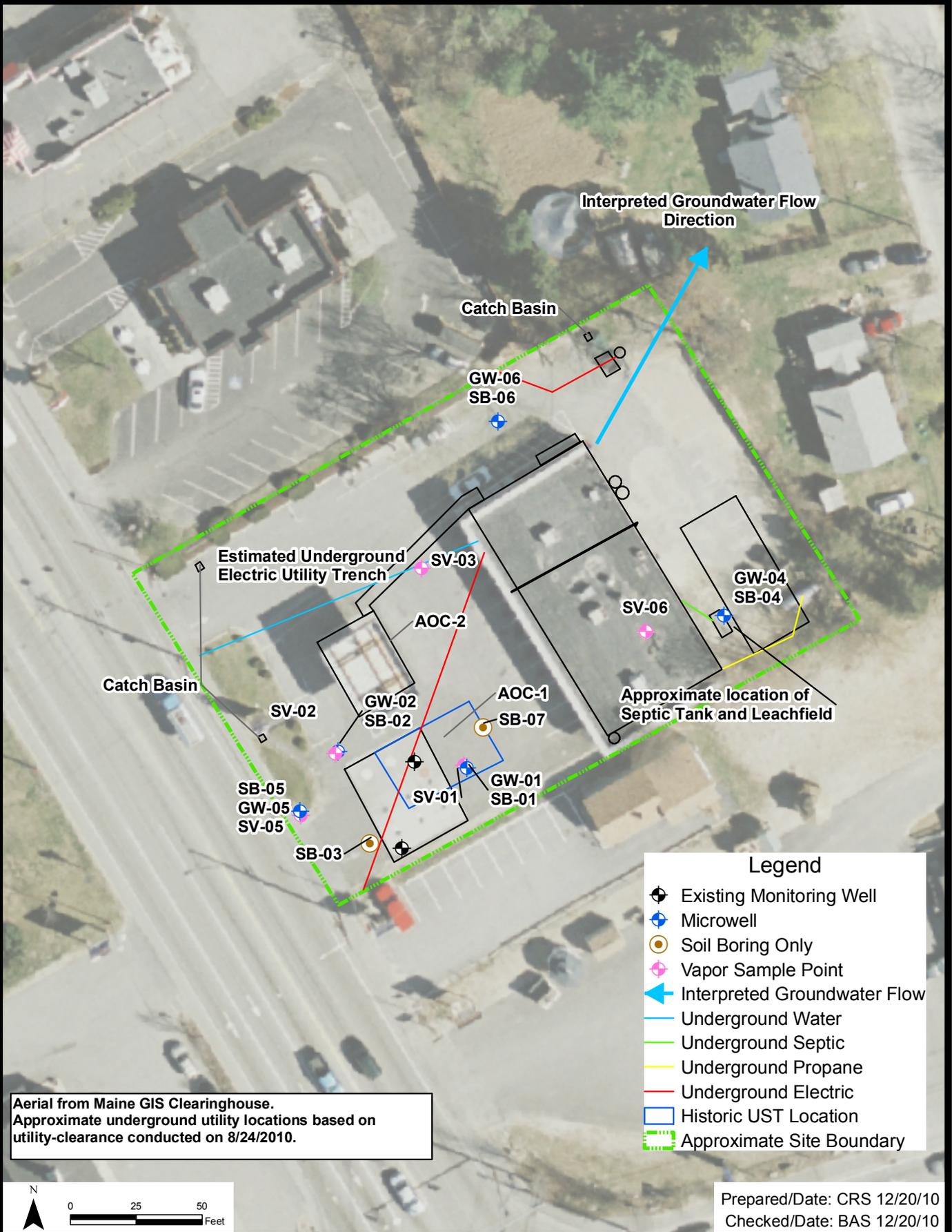
Based on the data collected, the site does not appear to pose a health risk from vapor intrusion, either to on-site receptors, or off-site receptors. Concentrations of VOCs diminished rapidly with distance away from the source areas, both horizontally, and vertically.

No further actions for vapor intrusion assessment are recommended for this Site.

6.0 REFERENCES

- ECS, 2005. Site Assessment During Underground Storage Tank Facility Closure, April 2004 at CFI #1836, 749 Roosevelt Trail, North Windham, Maine, Spill No. P-290-2005. June 16, 2005.
- MACTEC, 2010; Phase I Environmental Site Assessment - Cumberland Farms, Inc., Store # 1836, North Windham, Maine; Prepared for the Maine Department of Environmental Protection; August 2010.
- MGS, 1997a; Bedrock Geology map; North Windham, Quadrangle, Maine. Maine Geological Survey; Open File Number 97-43. 1997.
- MGS, 1997b; Surficial Geology map; North Windham, Quadrangle, Maine. Maine Geological Survey; Open File Number 97-41. 1997.
- MGS, 1998; Significant Sand and Gravel Aquifers; North Windham, Quadrangle, Maine. Maine Geological Survey; Open File Number 98-158. 1998.
- MEDEP, 1996. Oil and Hazardous Materials Report. Spill Number P-0456-1996. Completed by Nathan Thompson. Spill Date of 7/30/1996.
- MEDEP, 2005. Oil and Hazardous Materials Report. Spill Number P-290-2005. Completed by Steven Brezinski. Dated 4/19/2009.

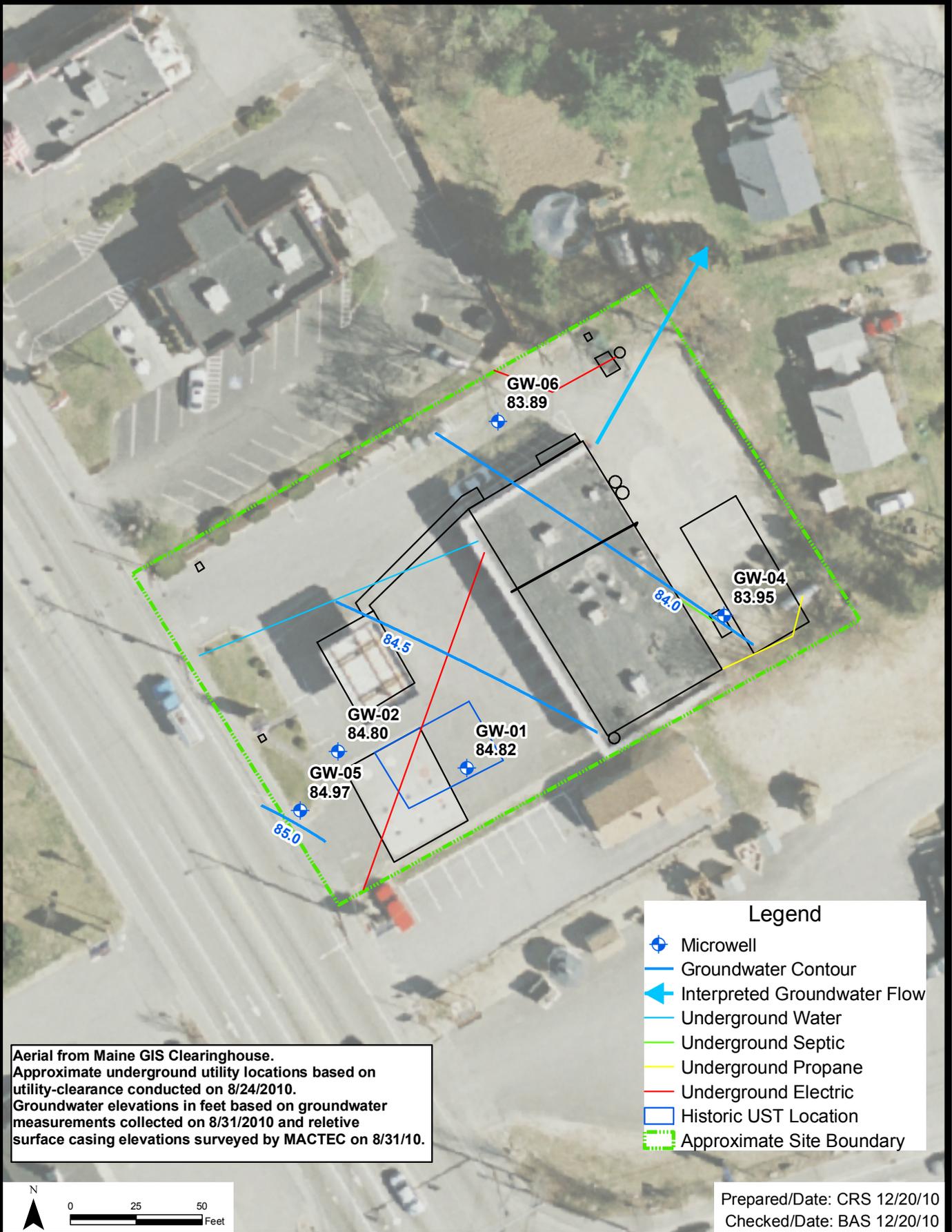
FIGURES



North Windham
 Cumberland Farms
 749 Roosevelt Trail



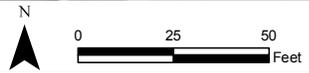
Sampling Locations
 Project 3612-10-2157
 Figure 3.1



Aerial from Maine GIS Clearinghouse.
 Approximate underground utility locations based on utility-clearance conducted on 8/24/2010.
 Groundwater elevations in feet based on groundwater measurements collected on 8/31/2010 and relative surface casing elevations surveyed by MACTEC on 8/31/10.

Legend

- Microwell
- Groundwater Contour
- Interpreted Groundwater Flow
- Underground Water
- Underground Septic
- Underground Propane
- Underground Electric
- Historic UST Location
- Approximate Site Boundary



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North Windham
 Cumberland Farms
 749 Roosevelt Trail



Interpreted Groundwater Contours
 Project 3612-10-2157
 Figure 4.1

TABLES

TABLE 3.1
GROUNDWATER MEASUREMENTS
CUMBERLAND FARMS STORE NO. 1836
NORTH WINDHAM SITE

Monitoring Point	Riser Elevation	Ground Surface Elevation	Depth to Water (TOR)	Groundwater Elevation
GW-1	98.33	98.58	13.51	84.82
GW-2	97.70	97.99	12.9	84.80
GW-4	99.33	99.54	15.38	83.95
GW-5	97.65	97.89	12.68	84.97
GW-6	98.31	98.60	14.42	83.89

Notes:

Elevations in feet and based on elevation of 100-feet at white paint mark on corner of concrete curb located at the northeast corner of the Site building.

Elevations surveyed and water levels collected by MACTEC on 8/31/10.

TOR = top of riser

TABLE 3.2
GROUNDWATER ANALYTICAL RESULTS
CUMBERLAND FARMS STORE NO. 1836
NORTH WINDHAM SITE

Parameter	MEG	MA-GW2	Sample Point Sample Depth Water Level Depth Sample Date Units	GW-1		GW-2		GW-4		GW-5	
				Concentration	Qualifier	Concentration	Qualifier	Concentration	Qualifier	Concentration	Qualifier
BENZENE	3	2,000	UG/L	5 U		5 U		5 U		5 U	
ETHYLBENZENE	30	20,000	UG/L	5 U		63		5 U		5 U	
METHYL-TERT-BUTYL ETHER (MTBE)	35	50,000	UG/L	5 U		5 U		5 U		5 U	
NAPHTHALENE	10	1,000	UG/L	5 U		23		5 U		5 U	
TOLUENE	600	50,000	UG/L	5 U		130		5 U		5 U	
XYLENE-M,P	1000	9,000	UG/L	10 U		260		10 U		10 U	
XYLENE-O	1000	9,000	UG/L	5 U		92		5 U		5 U	
C5-C8 ALIPHATIC HYDROCARBONS	300	3,000	UG/L	330		1100		100 U		100 U	
C9-C10 AROMATIC HYDROCARBONS	200	7,000	UG/L	1,800		840		100 U		100 U	
C9-C12 ALIPHATIC HYDROCARBONS	700	5,000	UG/L	1,000 U		540		100 U		100 U	
UNADJUSTED C5-C8 ALIPHATICS	300	3,000	UG/L	330		1200		100 U		100 U	
UNADJUSTED C9-C12 ALIPHATICS	700	5,000	UG/L	2,200		1,800		100 U		100 U	

Notes:

Samples analyzed by MA VPH (detections in **BOLD**).
 Depth in feet below measuring point or ground surface
 MEG = Maine Maximum Exposure Guidelines
 MA-GW2 = Massachusetts off gassing standards
Highlighted results exceed MEGs
 UG/L = Micrograms per liter
 U = not detected above reporting limit

TABLE 3.3
SOIL VAPOR ANALYTICAL RESULTS
CUMBERLAND FARMS STORE NO. 1836
NORTH WINDHAM SITE

Test Method	Parameter	Guidance	Sample Point Sample Type Sample Depth Water Depth Sample Date Units	SV-01		SV-02		SV-02 (duplicate)		SV-03		SV-05		SV-06									
				SOIL GAS	11	13	8/31/10 14:15	Concentration	Qualifier	SOIL GAS	10.5	13	8/31/10 10:21	Concentration	Qualifier	SOIL GAS	10.5	13	8/31/10 11:13	Concentration	Qualifier	SOIL GAS	1.5
MADEP-APH	1,3-BUTADIENE	4.05	UG/M3	2	U	2.3		2	U	2	U	9		2	U								
MADEP-APH	BENZENE	15.5	UG/M3	2	U	2.9		2.4		2	U	4.7		2	U								
MADEP-APH	ETHYLBENZENE	48.5	UG/M3	2	U	52		47		8.6		10		2	U								
MADEP-APH	M,P-XYLENE	1000	UG/M3	4	U	220		190		23		26		4	U								
MADEP-APH	METHYL-TERT-BUTYL ETHER (MTBE)	470	UG/M3	2	U	2	U	2	U	2	U	2	U	2	U								
MADEP-APH	NAPHTHALENE	3.6	UG/M3	2	U	2	U	2	U	2.2		2	U	2	U								
MADEP-APH	O-XYLENE	1000	UG/M3	2	U	74		65		9		8.2		2	U								
MADEP-APH	TOLUENE	50000	UG/M3	2	U	68		55		15		24		2.7									
MADEP-APH	C5-C8 ALIPHATIC HYDROCARBONS	2100	UG/M3	210		9700		8000		4300		450		61									
MADEP-APH	C9-C10 AROMATIC HYDROCARBONS	500	UG/M3	33		300		270		100		63		10	U								
MADEP-APH	C9-C12 ALIPHATIC HYDROCARBONS	2100	UG/M3	210		360		330		1300		100		16									
TO15	1,1,1-TRICHLOROETHANE	50000	UG/M3	1.09	U	1.09	U	1.09	U	1.09	U	--		--									
TO15	1,1-DICHLOROETHANE	75	UG/M3	0.809	U	0.809	U	0.809	U	0.809	U	--		--									
TO15	1,1-DICHLOROETHYLENE	2100	UG/M3	0.792	U	0.792	U	0.792	U	0.792	U	--		--									
TO15	1,2-DIBROMOETHANE	0.205	UG/M3	1.54	U	1.54	U	1.54	U	1.54	U	--		--									
TO15	1,2-DICHLOROETHANE	4.7	UG/M3	0.809	U	0.809	U	0.809	U	0.809	U	--		--									
TO15	CIS-1,2-DICHLOROETHENE	650	UG/M3	0.792	U	0.792	U	0.792	U	0.792	U	--		--									
TO15	TETRACHLOROETHYLENE	20.5	UG/M3	7.34		7.55		6.78		4.72		--		--									
TO15	TRANS-1,2-DICHLOROETHENE	650	UG/M3	0.792	U	0.792	U	0.792	U	0.792	U	--		--									
TO15	TRICHLOROETHYLENE	60	UG/M3	1.07	U	1.07	U	1.07	U	1.07	U	--		--									
TO15	VINYL CHLORIDE	27.5	UG/M3	0.511	U	0.511	U	0.511	U	0.511	U	--		--									
EPA METHOD 3C	CARBON DIOXIDE	%		13.8 D		5.35 D		5.39 D		5.27 D		3.98 D		1.17 D									
EPA METHOD 3C	OXYGEN GAS	%		2.49	U	12.3 D		12.4 D		12.9 D		13.3 D		16.8 D									
Ambient Air Measurements																							
FIELD	CARBON DIOXIDE	%		0.0403		0.047				0.0409		0.615		0.115									
FIELD	OXYGEN GAS	%		20.9		21.9				20.9		22.1		20.9									
FIELD	SUBSURFACE PRESSURE	Inch- H20		0.01	LT	0.005	LT			0.005	LT	0.005	LT										
Pre-Sample Measurements																							
FIELD	CARBON DIOXIDE	%		0.6 G		0.6 G				0.6 G		0.6 G		0.52									
FIELD	METHANE	%		0.5		0.5				0.25		0.55		0	U								
FIELD	OXYGEN GAS	%		0	U	12.8				15.1		15.1		17.5									
FIELD	PID SOIL GAS SCREEN	%		0.0001	LT	0.00001	LT			0.00006		0.00003		0	U								
Post-Sample Measurement																							
FIELD	CARBON DIOXIDE	%		0.6 G		0.6 G				0.6 G		0.6 G		0.6 G									
FIELD	OXYGEN GAS	%		0.1		12.8				14		15.1		16.6									

Note:
 Results as reported by the laboratory; detections in **BOLD**
 Guidance = residential multi contaminant chronic soil gas target (Table B10)
Highlighted results exceed Guidance value.
 UG/M3 = micrograms per cubic meter
 Qualifier
 U = not reported above detection limit
 D = result from dilution run
 LT = less than
 G = greater than

**APPENDIX A
FIELD DATA RECORDS**

**WELL/PIEZOMETER CONSTRUCTION DIAGRAM
FLUSHMOUNT**

LOCATION ID:

SB-01 / GW-01

Project Name: MEDEP. VI
 Project Location: N. Windham, ME
 Project Number: 3612102154 Task Number: 03.1
 Subcontractor: EPI Drilling Method: Direct Push
 Development Method: geopump Development Date: 18-31-10
 Bucking Posts/Ballards: _____
 Notes: depth to water (08-31-2010): 13.6' BTO 2

Date Started: 8/31/10 Date Completed: 8/31/10
 Logged By: C. Stapler
 Checked By: BAS Checked Date: 09-07-10

Measuring Point Information

Measuring Point (MP) Type: Top Of Riser
 MP Elevation (ft): 98.33

Item	Depth BMP (ft)	Elevation (ft)	Description
Surface Casing Elevation	<u>-0.05</u>	<u>98.58</u>	<p>Slope Away</p> <p>Surface Seal Type: <u>Niplt</u></p> <p>Lock Identification: <u>NA</u></p> <p>Stickup Casing Diameter: <u>4"</u></p> <p>Backfill/Grout Type: <u>SAND</u></p> <p>Riser Pipe Type: <u>PVC</u></p> <p>Riser Pipe ID: <u>1"</u></p> <p>Borehole Diameter: <u>2"</u></p> <p>Type of Seal: <u>Bentonite</u></p> <p>Screen Type: <u>PVC</u></p> <p>Screen ID: <u>1"</u></p> <p>Screen Slot Size: <u>0.01"</u></p> <p>Screen Length: <u>10'</u></p> <p>Filter/Sand Pack Type: <u>#10</u></p> <p>Sump: _____</p> <p>Fallback/Backfill: <u>-</u></p>
Ground Surface Elevation	<u>0</u>	<u>-</u>	
Riser Pipe (Top)	<u>-0.30</u>	<u>98.33</u>	
Top of Well Seal	<u>2.0</u>		
Top of Sand Pack	<u>4.0</u>		
Top of Screen	<u>6.0</u>		
Base of Screen	<u>16.0</u>		
End Cap	<u>16.0</u>		
Drilled Depth	<u>16.0</u>		
Bottom of Exploration	<u>16.0</u>		
Bedrock Surface	<u>-</u>		

NOT TO SCALE

SOIL BORING LOG



511 Congress Street, Portland Maine 04101

Project Name: MEDEF-VI	Boring ID: SB-02/GW-2
Project Location: N. Windham	Page No. 1
Project No.: 3612102154 Client: MEDEF	of: 1
Boring Location: SB-02	Refusal Depth: NA Total Depth: 20
Weather: 70° F clear	Soil Drilled: 20' Method: Direct Push
Subcontractor: EPI	P.I.D (eV): MiniRm 3000 Protection Level: D
Driller: D. Dionne	Date Started: 8/31/10 Date Completed: 8/31/10
Rig Type/Model: Geoprobe G6DT	Logged By: C. Staples Checked By: BAS 9/7/10
Reference Elevation: -	Water Level: 13.2' bgs Time: 0740
	Bore Hole ID/OD: 2"
	Casing Size: 2"
	Sampler: C-SAMPLER
	Sampler ID/OD: 12"
	Hammer Wt/Fall: -
	Hammer Type: -

Sample Information					Monitoring			Sample Description and Classification	USCS Group Symbol	Remarks	
Depth (feet bgs)	Sample Number	Penetration/Recovery (feet)	SPT Blows/6"	N Value	PID Field Scan	PID Headspace	Lab Tests Performed				Lab Sample ID
2	S1	2.0 / 4.0							Brown M+C SAND, poorly graded, moist	SP	
4	S2	2.6 / 4.0							Tan F+M SAND, uniform, p. graded, damp	SP	
6	S3	3.0 / 4.0							Tan M. SAND, uniform damp	SP	
8	S4	3.1 / 4.0							Tan M. SAND, uniform - saturated @ 0.4' - high PID @ water table	SP	▽
10	S5	3.5 / 4.0							Reddish Tan M. SAND, saturated 1. Hc fine SAND in section - 50% silt in bottom 0.4'	SP SM	
12											
14											
16											
18											
20									BOB @ 20' bgs		

NOTES: Vapor point SV-02 - 1' south
set to 10.5' bottom 6" screen - sand to 7', Bentonite to 5'

**WELL/PIEZOMETER CONSTRUCTION DIAGRAM
FLUSHMOUNT**

LOCATION ID:

SB-02 / GW-02

Project Name: MEDEP. VI
 Project Location: N. Windham
 Project Number: 3612102154 Task Number: 03.1
 Subcontractor: EPT Drilling Method: Direct Push
 Development Method: geopump Development Date: August 31, 2010
 Bucking Posts/Ballards: —
 Notes: depth to water (08-31-2010): 13.2' BTOR

Date Started: 8/31/10 Date Completed: 8/31/10
 Logged By: C. Staples
 Checked By: BTS Checked Date: 09-17-10

Measuring Point Information

Measuring Point (MP) Type: Top Of-Riser
 MP Elevation (ft): 97.70

Item	Depth ^{DMP} (ft)	Elevation (ft)	Description
Surface Casing Elevation	<u>Flush</u>	<u>97.99</u>	<p>Slope Away</p> <p>Surface Seal Type: <u>Concrete</u></p> <p>Lock Identification: <u>NA</u></p> <p>Stickup Casing Diameter: <u>4"</u></p> <p>Backfill/Grout Type: <u>Bentonite</u></p> <p>Riser Pipe Type: <u>PVC</u></p> <p>Riser Pipe ID: <u>1"</u></p> <p>Borehole Diameter: <u>2"</u></p> <p>Type of Seal: <u>Bentonite</u></p> <p>Screen Type: <u>PVC</u></p> <p>Screen ID: <u>2" - 0.01 slot</u></p> <p>Screen Slot Size: <u>—</u></p> <p>Screen Length: <u>10'</u></p> <p>Filter/Sand Pack Type: <u>#10 SAND</u></p> <p>Sump: <u>—</u></p> <p>Fallback/Backfill: <u>—</u></p>
Ground Surface Elevation	<u>—</u>	<u>—</u>	
Riser Pipe (Top)	<u>0.29</u>	<u>97.70</u>	
Top of Well Seal	<u>1'</u>	<u>—</u>	
Top of Sand Pack	<u>8'</u>	<u>—</u>	
Top of Screen	<u>10'</u>	<u>—</u>	
Base of Screen	<u>20'</u>	<u>—</u>	
End Cap	<u>20'</u>	<u>—</u>	
Drilled Depth	<u>20'</u>	<u>—</u>	
Bottom of Exploration	<u>20'</u>	<u>—</u>	
Bedrock Surface	<u>—</u>	<u>—</u>	

NOT TO SCALE

SOIL BORING LOG



511 Congress Street, Portland Maine 04101

Project Name: MEDEP -VT		Boring ID: SB-3
Project Location: N. Windham		Page No. 1
Project No.: 3612102154	Client: MEDEP	of: 1
Boring Location: SB-3	Refusal Depth: -	Total Depth: 16'
Weather: Clear 85°F	Soil Drilled: 16'	Method: Direct Push
Subcontractor: FPI	P.I.D (eV): Max Rng 3000	Protection Level: D
Driller: DIONNE	Date Started: 8/31/10	Date Completed: 9/31/10
Rig Type/Model: Geoprobe 66DT	Logged By: C. Staples	Checked By: BAJ 9/7/10
Reference Elevation: -	Water Level: ≈ 13' bgs	Time: 1100
		Hammer Wt/Fall: -
		Hammer Type: -

Sample Information							Monitoring			Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs)	Sample Number	Penetration/Recovery (feet)	SPT Blows/6"	N Value	PID Field Scan	PID Headspace	Lab Tests Performed	Lab Sample ID				
2	51	1.6 / 4.0			COI				Tan MOC SAND - dry	SP		
4		2.1 / 4.0			COI				Tan M. SAND - dry - uniform	SP		
6		3.0 / 4.0			COI				Tan M. SAND - Damp - uniform	SP		
8		2.8 / 4.0			COI				Tan M. SAND. some fine sand in 1" lenses. saturated @ 13'	SP	▼	
10												
12												
14												
16									BOB @ 16' bgs			
									- No wells or Vapor Points			

NOTES: No vapor point

SOIL BORING LOG



511 Congress Street, Portland Maine 04101

Project Name: MEDEP-VI		Boring ID: SB-4/GW-4
Project Location: N. Windham, ME		Page No. 1
Project No.: 3612102157	Client: MEDEP	of: 1
Boring Location: SB-4	Refusal Depth: —	Total Depth: 20'
Weather: Clear 90°F	Soil Drilled: 20"	Method: Direct Push
Subcontractor: EPI	P.I.D (eV): Mini Ram 3000	Protection Level: D
Driller: D. DIONNE	Date Started: 8/31/10	Date Completed: 8/31/10
Rig Type/Model: Geoprobe 66DT	Logged By: C. Staples	Checked By: BHS 9/2/10
Reference Elevation: NA	Water Level: 15.38 bbs	Time: 1600
		Bore Hole ID/OD: 2.25
		Casing Size: 2.25
		Sampler: 1.2 Geoprobe
		Sampler ID/OD: 1.2
		Hammer W/Fall: —
		Hammer Type: —

Sample Information				Monitoring				Sample Description and Classification	USCS Group Symbol	Remarks
Depth (feet bgs)	Sample Number	Penetration/Recovery (feet)	SPT Blows/6"	N Value	PID Field Scan	PID Headspace	Lab Tests Performed			
0.0										
2	S1	1.8 / 4.0			COIL ppm				SP	Brown granular to tan MAC SAND, dry poorly graded
4										
6	S2	2.5 / 4.0			COIL ppm				SP	Tan coarse SAND, damp. poorly graded
9										
10	S3	2.9 / 4.0			COIL ppm				SP	Tan M+C SAND, damp
12										
14	S4	2.8 / 4.0			< COIL ppm				SP	0-1.0 Same as S3 1.0-2.8 gray MAC SAND, little silt lenses - moist
16										
18		1.9 / 4.0			< 0.1 ppm				SP	Gray tan coarse SAND + F. Gravel saturated
20										BOB @ 20' bgs

NOTES:

set with GW-4 - No vapor point

CRS
checked by CRS 9/2/10

**WELL/PIEZOMETER CONSTRUCTION DIAGRAM
FLUSHMOUNT**

LOCATION ID:

SB-4/GW-4

Project Name: MEDEP. VI
 Project Location: N. Windham
 Project Number: 3612102154 Task Number: 03-1
 Subcontractor: FPI Drilling Method: Direct Push
 Development Method: glopump Development Date: 08/31/10
 Bucking Posts/Ballards: NA
 Notes: depth to water (08-31-10): 15.38' BTR

Date Started: 8/31/10 Date Completed: 8/31/10
 Logged By: C. Staples
 Checked By: BFS Checked Date: 09-07-10

Measuring Point Information

Measuring Point (MP) Type: Top Of Riser
 MP Elevation (ft): 99.33

Item	Depth BMP (ft)	Elevation (ft)	Description
Surface Casing Elevation	<u>0</u>	<u>99.54</u>	
Ground Surface Elevation	<u>-</u>		
Riser Pipe (Top)	<u>-0.28</u>	<u>99.33</u>	
Top of Well Seal	<u>2.0</u>		Surface Seal Type: <u>Asphalt</u>
Top of Sand Pack	<u>4.5</u>		Lock Identification: <u>NA</u>
Top of Screen	<u>10'</u>		Stickup Casing Diameter: <u>4"</u>
Base of Screen	<u>20'</u>		Backfill/Grout Type: <u>- SAND</u>
End Cap	<u>20.0'</u>		Riser Pipe Type: <u>PVC</u>
Drilled Depth	<u>20'</u>		Riser Pipe ID: <u>1"</u>
Bottom of Exploration	<u>20'</u>		Borehole Diameter: <u>2.25"</u>
Bedrock Surface	<u>-</u>		Type of Seal: <u>Bentonite</u>
			Screen Type: <u>PVC</u>
			Screen ID: <u>1"</u>
			Screen Slot Size: <u>0.01"</u>
			Screen Length: <u>10'</u>
			Filter/Sand Pack Type: <u>#0</u>
			Sump:
			Fallback/Backfill:

NOT TO SCALE

**WELL/PIEZOMETER CONSTRUCTION DIAGRAM
FLUSHMOUNT**

LOCATION ID:

SB/GW-5

Project Name: MEDEP-VI
 Project Location: N. Windham
 Project Number: 3612102154 Task Number: 03.1
 Subcontractor: EPI Drilling Method: Direct Push
 Development Method: gco pump Development Date: 08-31-10
 Bucking Posts/Ballards: -
 Notes: depth to water: 12.68' BTR (08-31-10).

Date Started: 8/31/10 Date Completed: 8/31/10
 Logged By: C. S. Taylor
 Checked By: PTS Checked Date: 09-07-10

Measuring Point Information

Measuring Point (MP) Type: Top Of Riser
 MP Elevation (ft): 97.65

Item	Depth BMP (ft)	Elevation (ft)	Description
Surface Casing Elevation	<u>Flush</u>	<u>97.89</u>	<p>Slope Away</p> <p>Surface Seal Type: <u>concrete</u></p> <p>Lock Identification: <u>NA.</u></p> <p>Stickup Casing Diameter: <u>4"</u></p> <p>Backfill/Grout Type: <u>SAND</u></p> <p>Riser Pipe Type: <u>PVC</u></p> <p>Riser Pipe ID: <u>1"</u></p> <p>Borehole Diameter: <u>2"</u></p> <p>Type of Seal: <u>bentonite</u></p> <p>Screen Type: <u>PVC</u></p> <p>Screen ID: <u>1"</u></p> <p>Screen Slot Size: <u>0.01"</u></p> <p>Screen Length: <u>10'</u></p> <p>Filter/Sand Pack Type: <u>#0</u></p> <p>Sump:</p> <p>Fallback/Backfill: <u>-</u></p>
Ground Surface Elevation	<u>-</u>		
Riser Pipe (Top)	<u>-3.5</u>	<u>97.65</u>	
Top of Well Seal	<u>3.0'</u>		
Top of Sand Pack	<u>4.5'</u>		
Top of Screen	<u>6.0'</u>		
Base of Screen	<u>16.0'</u>		
End Cap	<u>-</u>		
Drilled Depth	<u>16.0'</u>		
Bottom of Exploration	<u>16.0'</u>		
Bedrock Surface	<u>NA</u>		

NOT TO SCALE

**WELL/PIEZOMETER CONSTRUCTION DIAGRAM
FLUSHMOUNT**

LOCATION ID:

GW-6 / SB-06

Project Name: MEDEP-VI
 Project Location: N-Windham
 Project Number: 3612102154 Task Number: 03.1
 Subcontractor: EPI Drilling Method: Direct Push
 Development Method: grout pump Development Date: 08-31-10
 Bucking Posts/Ballards: -
 Notes: depth to water = 14.42' RPA (08-31-2010)

Date Started: 8/31/10 Date Completed: 8/31/10
 Logged By: C. Staples
 Checked By: BA Checked Date: 09-07-10

Measuring Point Information

Measuring Point (MP) Type: Top Of Riser
 MP Elevation (ft): 98.31

Item	Depth BMP (ft) BGS	Elevation (ft)	Description
Surface Casing Elevation	-0.00	98.60	Slope Away
Ground Surface Elevation	-		Surface Seal Type: <u>Asphalt</u>
Riser Pipe (Top)	0.29' btor	98.31	Lock Identification: <u>-</u>
			Stickup Casing Diameter: <u>1"</u>
			Backfill/Grout Type: <u>SAND</u>
			Riser Pipe Type: <u>PVC</u>
			Riser Pipe ID: <u>1"</u>
Top of Well Seal	5.0'		Borehole Diameter: <u>2"</u>
Top of Sand Pack	8.0'		Type of Seal: <u>Bentonite</u>
Top of Screen	10.0'		Screen Type: <u>PVC</u>
			Screen ID: <u>1"</u>
			Screen Slot Size: <u>0.01"</u>
			Screen Length: <u>10'</u>
Base of Screen	20.0'		Filter/Sand Pack Type: <u>#0 SAND</u>
End Cap	-		Sump:
Drilled Depth	20.0'		Fallback/Backfill: <u>- NA</u>
Bottom of Exploration	20.0'		
Bedrock Surface	NA		

NOT TO SCALE

SOIL BORING LOG



511 Congress Street, Portland Maine 04101

Project Name: MEDEP - VI		Boring ID: SB-7
Project Location: N. Windham ME		Page No. 1
Project No.: 3612102159	Client: MEDEP	of: 1
Boring Location: SB-7	Refusal Depth: NA	Total Depth: 16'
Weather: 80°F Clear	Soil Drilled: 16'	Method: Direct Push
Subcontractor: FPI	P.I.D (eV): M. M. Rose 3000	Protection Level: D
Driller: D. DIONNE	Date Started: 8/31/10	Date Completed: 9/31/10
Rig Type/Model: Geoprobe 66 DF	Logged By: C. Stapler	Checked By: BAS 9/7/10
Reference Elevation: -	Water Level: ≈ 12' bgs	Time: 0945

Sample Information					Monitoring			Sample Description and Classification	USCS Group Symbol	Remarks	
Depth (feet bgs)	Sample Number	Penetration/Recovery (feet)	SPT Blows/6"	N Value	PID Field Scan	PID Headspace	Lab Tests Performed				Lab Sample ID
0.0											
2		11.00 DUG			300 ppm					Brown - M+C SAND, bit concrete - hand dug	
4											
6		1.5 4.0			20.1 ppm					Gravelly fill - bit brick	GR SF
8											
10		1.0 4.0			20.1 ppm					Tan F SAND - Damp uniform	SP
12											
14		3.0 4.0			20.1					Tan M+C SAND - saturated @ 12' bgs	SP
16					0.15 ppm @ 14'						
					4.5 ppm @ 15'						
										BOB @ 16' bgs	

NOTES: No well or vapor point

SOIL VAPOR IMPLANT SAMPLING RECORD



511 Congress Street, Portland Maine 04101

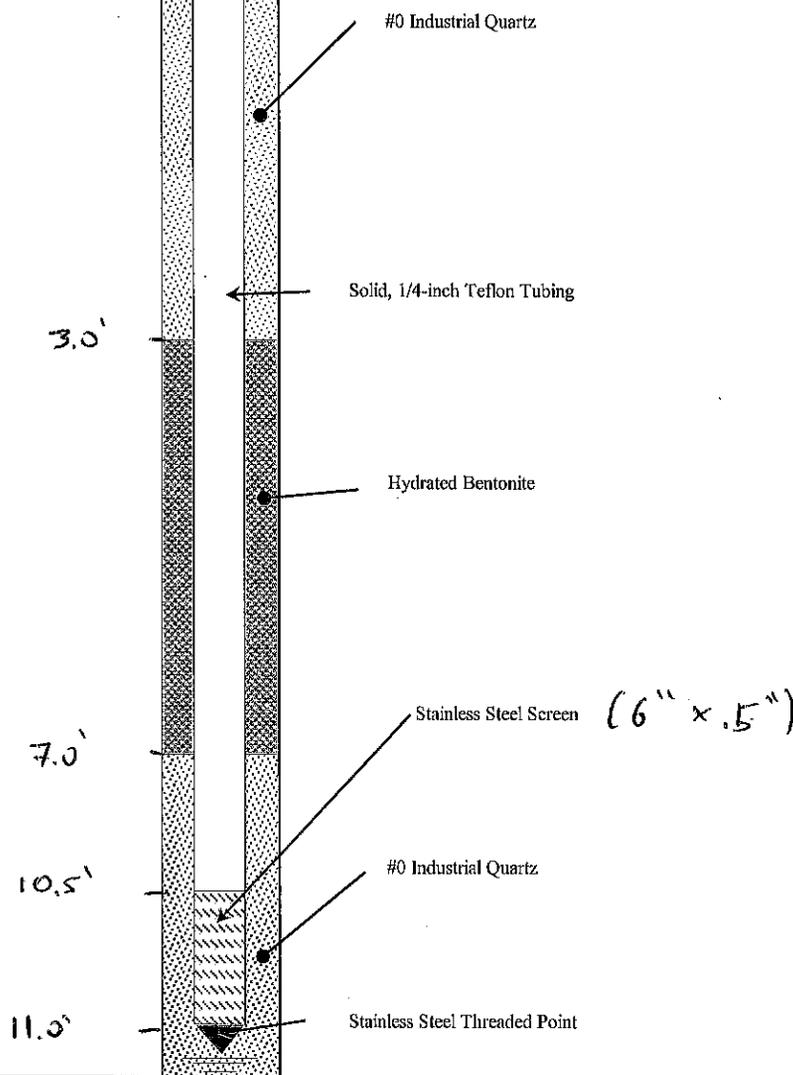
Project Name: CFI - MEDEP VI Study		Boring ID: SV-01
Project Location: N. Windham		Page No. 1
Project No.: 3612102157	Client: MEDEP	of: 1
Boring Location: SV-01	Refusal Depth: -	Total Depth: 2.5
Weather: 85°F Clear	Soil Drilled: -	Method: Direct Push
Subcontractor: EPI	P.L.D (eV): 10.8	Protection Level: D
Driller: Dave Dionne	Date Started: 8/31/10	Date Completed: 8/31/10
Rig Type/Model: Track Mounted	Logged By: CRS	Checked By: BJS 9/7/10
Reference Elevation: -	Water Level: 13.5'	Time: NA
He Breakthrough %: 0	Initial He %: 100+	Final He %: 91.8

Overburden Drilling Notes:

Soil Vapor
Diagram

Ft BGS
Flush mount

Soil Vapor Point Construction Notes:

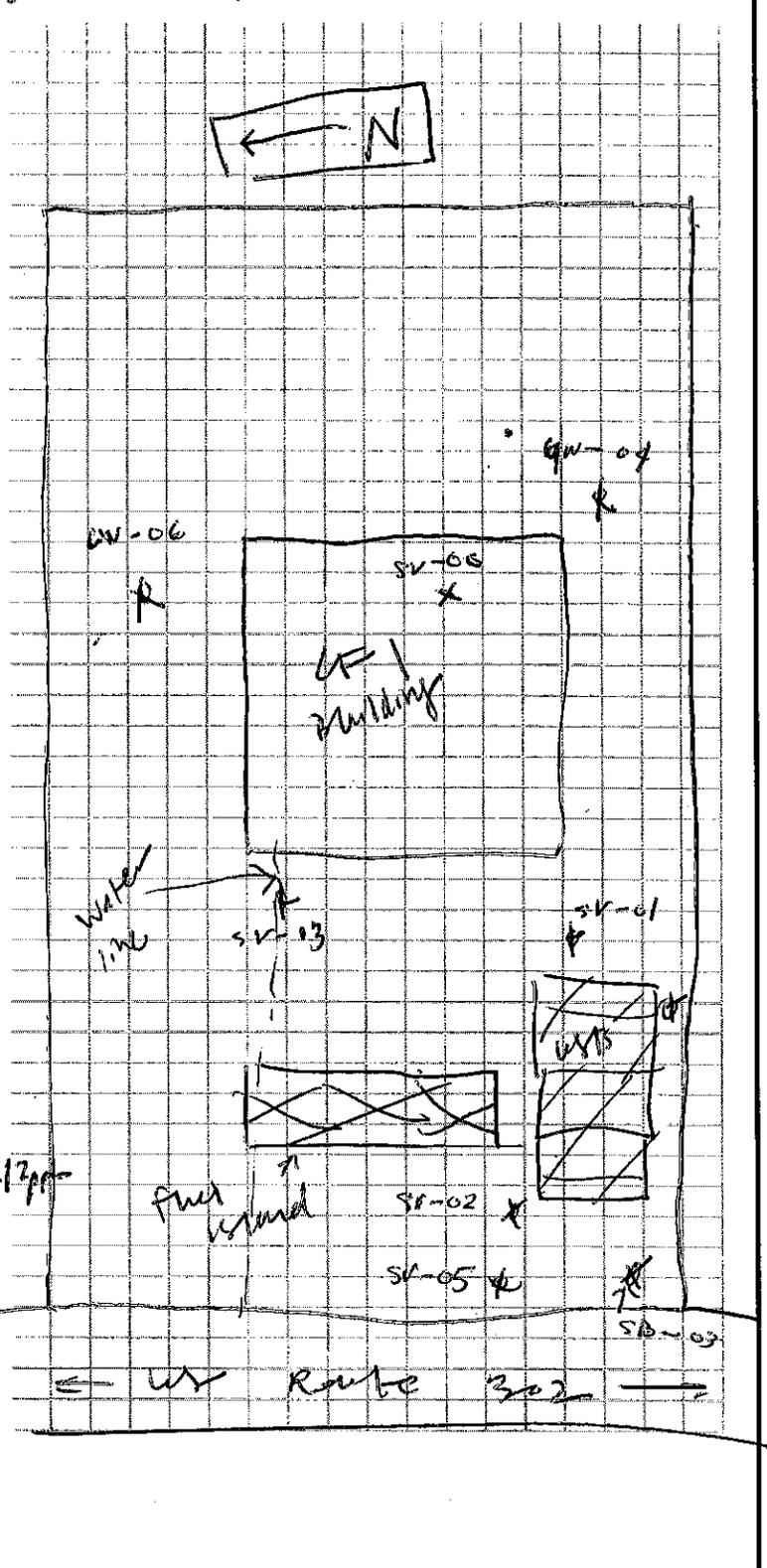


NOTES:

**Soil Gas Sampling Field Sheet
Maine DEP**

Site Name:	CFI - Windham (MEDDP V1)
Town:	Windham, ME
Date:	August 31, 2010
Sample I.D.:	SV-01
Sampling Purpose	(Source) (Utility) (Mitigation) (Receptor) (Other)
Sampling Personnel:	B. Shaw / O. Staples
Project Manager:	Peter Eremity
Collection Device:	(Summa Can) (Tedlar Bag)
Sample Penetration Location:	(Asphalt) (Concrete) (Soil)
Soil Type:	(Fill) (Till) (Sand & Gravel) (Glacial Marine)
Sample Depth:	11' bgs
Depth to Water:	~13' bgs
Suspected COCs:	(Petroleum) (Solvents)
Cannister I.D.:	230
Flow Control I.D.:	265
Flow control rate:	~100 ml/min
O ₂ Ambient:	20.9%
CO ₂ Ambient:	403 ppm
subsurface pressure/vacuum	— (+/- inches of water column)
Pre-Sample O ₂ :	0.0%
Pre-Sample CO ₂ :	7600 ppm (LEL: 10)
Pre-Sample PID:	278 ppb 1 part 2/2 ppb
Pre-Sample CH ₄ :	60% 312 (% Volume, %LEL, PPM)
Sample Initiation Time:	1340.
Initial Vacuum:	-30"
Sample End Time:	1415
Final Vacuum:	-4"
Post Sample O ₂ :	0.1%
Post Sample CO ₂ :	7600 ppm (LEL 12)

Sample Location Sketch



Notes:
 Helium Leak test:
 He in bucket: 100% +
 He in sample point: 0 ppb
 He in bucket after venting: 91.8%

Post the leak test:
 - remaining in bucket: 98.1%
 - in sample pt: 0 ppb

Checked by CES 9/7/10

SOIL VAPOR IMPLANT SAMPLING RECORD



511 Congress Street, Portland Maine 04101

Project Name: CFI - MEDEP VI Study		Boring ID: SV - 02
Project Location: <i>N. Windham</i>		Page No. 1
Project No.: 3612102157	Client: MEDEP	of: 1
Boring Location: <i>SV-02</i>	Refusal Depth: —	Total Depth: <i>20'</i>
Weather: <i>70°F clear</i>	Soil Drilled: <i>20'</i>	Method: Direct Push
Subcontractor: EPI	P.L.D (eV): 10.8	Protection Level: D
Driller: Dave Dionne	Date Started: <i>8/31/10</i>	Date Completed: <i>8/31/10</i>
Rig Type/Model: Track Mounted	Logged By: CRS	Checked By: <i>RTS 9/7/10</i>
Reference Elevation: —	Water Level: <i>12.9'</i>	Time: <i>NA</i>
He Breakthrough %: <i>0</i>	Initial He %: <i>100%</i>	Final He %: <i>88.9</i>

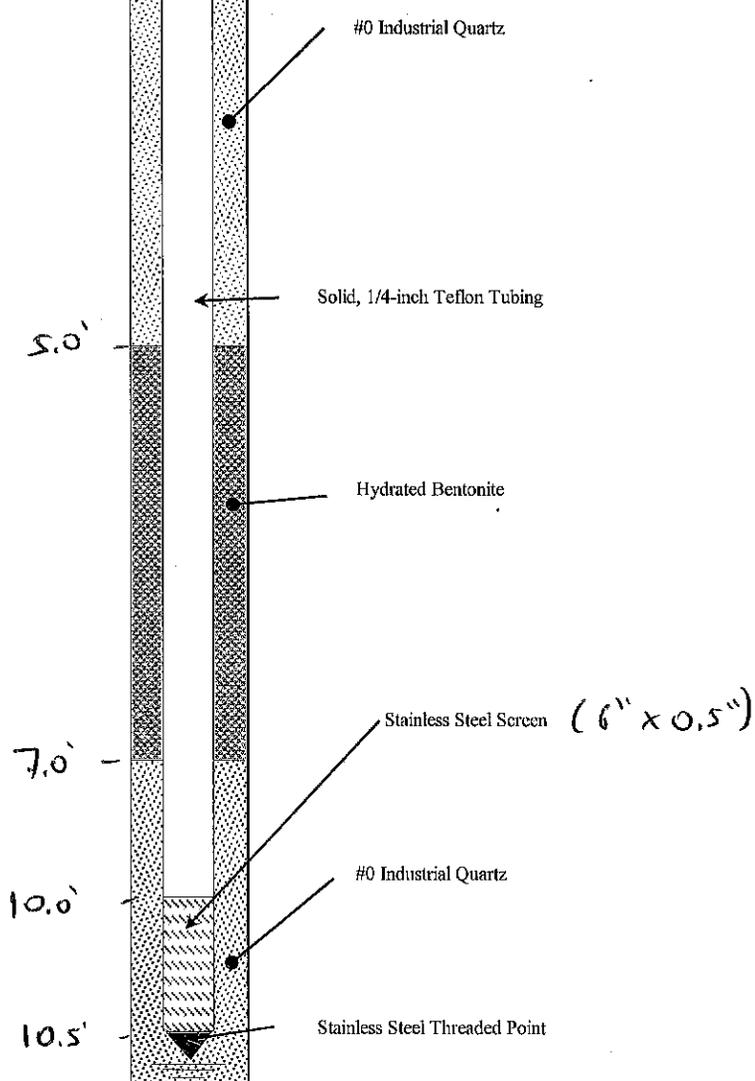
Overburden Drilling Notes:

Soil Vapor
Diagram

FT BGS

Soil Vapor Point Construction Notes:

Flush Mount

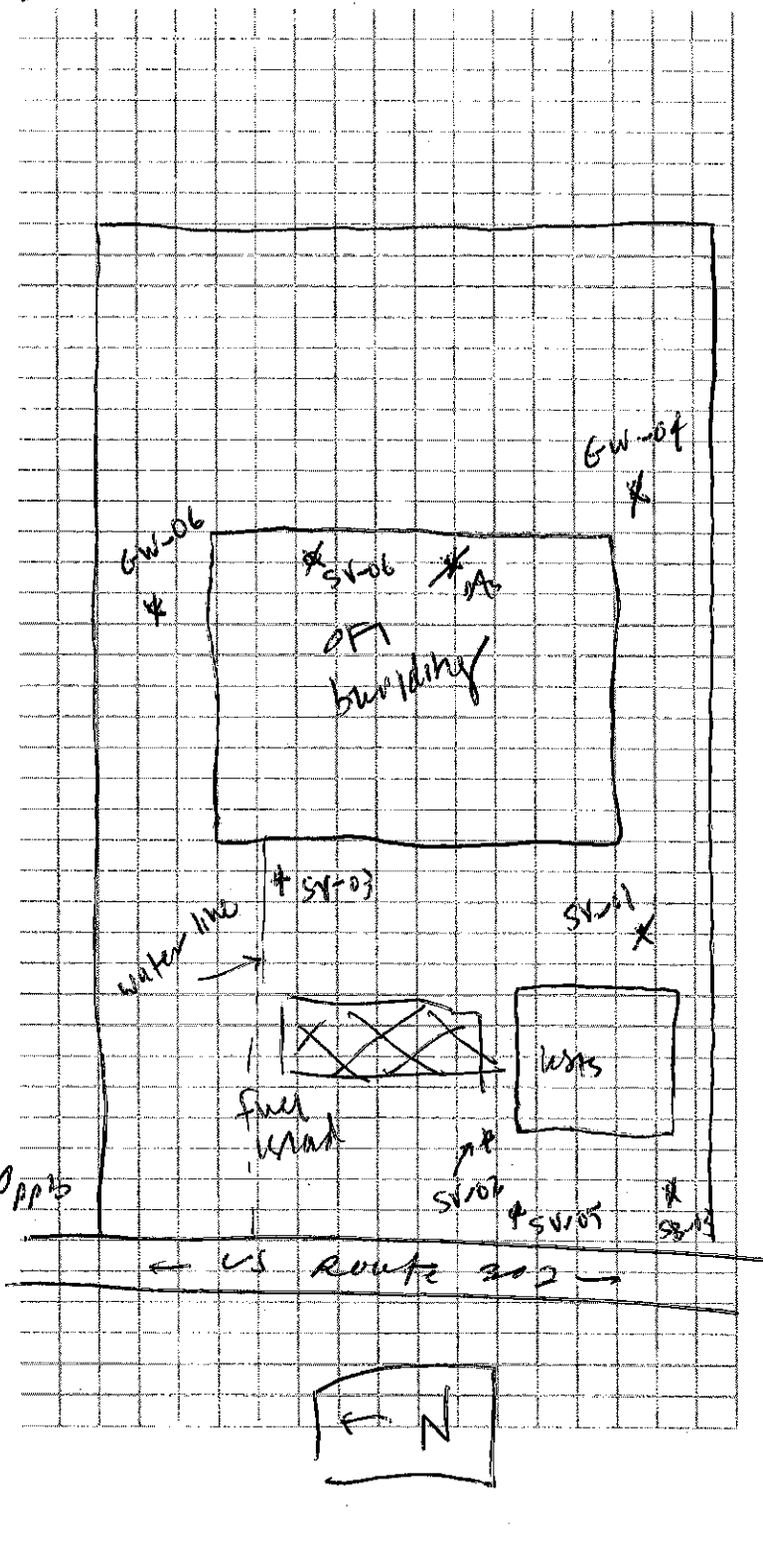


NOTES:

Soil Gas Sampling Field Sheet
Maine DEP

Site Name:	CFI - Windham (MSP-1).
Town:	North Windham, ME
Date:	August 21, 2016
Sample I.D.:	SV-02
Sampling Purpose	(Source) (Utility) (Mitigation) (Receptor) (Other)
Sampling Personnel:	B. Shaw / Costyles
Project Manager	Peter Drexler
Collection Device:	(Summa Can) (Tedlar Bag)
Sample Penetration Location:	(Asphalt) (Concrete) (Soil)
Soil Type:	(Fill) (Till) (Sand & Gravel) (Glacial Marine)
Sample Depth:	~ 10' bgs
Depth to Water:	13.1' bgs
Suspected COCs:	(Petroleum) (Solvents)
Cannister I.D.:	390 ; Dup: 320
Flow Control I.D.:	0176 ; Dup: 0287
Flow control rate:	~ 100 ml/min
O ₂ Ambient	21.9% (LEL: 5).
CO ₂ Ambient	470 ppm
subsurface pressure/vacuum	— (+/- inches of water column)
Pre-Sample O ₂	12.8
Pre-Sample CO ₂	> 6000 ppm
Pre-Sample PID:	0.06 p.p.t., post: 900 p.p.t.
Pre-Sample CH ₄ :	LEL: 10 (Dup: 10) (% Volume, %LEL, PPM)
Sample Initiation Time:	0950 ; Dup: 0950-1050
Initial Vacuum:	-30 ; Dup: -30+
Sample End Time:	1021 ; Dup: 1016
Final Vacuum:	-4 ; Dup: -4
Post Sample O ₂ :	12.8%.
Post Sample CO ₂ :	> 6000 ppm; LEL: 11

Sample Location Sketch



Notes: Helium leak test @ SV-02.
 He in bucket: 100% +
 He in sample point: 0 ppm-
 He in bucket after: 88.9%

Helium post sample:
 in bucket: 58.7%
 sample point: 0 ppm-

Checked by CRS 9/7/16

SOIL VAPOR IMPLANT SAMPLING RECORD



511 Congress Street, Portland Maine 04101

Project Name: CFI - MEDEP VI Study		Boring ID: SV - 03
Project Location: Windham, ME		Page No. 1
Project No.: 3612102157	Client: MEDEP	of: 1
Boring Location: water line trench	Refusal Depth: NA	Total Depth: 4.2' bgs
Weather: 90°F, Sunny	Soil Drilled: Sand	Method: Direct Push / Auger
Subcontractor: EPI	P.I.D (eV): 10.8	Protection Level: D
Driller: Dave Dionne	Date Started: August 31, 2010	Date Completed: 8-31-10
Rig Type/Model: Track Mounted	Logged By: CRS bats	Checked By: CRS 9/2/10
Reference Elevation: unknown	Water Level: unknown	Time: NA
He Breakthrough %: 14,600 ppm	Initial He %: 100%	Final He %: 91.9

Overburden Drilling Notes:

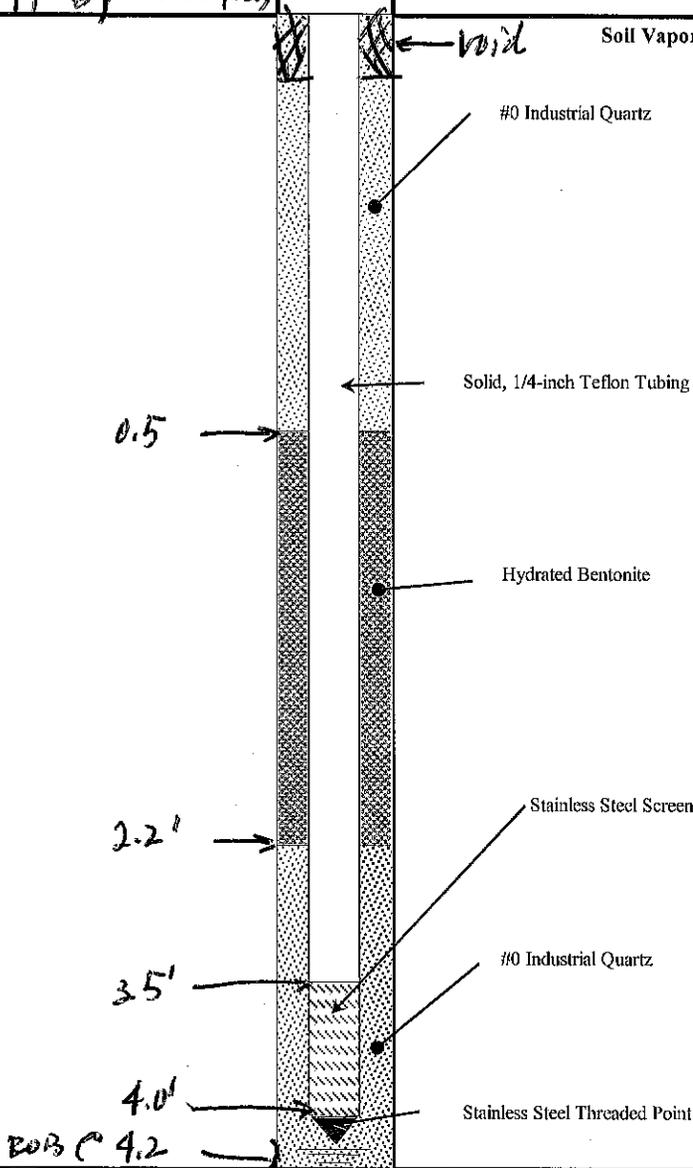
At

Depth measurements
(in ft' b ground surface)

Soil Vapor
Diagram

Constructed soil vapor point with jack
hammer and bucket auger

Soil Vapor Point Construction Notes:

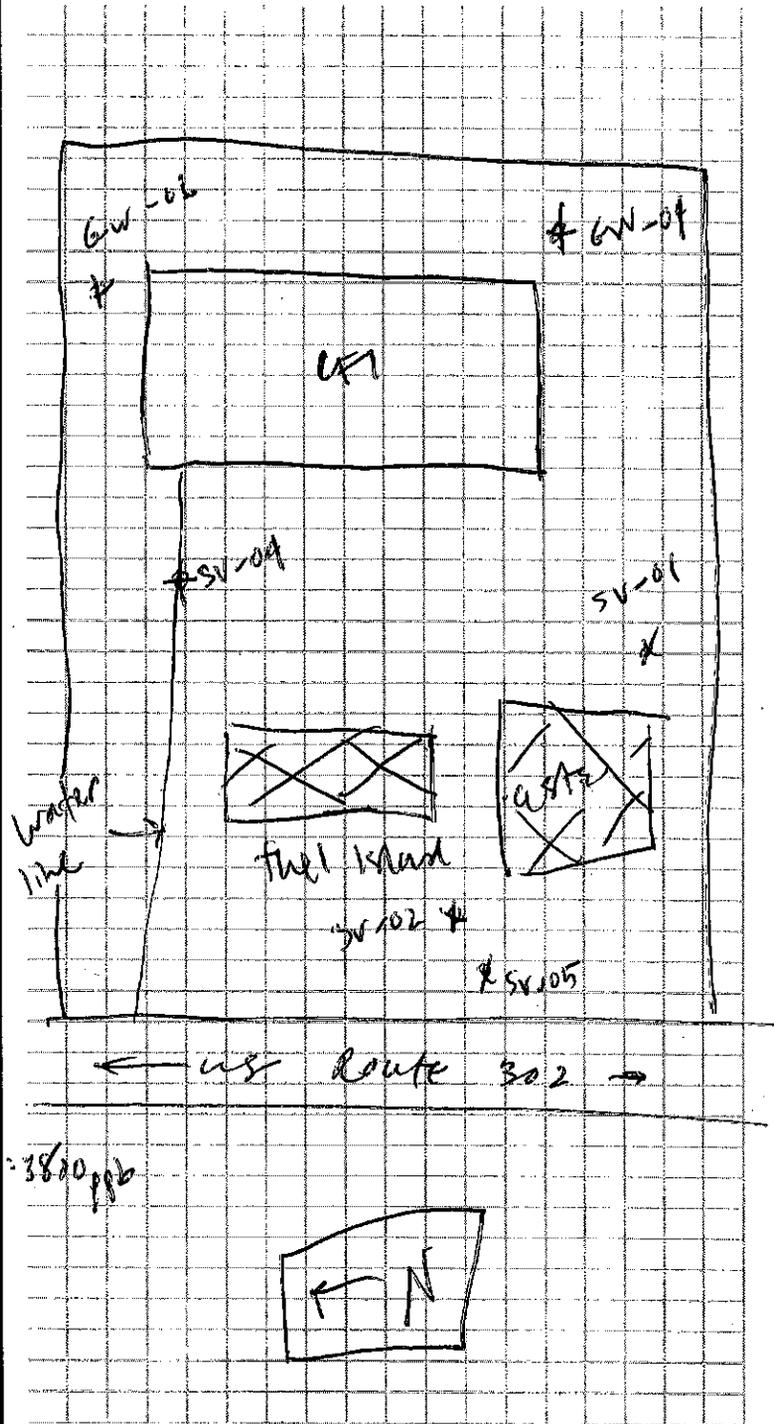


NOTES: In water service utility trench; water line estimated to be approximately 4 to 5 feet bgs.

**Soil Gas Sampling Field Sheet
Maine DEP**

Site Name:	CR1 - Windham (Maine DEP)
Town:	Windham, ME
Date:	August 31, 2010
Sample I.D.:	SV-03
Sampling Purpose:	(Source) (Utility) (Mitigation) (Receptor) (Other)
Sampling Personnel:	B. Shaw / C. Staples
Project Manager:	Peter Eremita
Collection Device:	(Summa Can) (Tedlar Bag)
Sample Penetration Location:	(Asphalt) (Concrete) (Soil)
Soil Type:	(Fill) (Till) (Sand & Gravel) (Glacial Marine)
Sample Depth:	4.2' bgs
Depth to Water:	Unknown
Suspected COCs:	(Petroleum) (Solvents)
Cannister I.D.:	515
Flow Control I.D.:	0062
Flow control rate:	~100 ml/min
O ₂ Ambient:	20.9%
CO ₂ Ambient:	909 ppm
subsurface pressure/vacuum:	— (± Inches of water column)
Pre-Sample O ₂ :	15.1%
Pre-Sample CO ₂ :	>6000 ppm (LEL: 5)
Pre-Sample PID:	6220 ppm, ppt: 3800 ppb
Pre-Sample CH ₄ :	— (% Volume, %LEL, PPM)
Sample Initiation Time:	1534
Initial Vacuum:	-30"
Sample End Time:	1625
Final Vacuum:	-15"
Post Sample O ₂ :	14.0%
Post Sample CO ₂ :	7600 LEL: 5

Sample Location Sketch



Notes: Undertaken Helium breakthrough test
 - He in bucket = 100%
 - He in sample point = 14600 ppm (<2%)
 - He after in bucket = 91.9%
 post He test: NA

checked by CR1 9/2/10

SOIL VAPOR IMPLANT SAMPLING RECORD



511 Congress Street, Portland Maine 04101

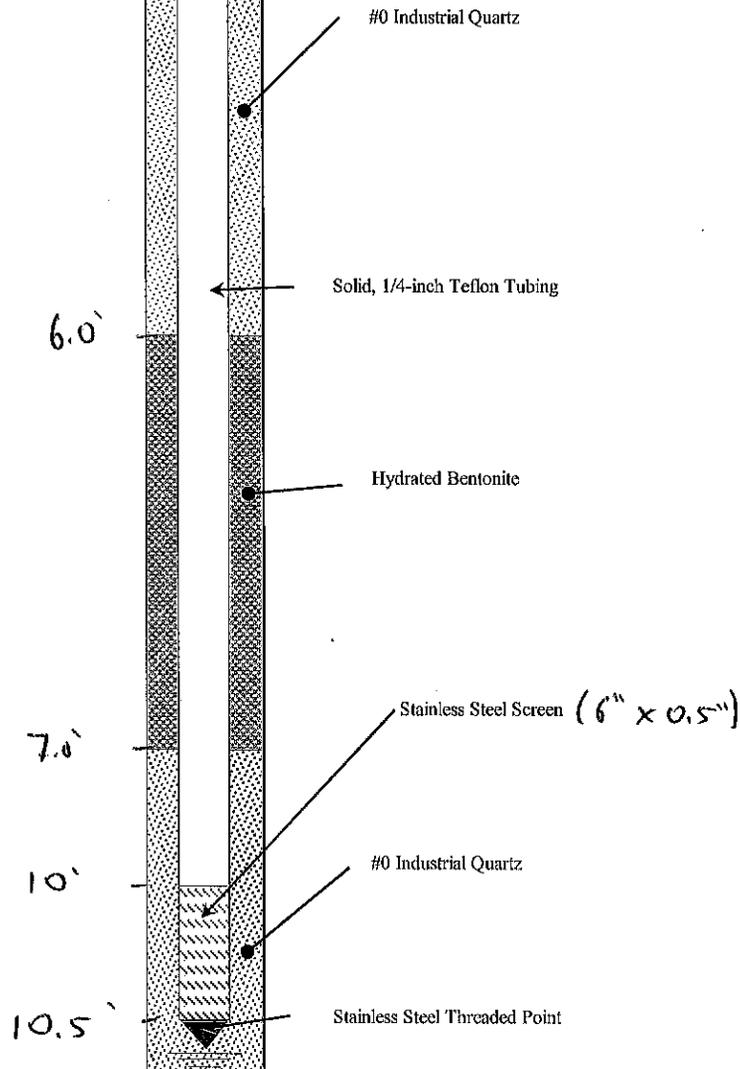
Project Name: CPI - MEDEP VI Study	Boring ID: SV - 05
Project Location: N. Windham	Page No. 1
Project No.: 3612102157 Client: MEDEP	of: 1
Boring Location: SV-05	Refusal Depth: - Total Depth: 16'
Weather: Clear 80°F	Soil Drilled: 16' Method: Direct Push
Subcontractor: EPI	P.I.D (eV): 10.8 Protection Level: D
Driller: Dave Dionne	Date Started: 8/31/10 Date Completed: 8/31/10
Rig Type/Model: Track Mounted	Logged By: CRS Checked By: BAS 9/7/10
Reference Elevation: -	Water Level: 12.7' Time: NA
He Breakthrough %: NA	Initial He %: NA Final He %: NA

Overburden Drilling Notes:

Flush Mount
FT BGS

Soil Vapor
Diagram

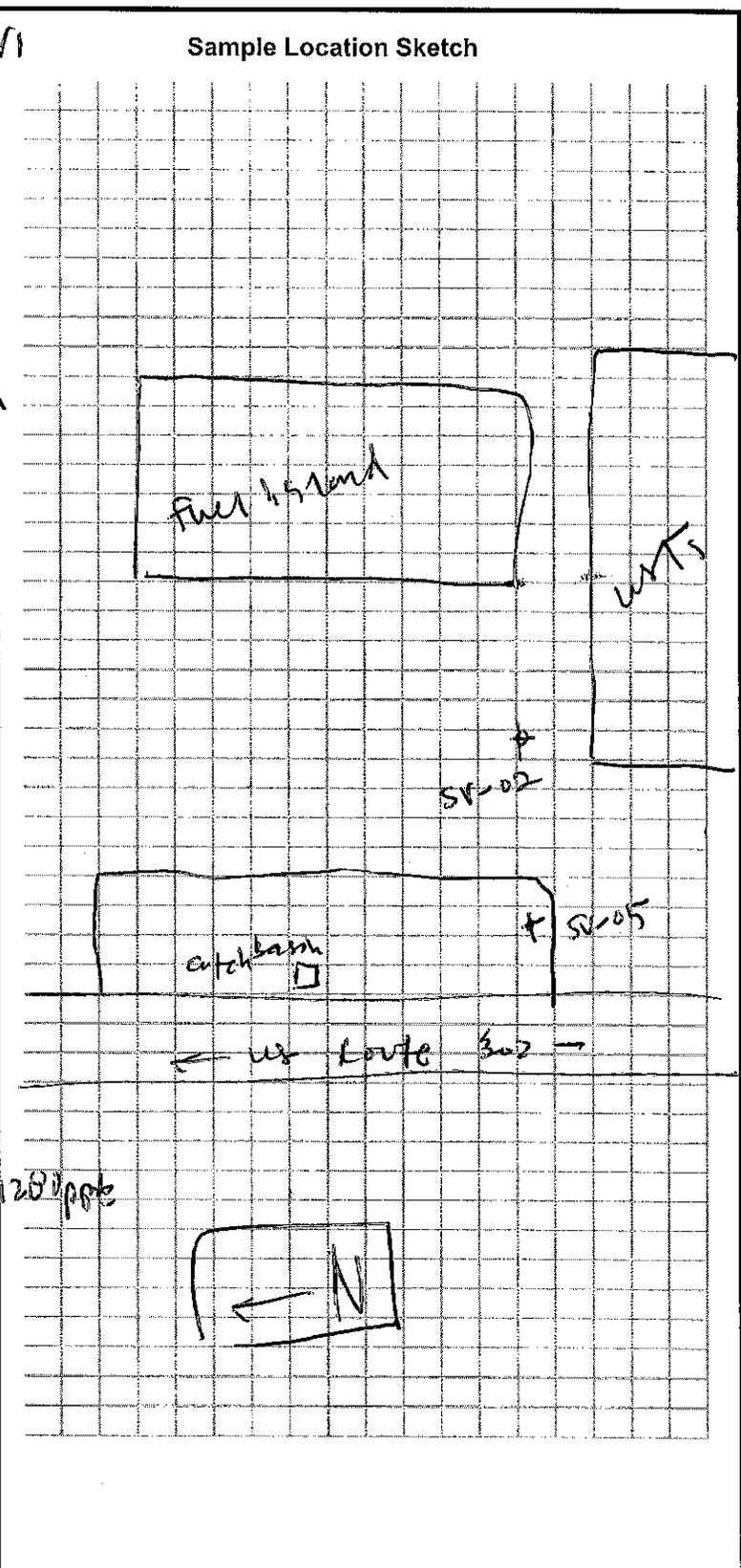
Soil Vapor Point Construction Notes:



NOTES:

Soil Gas Sampling Field Sheet
Maine DEP

Site Name:	CEI - Windham, ME DEP V1
Town:	Windham, ME
Date:	August 31, 2010
Sample I.D.:	SV-05
Sampling Purpose	(Source) (Utility) (Mitigation) (Receptor) (Other)
Sampling Personnel:	B. Shaw / C. Staples
Project Manager	Peter Erenwita
Collection Device:	(Summa) Can (Tedlar Bag)
Sample Penetration Location:	(Ashphalt) (Concrete) (Soil)
Soil Type:	(Fill) (Till) (Sand & Gravel) (Glacial Marine)
Sample Depth:	10.5' bgs
Depth to Water:	~ 13' bgs
Suspected COCs:	(Petroleum) (Solvents)
Cannister I.D.:	396
Flow Control I.D.:	298
Flow control rate:	~ 100 ml/min
O ₂ Ambient	22.1%, (LEL: 4)
CO ₂ Ambient	615 ppm
subsurface pressure/vacuum	— (± inches of water column)
Pre-Sample O ₂	22.4% 15.1
Pre-Sample CO ₂	7600 ppm (
Pre-Sample PID:	2800 ppb; post: 2800 ppb
Pre-Sample CH ₄ :	LEL: 11 (% Volume, %LEL, PPM)
Sample Initiation Time:	1049
Initial Vacuum:	-30"
Sample End Time:	1013
Final Vacuum:	-5"
Post Sample O ₂ :	15.1
Post Sample CO ₂ :	7600 ppm (LEL: 10)

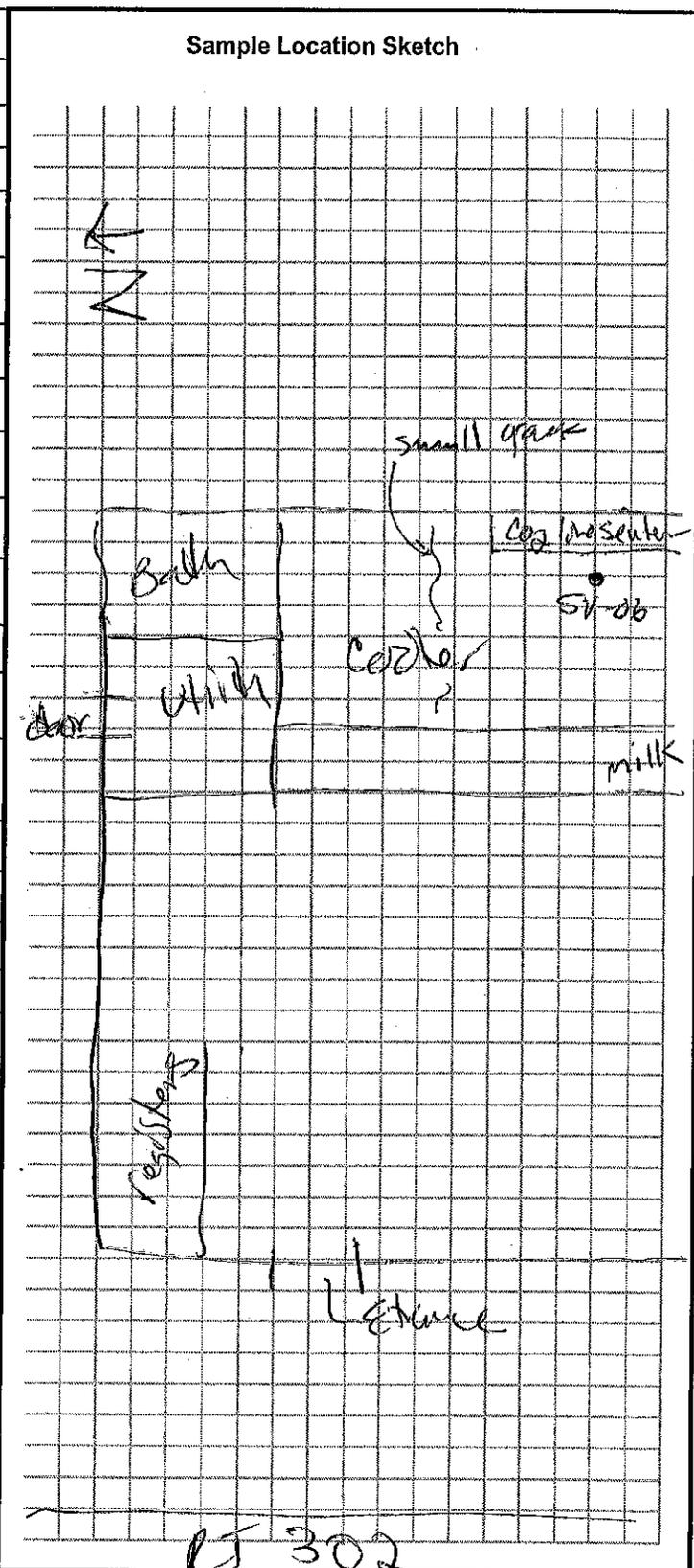


Notes: didnot conduct He leak test here

Checked by CES - 977/10

Indoor Air/Subslab Sampling Field Sheet
Maine DEP

Site Name:	Cumbe land Farms
Town:	Winthrop
Date:	11/31/10
Sample I.D.:	SU-06
Project Manager:	Zimmerman
Sampling Personnel:	Firm/shaw
Collection Device:	(Summa Can) (Tedlar Bag)
Sample Type:	(Subslab) (Indoor Air)
Sampling Location:	Cooler
Foundation Floor Type:	(Dirt) (Concrete)
Foundation Wall Type:	(Concrete) (Block) (Stone) (Brick) (Slab on Grade)
Sump Hole:	(Yes) (No)
Penetrations in Floor:	(Sewer) (Water) (Gas) (Cracks) (Drains)
Penetrations in Wall:	(Sewer) (Water) (Gas) (Electric) (Cracks)
Suspected COCs:	(Petroleum) (Solvents)
Cannister I.D.:	126
Flow Control I.D.:	0365
Flow control rate:	100
O ₂ Ambient:	20.9
CO ₂ Ambient:	1150
Pre-Sample O ₂ :	17.5%
Pre-Sample CO ₂ :	5200 ppm
Pre-Sample PID:	0
Pre-Sample CH ₄ :	0%
Sample Initiation Time:	12:20
Initial Vacuum:	7-30
Sample End Time:	12:45
Final Vacuum:	-3"
Post Sample O ₂ :	16.6%
Post Sample CO ₂ :	7600 ppm (LEL:0)



Notes/Observations:
 Slab 10"
 Sample depth 11.5"
 Helium trace:
 100% in bucket Post 91.5%
 3800 Breektrough
 Post sample He: in Bucket: 33%
 checked cps 9/7/10

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME: CPI - MEDPVI - Windham
 PROJECT NUMBER: 3612102154-03.1
 PROJECT LOCATION: Windham, ME
 WEATHER CONDITIONS (AM): 70°F, Sunny
 WEATHER CONDITIONS (PM): 95°F, Sunny

TASK NO: _____ DATE: 08-31-10
 MACTEC CREW: BAS/CRS
 SAMPLER NAME: Bryan Shaw
 SAMPLER SIGNATURE: _____
 CHECKED BY: CPI DATE: 9/7/10

MULTI-PARAMETER WATER QUALITY METER

METER TYPE	MODEL NO.	UNIT ID NO.	AM CALIBRATION			POST CALIBRATION CHECK						
			Start Time	End Time	Standard Value	Meter Value	*Acceptance Criteria (AM)	Start Time	End Time	Standard Value	Meter Value	*Acceptance Criteria (PM)
			Units	Standard Value	Meter Value	*Acceptance Criteria (AM)	Standard Value	Meter Value	*Acceptance Criteria (PM)			
			pH (4)	SU	4.0	+/- 0.1 pH Units						
			pH (7)	SU	7.0	+/- 0.1 pH Units	7.0		+/- 0.3 pH Units			
			pH (10)	SU	10.0	+/- 0.1 pH Units						
			Redox	+/- mV	240	+/- 10 mV	240		+/- 10 mV			
			Conductivity	mS/cm	1,413	+/- 3% of standard	1,413		+/- 5% of standard			
			DO (saturated)	%	100	+/- 2% of standard						
			DO (saturated)	mg/L ¹		+/- 0.2 mg/L			+/- 0.5 mg/L of standard			
			DO (<0.1)	mg/L	<0.1	< 0.5 mg/L						
			Temperature	°C								
			Baro. Press.	mmHg								

TURBIDITY METER

METER TYPE	MODEL NO.	UNIT ID NO.	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
			<0.1 Standard	NTU	<0.1	<0.1		+/- 0.3 NTU of stan.
			20 Standard	NTU	20	20		+/- 5% of standard
			100 Standard	NTU	100	100		+/- 5% of standard
			800 Standard	NTU	800	800		+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE	MODEL NO.	UNIT ID NO.	Background	ppmv	<0.1	0.0	<0.1	within 5 ppmv of BG
			Span Gas	ppmv	100	99.8	100	+/- 10% of standard

O₂-LEL 4 GAS METER

METER TYPE	MODEL NO.	UNIT ID NO.	Methane	%	50	50	+/- 10% of standard
			O ₂	% <td>20.9</td> <td>20.9</td> <td>+/- 10% of standard</td>	20.9	20.9	+/- 10% of standard
			H ₂ S	ppmv <td>25</td> <td>25</td> <td>+/- 10% of standard</td>	25	25	+/- 10% of standard
			CO	ppmv <td>50</td> <td>50</td> <td>+/- 10% of standard</td>	50	50	+/- 10% of standard

OTHER METER

METER TYPE	MODEL NO.	UNIT ID NO.	ppm	0.0	0.0	10.0	10.0	See Notes Below for Additional Information
			ppb model +	10	10.0	10.0	10.0	

- Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.
 Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

		Cal. Standard Lot Number	Exp. Date
Deionized Water Source:	Portland FOS		
Lot#/Date Produced:			
Trip Blank Source:			
Sample Preservatives Source:			
Disposable Filter Type:	0.45µm cellulose		
Calibration Fluids / Standard Source:			
- DO Calibration Fluid (<0.1 mg/L)	Portland FOS		
- Other			
- Other			
- Other			
		pH (4)	
		pH (7)	
		pH (10)	
		ORP	
		Conductivity	
		<0.1 Turb. Stan.	
		20 Turb. Stan.	
		100 Turb. Stan.	
		800 Turb. Stan.	
		PID Span Gas	100 ppm 9689
		O ₂ -LEL Span Gas	05-01-10
		Other	ppm miniRae: 010474
			12-15-10.

NOTES:



511 Congress Street, Portland Maine 04101

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

¹ = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.



AIR ANALYSIS

PAGE 1 OF 1

CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: MACEC Engineering
Address: 51 Congress StPhone: (207) 775-5401
Fax: (207) 772-4762Email: Crstaples@macec.com These samples have been previously analyzed by Alpha

Project Information

Project Name: CFI-MEDEP VI
Project Location: Windham, ME
Project #: 3612102157
Project Manager: Chuck Staples
ALPHA Quote #:

Turn-Around Time

 Standard RUSH (only confirmed if pre-approved)

Date Due: _____ Time: _____

Date Rec'd in Lab: _____

Report Information - Data Deliverables

 FAX ADEX
Criteria Checker: _____
(Default based on Regulatory Criteria Indicated)
Other Formats: _____
 EMAIL (standard pdf report)
 Additional Deliverables: _____
Report to: (if different than Project Manager) _____

ALPHA Job #: _____

Billing Information

 Same as Client info PO #: _____
MEDEP VI: Peter Eremita

Regulatory Requirements/Report Limits

State/Fed	Program	Criteria

Other Project Specific Requirements/Comments:

* CO₂ and O₂

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection					Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID - Flow Controller	ANALYSIS						Sample Comments (i.e. PID)
		Date	Start Time	End Time	Initial Vacuum	Final Vacuum						TO-14A by TO-15	TO-15	TO-15 SIM	APH	FIXED GASES	TO-15A	
	SV-01	8-31-10	1340	1415	-30 ⁺	-4	SV	BAS	2L	230	265				XXX	278 ppb		
	SV-02		0950	1021	-30	-4	SV	BAS	2L	390	176				XXX	908 ppb		
	SV-02 Dup		0950	1016	-30 ⁺	-4	SV	BAS	2L	320	287				XXX	908 ppb		
	SV-03		1534	1625	-30 ⁺	-15	SV	BAS	2L	515	62				XXX	6220 ppb		
	SV-05		1049	1113	-30 ⁺	-5	SV	BAS	2L	396	298				XXX	2800 ppb		
	SV-06		1220	1245	-30 ⁺	-3	SV	BAS	2L	126	365				XXX	28 ppb		
/																		

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:

Brandon Shaw

Date/Time:

9-1-10

Received By:

Date/Time: