

# **SITE INVESTIGATION/RISK EVALUATION**

*Property Location:*

**FORMER CVPS SUBSTATION  
ROUTE 7B  
CLARENDON, VERMONT.**

*Prepared For:*

**CENTRAL VERMONT PUBLIC SERVICE  
CORPORATION  
77 GROVE STREET  
RUTLAND, VERMONT 05701**

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**Atlantic Project No.: 1992-01-01**

**October 4, 1994**

## **ATLANTIC**



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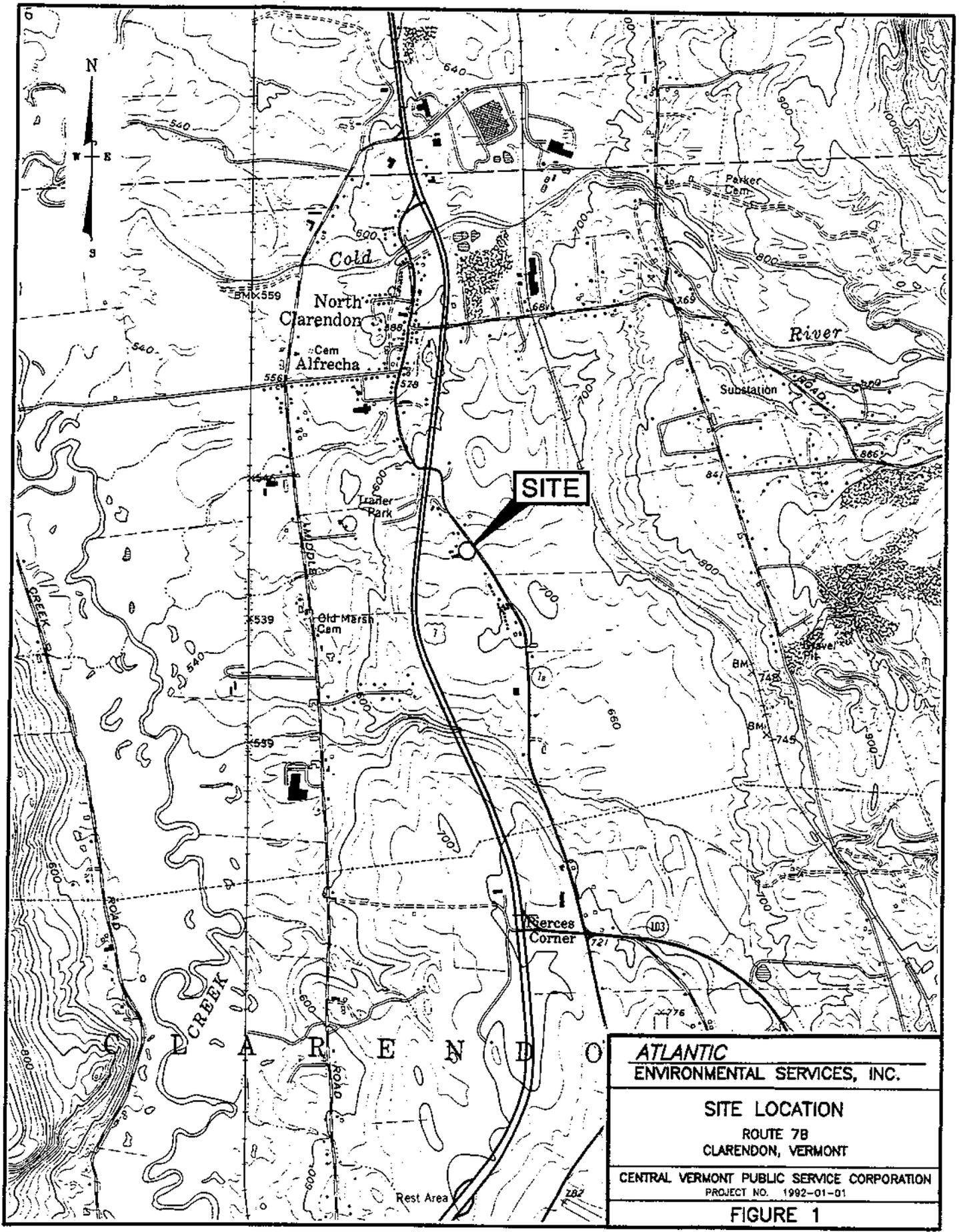
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## 1.0 INTRODUCTION

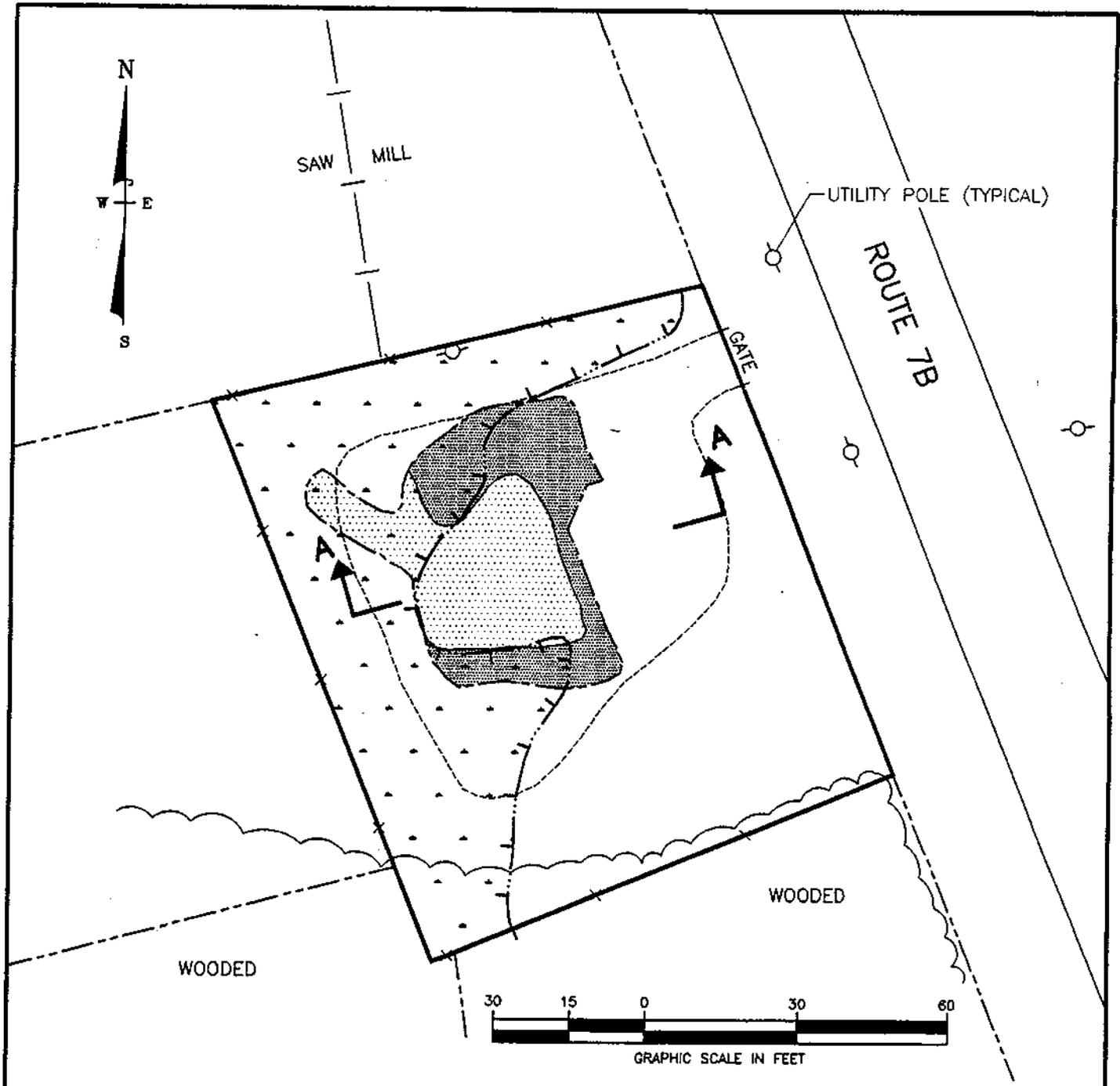
The purpose of this report is to document the results of the Site Investigation/Risk Evaluation performed by Atlantic Environmental Services, Inc. (Atlantic) at the former Central Vermont Public Service Corporation (CVPS) substation located on Route 7B in Clarendon, Vermont. The subject site location map is provided as Figure 1, and a site schematic plan is provided as Figure 2. The Site Investigation/Risk Evaluation was based on the Vermont Department of Environmental Conservation (VTDEC), Hazardous Materials Management Division, Site Management Section (SMS) approved *Site Investigation/Risk Evaluation Work Plan* (as amended), dated May 5, 1994. Complete details regarding the subject site property description, the site history, and site environmental issues are presented in the Work Plan. A summary of the site description and site history is provided in Section 2.0 of this report. A copy of the VTDEC SMS work plan approval letter and addendum is provided in Appendix A. The Site Investigation/Risk Evaluation was conducted to evaluate potential impacts to the site soil, intermittent stream sediments, and groundwater. These impacts are discussed in detail in Section 3.0 of this report.

The Scope of Work for this Work Plan was as follows:

- Screen for potential contaminants within the soil and groundwater on site.
- Spatially define the approximate lateral and vertical extent of suspect fill material on the site.
- Qualitatively evaluate the on-site risk to human health and the environment.



<b>ATLANTIC</b> ENVIRONMENTAL SERVICES, INC.
<b>SITE LOCATION</b> ROUTE 7B CLARENDON, VERMONT
CENTRAL VERMONT PUBLIC SERVICE CORPORATION PROJECT NO. 1992-01-01
<b>FIGURE 1</b>



**LEGEND**

-  PROPERTY BOUNDARY
-  RIGHT OF WAY LINE
-  BOARD FENCE
-  CHAIN FENCE
-  APPROXIMATE WETLAND BOUNDARY
-  APPROXIMATE EXTENT OF SAND AND GRAVEL FILL MATERIAL
-  APPROXIMATE EXTENT DEEP (1± FOOT) SUSPECT FILL MATERIAL
-  APPROXIMATE EXTENT SHALLOW (0.5± FOOT) SUSPECT FILL MATERIAL

NOTE:  
 SITE PLAN IS BASED ON MAP PROVIDED BY CVPS  
 AND FIELD OBSERVATIONS.

<b>ATLANTIC</b>	
ENVIRONMENTAL SERVICES, INC.	
<b>SITE SCHEMATIC</b>	
ROUTE 7B	
CLARENDON, VERMONT	
CENTRAL VERMONT PUBLIC SERVICE CORPORATION	
PROJECT NO. 1992-01-01	
SCALE: 1"=30'	DRN BY: KAS
DATE: OCT 94	CHK BY:
<b>FIGURE 2</b>	

## **2.0 SITE BACKGROUND**

### **2.1 Site Description**

The subject property consists of  $0.26 \pm$  acre of land along the western side of Route 7B, approximately 1,400 feet southeast of the intersection with Route 7. The site location is depicted on U.S. Geologic Survey (USGS) Rutland 7.5-minute topographic sheet (provided as Figure 1). The site is located in a mixed commercial, residential, and agricultural area and is bound by Route 7B to the east, a single-family residence to the south, and a saw mill to the north and west. The site lies on a small hillside, situated approximately 625 to 630 feet above mean sea level, according to the USGS Rutland topographic map. The grade drops down slightly to the north/northwest. Surface water drains across the site in a north/northwestward direction. Surficial geology of the site is identified as very deep fine sandy loams (glacial till deposits) derived mainly from schist, gneiss, and granite. The relatively impervious substratum of the site soils has created a shallow perched water table at the site and, in the case of the on-site wetlands, an area of inundation. This wetland is generally created by surface runoff and groundwater discharge from the surrounding perched groundwater table. Groundwater flow within the shallow groundwater table aquifer beneath the site is presumed to reflect the north/northwesterly grade evident in the local topography, as well as the similar surface water flow direction visibly observed within the on-site wetland.

Suspect fill material, characterized by dark ash and cinder materials on the surface and an area void of vegetation, is located within and adjacent to the on-site wetlands and centrally on the subject property. The suspect fill material is generally found at two depths,  $1 \pm$  foot (“deep”) and  $0.5 \pm$  (“shallow”), overlying sand and gravel, fill material ( $1.0 \pm$  feet thick). Figure 2 depicts the relative lateral extent of these fill materials.

## 2.2 Site History

The subject property currently is owned by Central Vermont Public Service Corporation (CVPS), who acquired the property on February 25, 1939. According to available historical sources, the subject site was undeveloped land, likely used for agricultural purposes, prior to circa 1940. When CVPS purchased the subject site in February of 1939, the corporation shortly thereafter constructed a switch station on the site. The site was converted into a substation (which included the on-site placement of transformers) in August of 1966, according to CVPS records. The substation subsequently was dismantled in circa 1970; the site has remained generally abandoned since.

### **3.0 Previous CVPS Investigation**

While screening the subject property for a potential transaction, CVPS discovered suspect fill material. According to CVPS representatives, the material potentially resembled solid waste from a manufactured gas plant (MGP). It has been speculated that the suspect fill material possibly originated in Rutland where a CVPS predecessor company operated an MGP.

To further determine the composition of the material and its potential impact on groundwater, CVPS screened the fill and site groundwater. Several polycyclic aromatic hydrocarbons (PAHs) were present in the fill; however, PAHs and volatile organics were absent in a groundwater sample collected from a test pit adjacent to the fill. Analytical results provided to Atlantic are included in Appendix B.

## **4.0 FIELD INVESTIGATION**

### **4.1 Objective**

The objective of the field investigation was to identify routes of exposure which may result in direct contact with MGP wastes and to characterize chemically the media associated with the exposure routes to evaluate potential health risks associated with the site.

Exposure routes with the potential for direct contact identified at the site include:

- dermal contact/incidental ingestion of surface and/or subsurface soils potentially contaminated by MGP-related wastes; and
- dermal contact/incidental ingestion of shallow groundwater potentially contaminated by contact with MGP-related wastes.

In addition to chemical characterization data, the field investigation was also designed to obtain sufficient site-specific information to evaluate qualitatively the on-site risks to human health and the environment.

### **4.2 Sample Plan and Rationale**

This subsection provides an overview of the site sampling plan, the rationale for the sample locations, and the samples selected for laboratory analysis. The rationale for the placement of groundwater monitoring wells, and also for the selection of surface and subsurface soil and sediment samples, are summarized in Table 1. Sample locations are depicted in Figure 3.

A total of four temporary monitoring wells were drilled on the subject property. In addition, two composite surface soil, three subsoil (grab), and two sediment (grab) samples were collected. Soil and groundwater samples were collected for analysis to screen for potential

**TABLE 1  
SITE SAMPLING SUMMARY**

<b>Sample ID: Sample Location</b>	<b>Boring Depth: Sampling Specifications</b>	<b>Location Rationale</b>	<b>Soil Sample Depth (ft): Rationale</b>	<b>Analysis</b>
<i>Monitoring Wells</i>				
MW-1: Along western property boundary, south of suspect fill material.	3 ± feet; no collection of soil samples.	To screen for potential off-site sources of groundwater contamination; generally upgradient well position.	No soil samples; no visual or olfactory evidence of contamination.	<u>Groundwater:</u> VOCs, PAHs, PCBs, metals, and cyanide.
MW-2: Centrally located on subject property, within area of suspect fill material.	4.5 ± feet; no collection of soil samples.	To screen for potential groundwater contamination from on-site sources.	No soil samples; no visual or olfactory evidence of contamination.	<u>Groundwater:</u> VOCs, PAHs, PCBs, metals, and cyanide.
MW-3: Centrally located along northern property boundary.	3 ± feet; no collection of soil samples.	To screen for potential groundwater contamination from on-site sources.	No soil samples; no visual or olfactory evidence of contamination.	<u>Groundwater:</u> VOCs, PAHs, PCBs, metals, and cyanide.
MW-4: Located along northern boundary, within northeastern portion of the site.	3 ± feet; no collection of soil samples.	To screen for potential groundwater contamination from on-site sources.	No soil samples; no visual or olfactory evidence of contamination.	<u>Groundwater:</u> VOCs, PAHs, PCBs, metals, and cyanide.
<i>Surface Soil</i>				
SS-1: Composite sample from 5 nodal points outside of the suspect fill area.	0.5 ± foot; surface sample.	To screen for potential on-site contamination in native soils.	SS-1 (0-0.5 ft.); no visual or olfactory evidence of contamination.	<u>Soil:</u> PAHs, PCBs, metals, and cyanide.
SS-2: Composite sample from 5 nodal points with area of suspect fill area.	0.5 ± foot; surface sample.	To screen for potential soil contamination associated with informal on-site disposal of MGP-related waste.	SS-2 (0-0.5 ft.); visual and slight olfactory evidence of contamination.	<u>Soil:</u> PAHs, PCBs, metals, and cyanide.
<i>Subsurface Soil</i>				
SBa-1: Centrally located within "deep" suspect fill material.	1.5 ± feet; grab sample of suspect fill material.	To screen for potential soil contamination associated with informal on-site disposal of MGP-related waste.	SBa-1 (0.5-1.5 ft.); visual and slight olfactory evidence of contamination.	<u>Soil:</u> VOCs, PAHs, PCBs, metals, and cyanide.

**TABLE 1 (Continued)  
SITE SAMPLING SUMMARY**

<b>Sample ID: Sample Location</b>	<b>Boring Depth: Sampling Specifications</b>	<b>Location Rationale</b>	<b>Soil Sample Depth (ft): Rationale</b>	<b>Analysis</b>
SBb-1: Centrally located within "deep" suspect fill area.	2 ± feet; grab sample of underlying sand and gravel fill material.	To screen for potential on-site soil contamination associated with informal on-site disposal of MGP-related waste and/or historic site activities.	SBb-1 (1.5-2 ft.); no visual or olfactory evidence of contamination.	<u>Soil</u> : VOCs, PAHs, PCBs, metals, and cyanide.
SBC-1: Centrally located within "deep" suspect fill area.	3 ± feet; grab sample of underlying native soil.	To screen for potential on-site soil contamination associated with informal on-site disposal of MGP-related waste and/or historic site activities.	SBC-1 (2-2.5 ft.); no visual or olfactory evidence of contamination.	<u>Soil</u> : VOCs, PAHs, PCBs, metals, and cyanide.
<i>Stream Sediment</i>				
SD-1: Along northern property boundary as intermittent stream exits site.	0.25 ± foot; surface sediment sample.	To screen for potential on-site soil contamination associated with informal on-site disposal of MGP-related waste and/or historic site activities.	SD-1 (0-0.25 ft.); no visual or olfactory evidence of contamination.	<u>Sediment</u> : VOCs, PAHs, PCBs, metals, and cyanide.
SD-2: Along western property boundary as stream enters site.	0.25 ± foot; surface sediment sample.	To screen for potential off-site sources of contamination; generally upgradient position.	SD-2 (0-0.25 ft.); no visual or olfactory evidence of contamination.	<u>Sediment</u> : VOCs, PAHs, PCBs, metals, and cyanide.
<b>Notes:</b>	<ol style="list-style-type: none"> <li>VOCs indicate volatile organic compounds analysis conducted by using EPA Methods 8010 and 8020.</li> <li>PAHs indicate polycyclic aromatic hydrocarbons analysis conducted by using EPA Method 8100.</li> <li>PCBs indicate polychlorinated biphenyls analysis conducted by using EPA Method 8080.</li> <li>Metals soil analysis was conducted by using Extraction Procedure Toxicity Characteristic (EP Toxicity) (EPA Method 1310); groundwater results represent total (by mass) constituents.</li> <li>Both soil and groundwater cyanide analysis represent total (by mass) results.</li> </ol>			



MGP-related contamination.

The purpose of the four temporary groundwater monitoring wells was to analyze on-site water quality to screen for potential on-site and off-site sources of contamination, and also to assess the general groundwater flow direction. Generally upgradient monitoring well MW-1 is located along western property boundary, south of suspect fill material; this placement was designed to assess the effects from potential off-site sources of contamination. MW-2 is located centrally on the subject property, within the area of suspect fill material to assess potential contamination associated with informal on-site disposal of MGP-related waste and/or historic site activities. Monitoring wells MW-3 and MW-4 are located along the northern property boundary to assess potential impacts from historic on-site activities.

Surface water sampling had also been proposed for inclusion in the field investigation. Two surface water samples were to be collected, one as the surface water enters the property and a second as it exits the northern property boundary, respectively. Due to climatic conditions at the time of the investigation, sediment samples (SD-1 and SD-2) were collected in place of the proposed surface water samples (as no surface water was present). No visual or olfactory evidence of contamination was noted at the time of sample collection.

Two composite surface soil samples were collected at the former CVPS substation site. The primary objective of the surface soil sampling was to determine whether surface soils present a risk to human health and the environment. The proposed composite surface soil sampling locations were chosen based on historical site information and visual observations made during the site reconnaissance. The composite samples were collected to screen both beyond (SS-1) and within (SS-2) the suspect fill material. Surface soils were gridded and consisted of approximately 50 nodal points; two separate grids were generated for the areas within and

outside of the suspect fill material. Five nodes from each grid, selected by a random number generator, were sampled and combined, separately, to produce each composite sample. Sample collection procedures are described in Atlantic Procedure 1020 (Appendix C). No visual or olfactory evidence of contamination was noted at the time of sample SS-1 collection (outside of suspect fill). Visual (coal ash and cinders) and slight olfactory evidence of contamination were noted during collection of surface soil sample SS-2 (within fill).

A total of three subsurface soil samples (grab) were collected for laboratory analyses from a point centrally located in the “deep” suspect fill area. Representative suspect fill (SBa-1), underlying sand and gravel fill (SBb-1), and underlying native soil (SBc-1) (site background information) were collected. Visual (coal ash and cinders) and slight olfactory evidence of contamination were noted during collection of subsurface soil sample SBa-1. No evidence of contamination was noted during collection of the remaining two samples (SBb-1 and SBc-1).

Selected soil and groundwater samples were analyzed for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), metals, total cyanide, and polychlorinated biphenyls (PCBs). VOCs were selected for analysis because they comprise chemicals contained in solvents, degreasers, and petroleum products, all of which are commonly associated with areas of potential chemical releases. PAHs were selected for analysis because they comprise chemicals contained in typical MGP-related wastes (apparent source of the suspect fill material). The metals selected for analysis (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) have been identified by the U.S. EPA as common metal contaminants; cyanide is commonly found in MGP-related wastes. PCBs were selected for analysis because of former site usage as a substation and the likely former presence of associated PCB-containing fluids in on-site transformers.

### **4.3 Field Investigation and Sampling Methods**

#### **4.3.1 Well Installation and Test Boring Procedures**

Four groundwater samples were collected to assess potential impacts to site groundwater quality from the suspect fill or other sources. The water table below the site is quite shallow (generally encountered less than two feet below the ground surface). Groundwater samples were collected by Atlantic personnel using a Geoprobe™ sampling system. The Geoprobe™ is a small diameter (1.25-inch), stainless-steel sampling device which, in conjunction with a peristaltic pump, was used to sample the shallow groundwater. The Geoprobe™ was equipped with a 19-inch screen point well sampler to collect groundwater samples. After the Geoprobe™ well point was in place, a peristaltic pump was used to purge the well. Purging continued until the water was visually free of silt, or at least until 10 well volumes had been removed. Due to complications encountered while utilizing the Geoprobe™ (very silty conditions which clogged the well screen unit), a modification to the original groundwater sampling plan was deemed necessary. Since groundwater is very shallow, temporary groundwater monitoring wells were installed to a general depth of 3 feet with a 2.5± inch outside diameter (O.D.) hand auger. Wells were subsequently purged utilizing the Geoprobe™ sampling screen without the surrounding well point encasement. Groundwater samples were subsequently collected for VOCs with a stainless-steel Geoprobe™ minibailer, while the remaining constituents were sampled with a peristaltic pump.

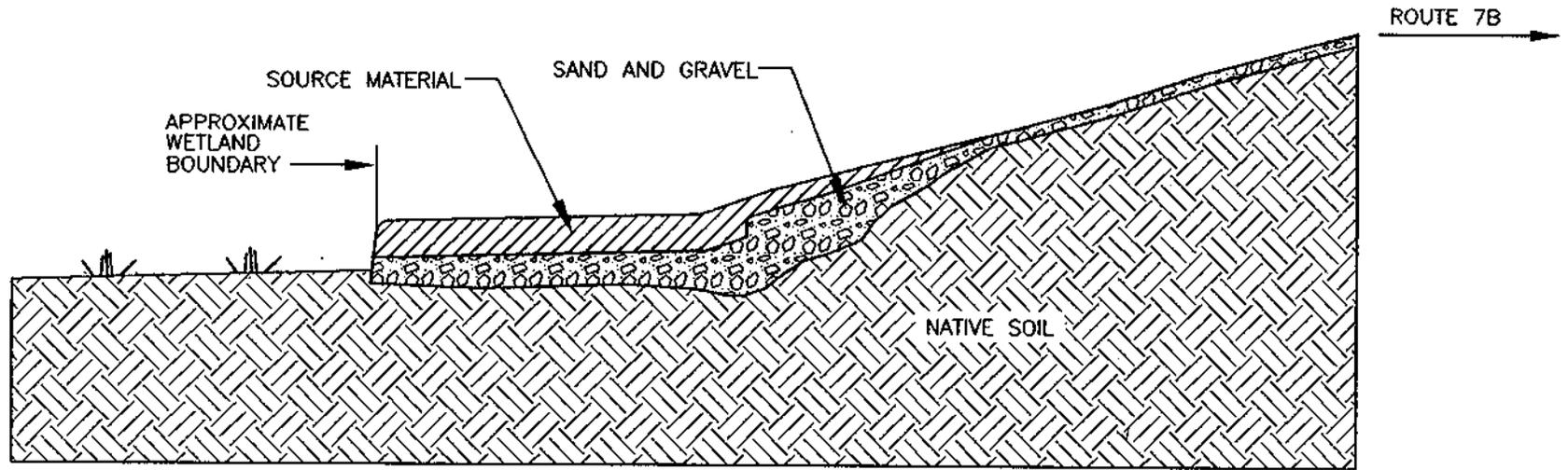
The initial site reconnaissance revealed that the suspect fill material is generally less than two feet deep and is underlain by sand and gravel fill material (approximately one foot deep) which overlies native glacial till soil. Based on this information, subsurface-soil samples were collected with the use of a hand auger and spade. Numerous test borings were conducted with

the use of a hand auger and spade due to the shallow nature of the suspect fill material being investigated. In addition, hand-dug test pits were excavated to further characterize the fill materials and native soil and to laterally define the limits of fill materials. The lateral extent of suspect (deep and shallow) and sand and gravel fill materials was previously depicted in Figure 2. A cross section showing the vertical and horizontal extent of the fill materials is provided in Figure 4. Based on volume calculations developed from the numerous test pits dug throughout the site, approximately 80 yards of suspect (MGP-related) fill material exists on the subject site.

#### **4.3.2 Soil and Groundwater Sampling Methods**

Soil samples were generally collected and logged at specific soil sample intervals for physical characterization as indicated previously in Table 1. To prevent cross contamination of the samples between soil sampling events, all sampling equipment was cleaned with nonphosphate detergent and rinsed with diluted nitric acid, diluted methanol, and distilled water between each event.

Groundwater samples were obtained on the same date as the installation of the temporary groundwater monitoring wells for analysis. The temporary wells were sampled following development of the well (as previously described in subsection 4.3.1). Dedicated disposable polypropylene tubing, in conjunction with a peristaltic pump, were used to collect groundwater samples for each well to prevent cross contamination between sampling events; a stainless steel minibailer was used for sampling VOCs. (The minibailer was cleaned between sampling events to prevent cross contamination). Groundwater samples for metal analysis were field-filtered with a 0.45-micron QED™ filter; analytical results represent dissolved constituents.



### SECTION A-A



APPROXIMATE HORIZONTAL SCALE IN FEET



APPROXIMATE VERTICAL SCALE IN FEET

<b>ATLANTIC</b>	
ENVIRONMENTAL SERVICES, INC.	
CROSS SECTION A-A	
ROUTE 7B	
CLARENDON, VERMONT	
CENTRAL VERMONT PUBLIC SERVICE CORPORATION	
PROJECT NO. 1992-01-01	
SCALE AS NOTED	DRN BY: KAS
DATE: OCT 84	CHEK BY:
FIGURE 4	

Soil and groundwater samples were collected in accordance with Atlantic's technical procedures to ensure quality control/quality assurance.

All soil and groundwater samples collected for laboratory analysis were placed in an iced cooler and transported via Federal Express carrier (overnight delivery) to Connecticut Testing Laboratories, Inc. in Meriden, Connecticut, for analysis.

#### **4.3.3 Analytical Methods**

Laboratory analysis of selected soil (surface and subsurface) and sediment samples included volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), total cyanide, and polychlorinated biphenyls (PCBs), as specified in Table 1. VOC analysis was conducted using EPA Methods 8010 and 8020. PAH analysis was conducted using EPA Method 8100. Metals were analyzed in accordance with EPA atomic absorption methods for the specific metals using extraction procedure toxicity analysis (EP Toxicity) (EPA Method 1310). Cyanide results represent total (by mass) values. PCB analysis was conducted using EPA Method 8080.

Laboratory analysis for groundwater included VOCs, PAHs, metals, cyanide, and PCBs. The VOC, PAH, and PCB analytical procedures were the same EPA Methods as soil analysis. Both metals and cyanide analyses were conducted on a total (by mass) basis.

#### **4.4 Evaluation of Soil and Water Quality Data**

##### **4.4.1 Regulatory Cleanup Standards and Guidelines**

Soil analytical results obtained during the field investigation were compared to soil cleanup standards used as a draft policy by the Vermont Department of Environmental Conservation (VTDEC) Hazardous Materials Management Division. The draft policy developed for soil cleanup standards is based on twenty times the concentration of the Primary Ground

Water Quality Standards (Enforcement Standard) as published in the *VTDEC Chapter 12 Ground Water Protection Rule and Strategy*, effective date September 29, 1988. As a matter of policy, for certain constituents which do not have Primary Ground Water Quality Standards, other published U.S. EPA numerical standards (including final and proposed maximum contaminant levels) and Vermont Health Advisory published standards are considered by the VTDEC Hazardous Materials Management Division (HMMD) when determining cleanup levels. In addition, VTDEC HMMD will consider site-specific soil cleanup standards based on a detailed quantitative risk assessment.

For groundwater, state (Primary Ground Water Quality Standards—Enforcement Standard) and federal drinking water standards (for VTDEC unpublished constituents) are compared with concentrations of any detected chemicals.

#### **4.4.2 Soil Analytical Results**

Laboratory analysis of selected soil samples indicate that no detectable levels of VOCs, metals, or PCBs are present. In addition, no detectable levels of PAHs or cyanide are present in the sand and gravel fill material and native soil underlying the suspect fill material or in sediments samples collected from the site's intermittent stream bed. Soil analytical results are summarized in Table 2.

Several PAH constituents as well as cyanide were detected in both a grab sample (SBa-1) and composite sample (SS-2) collected from areas within the suspect fill material. Fluoranthene was detected in SBa-1 and SS-2 at concentrations of 118 and 316 parts per billion (ppb), respectively. SBa-1 and SS-2 also detected pyrene at concentrations of 173 ppb and 287 ppb, respectively. No draft soil cleanup standards have been developed for either of these PAH constituents. Benzo(a)anthracene was detected in both SBa-1 (45 ppb) and SS-2 (62 ppb), above

**TABLE 2  
SOIL ANALYTICAL RESULTS SUMMARY**

Parameter	VTDEC Soil Cleanup Standard	Sample ID (Depth in feet)						
		SBa-1 (0.5-1.5)	SBb-1 (1.5-2.0)	SBc-1 (2.0-2.5)	SS-1 (0-0.5)	SS-2 (0-0.5)	SSD-1 (0-0.25)	SD-2 (0-0.25)
<i>Volatle Organic Compounds (VOCs)(ppb)</i>								
VOCs	---	ND	ND	ND	NA	NA	ND	ND
<i>Polycyclic Aromatic Hydrocarbons (PAHs)(ppb)</i>								
Fluoranthene	---	118	ND	ND	ND	316	ND	ND
Pyrene	---	173	ND	ND	ND	287	ND	ND
Benzo(a)anthrene	2	45	ND	ND	ND	62	ND	ND
Chrysene	4	50	ND	ND	ND	92	ND	ND
Benzo(b)fluoranthene	4	106	ND	ND	ND	202	ND	ND
Benzo(k)fluoranthene	4	183	ND	ND	ND	285	ND	ND
Benzo(a)pyrene	4	190	ND	ND	ND	196	ND	ND
<i>Metals (ppm)</i>								
Metals	---	ND	ND	ND	ND	ND	ND	ND
<i>Cyanide (ppm)</i>								
Cyanide	3.08	1.5	ND	ND	ND	3.6	ND	ND
<i>Polychlorinated biphenyls (PCBs)(ppm)</i>								
PCBs	0.00016	ND	ND	ND	ND	ND	ND	ND
Notes:	1) Cleanup standard developed from 20 times the published Vermont Primary Groundwater Quality Standards (Enforcement Standard). 2) ND indicates not detected; NA indicates not analyzed. 3) ppm indicates parts per million; ppb indicates parts per billion. 4) Only those parameters detected are listed in this table. 5) Shaded values exceed soil cleanup standards.							

the draft soil cleanup standard of 2 ppb. Grab (SBa-1) and composite (SS-2) samples collected from the suspect fill material also detected chrysene (standard of 4 ppb) at concentrations of 50 and 92 ppb, respectively. Additional PAH constituents detected in the suspect fill material include benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene; all were detected above draft soil cleanup standards of 4 ppb (for all constituents). SBa-1 detected these constituents at concentrations of 106, 183, and 190 ppb, respectively; SS-2 detected these constituents at 202, 285, and 196 ppb, respectively. Cyanide was detected in SBa-1 and SS-2 at concentrations of 1.5 and 3.6 ppm; SS-2 exceeded the draft soil cleanup standard for cyanide of 3.08 ppm. The constituents detected in the on-site suspect fill material are characteristic of MGP combustion wastes.

Complete laboratory analytical results are provided in Appendix D.

#### **4.4.3 Groundwater Analytical Results**

Laboratory analysis of groundwater samples collected from the four temporary groundwater monitoring wells indicate that no detectable levels of analyzed constituents are present in these locations. Laboratory analytical groundwater results are provided in Appendix D.

## **5.0 QUALITATIVE RISK EVALUATION**

### **5.1 Hazard Identification**

The site investigation and the laboratory data for the on-site chemical concentrations were reviewed to identify the chemicals of concern (COC) for this site. On-site soil and groundwater samples were analyzed for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and total cyanide. The analytical results indicate the presence of PAHs and total cyanide in two of the soil samples collected from the suspect fill area.

Site sampling indicates that the suspect fill material contains low levels of PAHs. Surface sample SS-2 was a composite sample of the fill material which contained PAH levels ranging from 62 parts per billion (ppb) to 316 ppb. Sample SBa-1 was a grab sample of the fill material, and showed concentrations of PAHs ranging from 45 ppb to 190 ppb. Five carcinogenic PAHs were detected at the site: benzo(a)anthracene, chrysene, benzo(b)-fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene. Two noncarcinogenic PAHs were detected in the soil samples: fluoranthene and pyrene. The remaining PAH constituents were below laboratory detection limits.

PAHs are semivolatile organic compounds (SVOCs). The SVOCs with lighter molecular weights such as naphthalene and acenaphthylene are capable of some volatilization. The majority of the PAHs detected at the site are heavier molecular weight compounds, which are relatively insoluble and tend to adsorb to the organic carbon present in the soil. This opinion is consistent with the analytical results, which indicated there were no PAHs present in the soils underlying the suspect fill material and in groundwater samples collected from areas upgradient, downgradient, and directly beneath the fill material.

PAHs are present in the environment due to incomplete combustion from both natural and anthropogenic sources. Natural sources include forest fires; anthropogenic sources include automobiles and fossil fuel burning facilities. Concentrations of PAHs have been measured in agricultural land, in soils of industrial areas, in road dust (urban runoff), and in forest soils. Measured total carcinogenic PAH concentrations (not including noncarcinogenic PAHs) had ranges of 10 to 100  $\mu\text{g}/\text{kg}$  (10 to ppb) in agricultural soils; 1,000 to 3,000  $\mu\text{g}/\text{kg}$  (1 to 3 ppm) in urban/industrial soils; 8,000 to 336,000  $\mu\text{g}/\text{kg}$  (8 to 336 ppm) in road dust. Typical PAH concentrations in forest soils can vary from 5 to 100  $\mu\text{g}/\text{kg}$ , and near highways or industries can have PAH levels at 1,000  $\mu\text{g}/\text{kg}$  (Menzie, et al.,1992). The analytical results indicate that the levels of PAHs detected in the suspect fill material at the site were within these typical background concentration ranges.

Cyanide was also detected in the two soil samples collected from the suspect fill material. The analytical methods indicated levels of total cyanide at 1.5 parts per million (ppm) in the subsurface grab sample (SBa-1) and 3.6 ppm in the composite surface sample (SS-2) collected from the suspect fill material. No other inorganic compounds of concern were detected in the collected soil samples.

Cyanide may be present in a variety of forms at the site. Hydrogen cyanide (HCN), a weak acid, is highly soluble and volatilizes as cyanide gas. It is likely that cyanide occurs more commonly at the site as hexacyanoferrate complexes, which bind to ferrous or ferric ions to produce ferri- and ferrocyanide compounds. These compounds are relatively insoluble in water and readily adsorb to soil, which is consistent with the groundwater analytical results.

The PAHs and cyanide constituents detected in the on-site suspect fill material were reviewed within the context of this qualitative risk evaluation.

## **5.2 Exposure Potential**

The site history indicates that the site was formerly used as an electrical switching station (and more recently a substation for CVPS) and was occupied by a small shed housing the electrical equipment. The subject property, abandoned since approximately 1970, is currently vacant and overgrown. An area of fill material located on the site appears to have originated from a nearby former CVPS manufactured gas plant. The site is surrounded by barbed wire and welded wire fencing with a padlocked gate. A section of the fencing is down in the rear of the site; however, this area is heavily overgrown and in a wetland area. Trespass is unlikely to occur at the site. According to Mr. John C. Greenan, P.E., an Environmental Engineer of CVPS, the site is being considered for reestablishment as a substation due to increased power needs in the area. This reestablishment could involve construction activities and maintenance activities at the site. Although future residential development of the site is unlikely, this scenario will be considered in the risk evaluation. Overhead utility lines exist on the site; therefore, any utility work at the site would not involve exposure to on-site soils during utility repair activities.

Based on the known and probable uses of the site, potential receptors include future construction workers, future maintenance workers, and hypothetical future residential development. The primary source of potential exposure would be through contact with the on-site fill material. This contact could occur through dermal exposure, incidental ingestion of contaminated material, and inhalation of fugitive dust particles. Groundwater samples were collected from directly beneath the fill material and at points upgradient and downgradient of the fill. Laboratory analysis showed no evidence of groundwater degradation at the subject site; the

installation of a drinking water well is not planned as part of the potential reestablishment of the site as a substation. Based on this information, ingestion of groundwater at the site is not considered a potential route of exposure.

**5.3 Toxicity Assessment**

The following section is a summary of potential carcinogenic and noncarcinogenic effects of the COCs.

**Polycyclic Aromatic Hydrocarbons (PAHs)**

Total PAHs are divided into two categories: carcinogenic PAHs and noncarcinogenic PAHs. The carcinogenic PAHs are suspected of promoting and/or initiating cancer based on laboratory animal studies. Noncarcinogenic PAHs have not been shown to cause cancer, but may have other adverse health effects. Each of the environmentally relevant PAHs has been tested for their carcinogenicity in animal studies and categorized as listed in the following table.

Suspected Carcinogen	Non-carcinogen
Benzo(a)anthracene*	Acenaphthene
Benzo(a)pyrene*	Acenaphthylene
Benzo(b)fluoranthene*	Anthracene
Benzo(k)fluoranthene*	Fluoranthene*
Benzo(g,h,i)perylene	Fluorene
Chrysene*	2-Methylnaphthalene
Dibenzo(a,h)anthracene	Naphthalene
Indeno(1,2,3-cd)pyrene	Phenanthrene
	Pyrene*

\* constituents detected in suspect on-site fill material

PAHs are a diverse class of chemicals found throughout the environment as complex mixtures, and, as previously discussed, are the result of incomplete combustion. Individuals are exposed to these compounds on a daily basis in food, air, and water. PAHs were first identified as occupational carcinogens after a correlation was made between high exposure levels to soot

and tar and an increased incidence of skin cancer. Animal data indicate that the PAHs are readily absorbed after exposure by inhalation or oral intake and distributed to many tissues in the body. PAHs are also absorbed via dermal exposure, although very little is distributed to tissue.

There are minimal data, animal or human, on the noncarcinogenic toxicities of PAHs, and virtually no data on the acute effects of these compounds. The noncarcinogenic effects caused by high concentrations of PAHs may include tissue damage in animals with proliferating tissues such as the intestinal epithelium, bone marrow, lymphoid organs, and testes.

### **Cyanide**

Cyanide complexes associated with MGP processes are frequently associated with purification wastes formed during coal carbonization. The form of cyanide is the most important factor with respect to the potential for acute or chronic effects, and the toxicity of the cyanide complexes is related to the degree to which they dissociate to form and release free cyanide. MGP wastes typically contain cyanide in iron and sulfur complexes. The most common complexes, ferri-ferrocyanide and ferrocyanide, are considered low in toxicity due to their low extent of dissociation; these complexes most likely represent the majority of cyanide detected at the site. A recent study has estimated that a maximum of 15 percent of total cyanide may be in a form that is soluble and possibly bioavailable at low pH levels encountered in the human digestive system (Theis, et al., 1994).

Brief oral or inhalation exposures to low levels of free cyanide can result in rapid, deep breathing, shortness of breath, convulsions, and unconsciousness. These effects are reversible over time. Long-term exposures to low levels can result in adverse central nervous system, thyroid gland, and cardiovascular effects. Free cyanide has been estimated to have an average

fatal dose of 1.52 mg/kg (ASTDR, 1993).

#### **5.4 Risk Characterization**

In general, the risks associated with the contaminants present at the site appear to be low. PAHs were detected only in samples collected from the MGP-related fill material and at relatively low concentrations: levels that are commonly associated with background PAH levels in soil. The analytical results indicate that the PAHs are not in the groundwater, which is consistent with the heavier molecular weight compounds detected in the soil. These types of PAHs are relatively insoluble in water and readily adsorb to soils.

The cyanide at the site is likely to be in the form of cyanide complexes such as ferri-ferrocyanide and ferrocyanide. These compounds are considered to be low in toxicity. The complexes are also relatively insoluble and adsorb to soils, which is consistent with the analytical results showing no cyanide in the groundwater. As previously noted, the estimated average fatal dose is 1.52 mg/kg. In order to receive this dose, a 70 kg adult would need to ingest 106.4 mg of cyanide, and a 15 kg child would need to ingest 22.8 mg. Using a maximum estimate of 15 percent of the total cyanides detected, the soil samples SBa-1 and SS-2 would release bioavailable levels of cyanide at 0.23 mg/kg and 0.54 mg/kg, respectively. Based on these estimates, a 70 kg adult would be required to ingest approximately 200 kg to 460 kg (440 lbs. to 1,014 lbs) of suspect fill material from the site to receive a fatal dose. A 15 kg child would need to ingest approximately 40 to 100 kg (88 to 220 lbs.) of material to receive a fatal dose. U.S. EPA estimates of soil ingestion rates for adults and children in a residential setting are 100 mg/day and 200 mg/day, respectively.

Currently, activity at the site appears to be negligible. The site has been abandoned since approximately 1970, and the property is surrounded by a fence that makes access extremely

difficult for unauthorized persons. Future construction and maintenance activities at the site are possible if the parcel is reestablished as a switching station. These activities are likely to be short term, with potential exposures to low PAH concentrations and cyanide compounds that are generally considered to have low toxicity. The risks to these workers would be predicted to be low. Should the site be utilized for future residential development, there could be some risk associated with the contaminants present due to potential for long-term exposure.

## **6.0 SUMMARY/CONCLUSIONS**

A site investigation/risk evaluation was conducted at the former CVPS substation located on Route 7B in Clarendon, Vermont. The subject property has been owned by CVPS since February 25, 1939.

### **6.1 Site Description and History**

The subject property consists of 0.26± acre of vacant, heavily vegetated land along the western side of Route 7B, approximately 1,400 feet southeast of the intersection with Route 7.

The site is located in a mixed commercial, residential, and agricultural area and is bound by Route 7B to the east, a single-family residence to the south, and a saw mill to the north and west.

According to available historical sources, the subject site was undeveloped land, likely used for agricultural purposes, prior to 1940. CVPS purchased the subject site in February of 1939 and shortly thereafter constructed a switch station on the site. The site was converted into a substation (which included the on-site placement of transformers) in August of 1966, according to CVPS records. The substation was subsequently dismantled in circa 1970; the site has generally remained abandoned since that time.

### **6.2 Site Investigation**

A total of four temporary monitoring wells were drilled on the subject property. In addition, two composite surface soil, three subsoil (grab), and two sediment (grab) samples were collected. Soil and groundwater samples were collected for analysis to screen for potential contamination resulting from historic on-site placement of suspected MGP-related fill material.

Laboratory analysis of selected soil samples indicate that no detectable levels of VOCs, metals, or PCBs are present. In addition, no detectable levels of PAHs are present in the sand and gravel fill material and native soil underlying the suspect fill material or in sediment samples collected from the site's intermittent stream bed.

Several PAH constituents as well as cyanide were detected in both a grab sample (SBa-1) and composite sample (SS-2) collected from within the suspect fill material area. Fluoranthene and pyrene were detected in SBa-1 and SS-2; no draft soil cleanup standards have been developed for either of these PAH constituents. PAH constituents detected in both the grab (SBa-1) and composite (SS-2) samples collected from the suspect fill material include benzo (a) anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene. Cyanide was detected in SBa-1 and SS-2 at concentrations of 1.5 and 3.6 ppb; SS-2 exceeded the draft soil cleanup standard for cyanide of 3.08 ppb. The constituents (and concentrations) detected in the on-site suspect fill material are commonly detected in MGP-related waste products and are generally consistent with CVPS previous investigation results.

Several of the PAH constituents detected in the suspect fill material exceeded the VTDEC HMMD draft soil cleanup standards. However, it is Atlantic's opinion that these values are very conservative; the detected PAH concentrations are within typical background ranges. For example, an EPA Superfund Record of Decision (Fairfield Coal Gasification Plan, IA, dated September 1990) defined MGP-contaminated soil as containing contaminants above 500 ppm total PAHs and 100 ppm carcinogenic PAHs level (a risk level of  $10^{-4}$  and proper institutional controls were implemented). Total PAHs detected in the subject material ranged from 0.865 to 1.44 ppm, and total carcinogenic PAHs from 0.574 to 0.837 ppm. In addition, according to Richard Spiese, Acting Supervisor for the VTDEC HMMD Sites Management Section (SMS), PAH cleanup standards were developed and accepted by SMS for contaminated soil with respect

to the Burlington Water Front Park development. Mr. Spiese recalled that a cleanup level of 12.0 ppm for total carcinogenic PAHs was utilized at that site.

Groundwater analytical results indicate no detectable levels of the analyzed constituents are present.

### **6.3 Qualitative Risk Evaluation**

In general, the risks associated with the contaminants present at the site appear to be low. PAHs were detected only in samples collected from the suspect fill material and at relatively low concentrations: levels that are commonly associated with background PAH levels in soil. The analytical results indicate that the PAHs are not in the groundwater, which is consistent with the heavier molecular weight compounds detected in the soil. These types of PAHs are relatively insoluble in water and readily adsorb to soils.

The cyanide at the site is likely to be in the form of cyanide complexes such as ferri-ferrocyanide and ferrocyanide. These compounds are considered to be low in toxicity. The complexes are also relatively insoluble and adsorb to soils, which is consistent with the analytical results showing no cyanide in the groundwater. Based on a maximum estimate of 15 percent of the total cyanides detected, the samples SBa-1 and SS-2 would release bioavailable levels of cyanide at 0.23 mg/kg and 0.54 mg/kg, respectively. These concentrations would be well below the estimated average fatal dose of 1.52 mg/kg.

Currently, activity at the site appears to be negligible. The site has been abandoned since approximately 1970, and the property is surrounded by a fence that makes access extremely difficult for unauthorized persons. Future construction and maintenance activities at the site are possible if the parcel is reestablished as a switching station. These activities are likely to be short term, with potential exposures to low PAH concentrations and cyanide compounds that are generally considered to have low toxicity. The risks to these workers would be predicted to be

low. Should the site be utilized for future residential development, there could be some risk associated with the contaminants present due to potential for long term exposure.

#### **6.4 Conclusions and Recommendations**

Based on the results of the Site Investigation/Risk Evaluation, the following conclusions and recommendations are provided:

- Soil analytical results of samples collected from the suspect fill material indicate concentrations of several PAH constituents and cyanide which exceed VTDEC draft soil cleanup standards.
- Analytical results of nonsuspect fill (sand and gravel fill; native soil), sediment, and groundwater samples indicate that the subject site has not been significantly impacted from the informal disposal of MGP-related waste.
- In general, the risks associated with the contaminants present at the site appear to be low. PAHs were detected only in samples collected from the suspect fill material and at relatively low concentrations: levels that are commonly associated with background PAH levels in soil. The analytical results indicate that the PAHs are not in the groundwater. The cyanide at the site is likely to be in the form of cyanide complexes such as ferri-ferrocyanide and ferrocyanide, which are considered to be low in toxicity. No cyanide was detected in the groundwater.
- Based on volume calculations developed from the numerous test pits dug throughout the site, approximately 80 yards of suspect (MGP-related) material exists on the subject site.

The qualitative risk evaluation concluded that the risk associated with the suspect fill material appears to be generally low. However, Atlantic would recommend the proper removal and disposal of this material in light of the VTDEC draft soil cleanup standards (and without a detailed quantitative risk assessment) and in order to limit CVPS future liability associated with this contaminated material.



State of Vermont

Department of Fish and Wildlife  
Department of Forests, Parks and Recreation  
Department of Environmental Conservation  
State Geologist  
Natural Resources Conservation Council  
RELAY SERVICE FOR THE HEARING IMPAIRED  
1-800-253-0191 TDD>Voice  
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES  
Department of Environmental Conservation  
Hazardous Materials Management Division  
103 South Main Street/West Office Building  
Waterbury, VT 05671-0404  
Phone: (802) 241-3888  
Fax: (802) 241-3296

June 24, 1994

John Greenan  
CVPS  
77 Grove Street  
Rutland, VT 05 701



RE: CVPS Property, Clarendon, Site # 93-1498

Dear Mr. Greenan:

The Sites Management Section (SMS) has reviewed your letter dated June 16, 1994. The SMS approves the workplan as amended (additional groundwater and surface water sampling). If surface water is not present during sampling, the SMS recommends sediment samples be collected from the upper few (1"-3") inches of the drainage pathway. The samples should be analyzed for the same compounds as the surface water samples.

The SMS understands the work will be completed on 11 and 12 July. Please notify the SMS if the dates change. If I may be of further assistance please feel free to contact me at the phone number or address identified above.

Sincerely,

Michael W. Young  
Asst. Hazardous Materials Specialist  
Sites Management Section

Post-It™ brand fax transmittal memo 7671		# of pages > 1
To	DEAN GUSTAFSON	From JOHN GREENAN
Co.	ATLANTIC	Co. CVPS
Dept.		Phone #
Fax #	203 537 6397	Fax #



# State of Vermont

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AGENCY OF NATURE/  
 Department of Environment  
 Hazardous Materials Max  
 100 South Main Street/West  
 Waterbury  
 Phone #  
 Fax #

May 26, 1994

John Greenan  
 CVPS  
 77 Grove Street  
 Rutland, VT 05701

RE: CVPS Property, Route 7B, Clarendon, VT, Site #93-1498

Dear Mr. Greenan:

The Sites Management Section (SMS) has reviewed the Site Investigation/Risk Evaluation Work Plan submitted by Atlantic Environmental Services for the above referenced site. The SMS offers the following comments:

3.1 Surface Soil - Text states sample locations are illustrated in Figure 3. Sample locations illustrated are those of previous sample locations. The SMS understands the samples will be collected from five (5) separate locations within the previously identified fill area ("small" grids in Figure 3) and five (5) locations out side of the suspect fill area ("large" grids in Figure 3).

3.2 Subsurface Soil - The SMS understands three (3) subsurface soil samples will be collected. One each from the fill material, sand and gravel fill material and native soil. Will these samples be composite samples? And if so from how many sample locations?

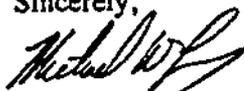
3.3 Groundwater Sampling - The SMS recommends two (2) downgradient groundwater samples be collected. The proposed sample location (northeastern portion of property) may not intercept any potentially contaminated groundwater flowing from the property (groundwater flow is identified as being in a north/northwesterly direction in Section 2.3 of the work plan). One (1) additional sample should be collected from a point more directly north of the fill area.

The SMS recommends surface water sampling be included in the work plan. Two surface water samples should be collected. A background sample, collected where surface water enters property and a downstream sample, where surface water exits property be collected and analyzed to determine if surface water has been impacted. Sample should be analyzed for the same compounds (VOC, SVOC, metals, cyanide) as soil and groundwater samples.

Post-It™ brand fax transmittal memo 7671	From	SDHA GREENAN
	To	CVPS
	Phone #	
	Fax #	
	Re	DEAN GUSTAFSON
	Co.	ATLANTIC
	Repl.	REPLY: GIVE ME A CALL
	Fax #	AFTER YOU REVIEW
		203 537 6347

The SMS looks forward to your continued cooperation in addressing the contamination at the property. Please inform the SMS ten (10) days prior of the date the sampling is scheduled to occur. If you have any questions please feel free to contact me at the phone number identified above.

Sincerely,



Michael W. Young  
Asst. Hazardous Materials Specialist  
Sites Management Section



# IEA

An Aquanon Company

## Analysis Report: EPA Method 8020 (Volatile Aromatics)

Client:	Central Vermont Pub. Ser.	IEA ID:	C107-008-03
Project:	Clarendon	Sample:	Clarendon 1
Report Date:	11/10/93	Type:	Water
Collected:	11/02/93	Container:	VOA
Received:	11/03/93		
Analyzed:	11/08/93	Dilution	
By:	GMT	Factor:	1

Number	Compound	PQL (ug/L)	Result (ug/L)
1	Benzene	1	BQL
2	Chlorobenzene	1	BQL
3	1,2-Dichlorobenzene	1	BQL
4	1,3-Dichlorobenzene	1	BQL
5	1,4-Dichlorobenzene	1	BQL
6	Ethylbenzene	1	BQL
7	Toluene	1	BQL
8	Xylenes (total)	1	BQL
9	Methyl-t-butylether	1	BQL

### Surrogate Standard Recovery:

1,4-Difluorobenzene                      85 %

### Comments:

BQL = Below quantitation limit

PQL = Practical quantitation limit.

Quantitation limits for this sample are obtained by multiplying the PQL by the dilution factor.



# IEA

An Aquarion Company

Analysis Report: EPA Method 8270  
(PAGE 1 OF 2 PAGES)

Client:	Central Vermont Pub. Ser.	IEA ID:	C107-008-01
Project:	Clarendon	Sample:	Clarendon 1
Report Date:	11/10/93	Type:	Soil
Collected:	11/02/93	Container:	Glass
Received:	11/03/93		
Extracted:	11/04/93		
Analyzed:	11/09/93	Dilution	
By:	LJT	Factor:	1.2

Number	Compound	PQL (ug/kg dry wt.)	Result (ug/kg dry wt.)
1	Acenaphthene	330	BQL
2	Acenaphthylene	330	BQL
3	Aniline	1650	BQL
4	Anthracene	330	BQL
5	Benzoic acid	1650	BQL
6	Benzo(a)anthracene	330	1,000
7	Benzo(b)fluoranthene	330	2,100
8	Benzo(k)fluoranthene	330	1,600
9	Benzo(g,h,i)perylene	330	1,700
10	Benzo(a)pyrene	330	1,700
11	Benzyl alcohol	660	BQL
12	bis(2-Chloroethoxy)methane	330	BQL
13	bis(2-Chloroethyl)ether	330	BQL
14	bis(2-Chloroisopropyl)ether	330	BQL
15	bis(2-Ethylhexyl)phthalate	330	BQL
16	4-Bromophenyl phenyl ether	330	BQL
17	Benzyl butyl phthalate	330	BQL
18	4-Chloroaniline	660	BQL
19	2-Chloronaphthalene	330	BQL
20	4-Chloro-3-methylphenol	660	BQL
21	2-Chlorophenol	330	BQL
22	4-Chlorophenyl phenyl ether	330	BQL
23	Chrysene	330	1,400
24	Dibenzo(a,h)anthracene	330	1,300
25	Dibenzofuran	330	BQL
26	Di-n-butyl phthalate	330	BQL
27	1,3-Dichlorobenzene	330	BQL
28	1,4-Dichlorobenzene	330	BQL
29	1,2-Dichlorobenzene	330	BQL
30	1,2-Diphenylhydrazine	330	BQL
31	3,3'-Dichlorobenzidine	660	BQL
32	2,4-Dichlorophenol	330	BQL
33	Diethyl phthalate	330	BQL
34	2,4-Dimethylphenol	330	BQL
35	Dimethyl phthalate	330	BQL
36	2-Methyl-4,6-dinitrophenol	1650	BQL
37	2,4-Dinitrophenol	1650	BQL
38	2,4-Dinitrotoluene	330	BQL



# IEA

An Aquanon Company

## Analysis Report: EPA Method 8270

(PAGE 2 OF 2 PAGES)

Client: Central Vermont Pub. Ser. IEA ID: C107-008-01  
 Project: Clarendon Sample: Clarendon 1

Number	Compound	PQL (ug/kg dry wt.)	Result (ug/kg dry wt.)
39	2,6-Dinitrotoluene	330	BQL
40	Di-n-octylphthalate	330	BQL
41	Fluoranthene	330	2,100
42	Fluorene	330	BQL
43	Hexachlorobenzene	330	BQL
44	Hexachlorobutadiene	330	BQL
45	Hexachlorocyclopentadiene	330	BQL
46	Hexachloroethane	330	BQL
47	Indeno(1,2,3-cd)pyrene	330	2,500
48	Isophorone	330	BQL
49	2-Methylnaphthalene	330	BQL
50	2-Methylphenol (o-cresol)	330	BQL
51	4-Methylphenol (p-cresol)	330	BQL
52	Naphthalene	330	BQL
53	2-Nitroaniline	1650	BQL
54	3-Nitroaniline	1650	BQL
55	4-Nitroaniline	1650	BQL
56	Nitrobenzene	330	BQL
57	2-Nitrophenol	330	BQL
58	4-Nitrophenol	1650	BQL
59	N-Nitrosodimethylamine	330	BQL
60	N-Nitroso-di-n-propylamine	330	BQL
61	N-Nitrosodiphenylamine	330	BQL
62	Pentachlorophenol	1650	BQL
63	Phenanthrene	330	630
64	Phenol	330	BQL
65	Pyrene	330	2,700
66	1,2,4-Trichlorobenzene	330	BQL
67	2,4,5-Trichlorophenol	330	BQL
68	2,4,6-Trichlorophenol	330	BQL

### Surrogate Standard Recovery:

2-Fluorophenol	69 %
Phenol-d6	67 %
Nitrobenzene-d5	74 %
2-Fluorobiphenyl	69 %
2,4,6-Tribromophenol	72 %
Terphenyl-d14	110 %

### Comments:

PQL = Practical quantitation limit.

BQL = Below quantitation limit.

Quantitation limits for this sample are obtained by multiplying the PQL by the dilution factor.

Dilution factor adjusted for % moisture.



# IEA

An Aquarion Company

Analysis Report: EPA Method 8270  
(PAGE 1 OF 2 PAGES)

Client: Central Vermont Pub. Ser.  
Project: Clarendon  
Report Date: 11/10/93  
Collected: 11/02/93  
Received: 11/03/93  
Extracted: 11/04/93  
Analyzed: 11/08/93  
By: LJT

IEA ID: C107-008-02  
Sample: Clarendon 1  
Type: Water  
Container: Glass

Dilution  
Factor: 1

Number	Compound	PQL (ug/L)	Result (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Aniline	50	BQL
4	Anthracene	10	BQL
5	Benzoic acid	50	BQL
6	Benzo(a)anthracene	10	BQL
7	Benzo(b)fluoranthene	10	BQL
8	Benzo(k)fluoranthene	10	BQL
9	Benzo(g,h,i)perylene	10	BQL
10	Benzo(a)pyrene	10	BQL
11	Benzyl alcohol	20	BQL
12	bis(2-Chloroethoxy)methane	10	BQL
13	bis(2-Chloroethyl)ether	10	BQL
14	bis(2-Chloroisopropyl)ether	10	BQL
15	bis(2-Ethylhexyl)phthalate	10	BQL
16	4-Bromophenyl phenyl ether	10	BQL
17	Benzyl butyl phthalate	10	BQL
18	4-Chloroaniline	20	BQL
19	2-Chloronaphthalene	10	BQL
20	4-Chloro-3-methylphenol	20	BQL
21	2-Chlorophenol	10	BQL
22	4-Chlorophenyl phenyl ether	10	BQL
23	Chrysene	10	BQL
24	Dibenzo(a,h)anthracene	10	BQL
25	Dibenzofuran	10	BQL
26	Di-n-butyl phthalate	10	BQL
27	1,3-Dichlorobenzene	10	BQL
28	1,4-Dichlorobenzene	10	BQL
29	1,2-Dichlorobenzene	10	BQL
30	1,2-Diphenylhydrazine	10	BQL
31	3,3'-Dichlorobenzidine	20	BQL
32	2,4-Dichlorophenol	10	BQL
33	Diethyl phthalate	10	BQL
34	2,4-Dimethylphenol	10	BQL
35	Dimethyl phthalate	10	BQL
36	2-Methyl-4,6-dinitrophenol	50	BQL
37	2,4-Dinitrophenol	50	BQL
38	2,4-Dinitrotoluene	10	BQL



**IEA**  
An Aquarion Company

Analysis Report: EPA Method 8270  
(PAGE 2 OF 2 PAGES)

Client: Central Vermont Pub. Ser. IEA ID: C107-008-02  
Project: Clarendon Sample: Clarendon 1

Number	Compound	PQL (ug/L)	Result (ug/L)
39	2,6-Dinitrotoluene	10	BQL
40	Di-n-octylphthalate	10	BQL
41	Fluoranthene	10	BQL
42	Fluorene	10	BQL
43	Hexachlorobenzene	10	BQL
44	Hexachlorobutadiene	10	BQL
45	Hexachlorocyclopentadiene	10	BQL
46	Hexachloroethane	10	BQL
47	Indeno(1,2,3-cd)pyrene	10	BQL
48	Isophorone	10	BQL
49	2-Methylnaphthalene	10	BQL
50	2-Methylphenol (o-cresol)	10	BQL
51	4-Methylphenol (p-cresol)	10	BQL
52	Naphthalene	10	BQL
53	2-Nitroaniline	50	BQL
54	3-Nitroaniline	50	BQL
55	4-Nitroaniline	50	BQL
56	Nitrobenzene	10	BQL
57	2-Nitrophenol	10	BQL
58	4-Nitrophenol	50	BQL
59	N-Nitroso-di-n-propylamine	10	BQL
60	N-Nitrosodiphenylamine	10	BQL
61	Pentachlorophenol	50	BQL
62	Phenanthrene	10	BQL
63	Phenol	10	BQL
64	Pyrene	10	BQL
65	1,2,4-Trichlorobenzene	10	BQL
66	2,4,5-Trichlorophenol	10	BQL
67	2,4,6-Trichlorophenol	10	BQL

**Surrogate Standard Recovery:**

2-Fluorophenol	61 %
Phenol-d6	60 %
Nitrobenzene-d5	67 %
2-Fluorobiphenyl	52 %
2,4,6-Tribromophenol	69 %
Terphenyl-d14	98 %

**Comments:**

PQL = Practical quantitation limit.

BQL = Below quantitation limit.

Quantitation limits for this sample are obtained by multiplying the PQL by the dilution factor.



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## **1.0 PURPOSE**

To impose a standard procedure for collecting surface-soil samples for the identification of chemical parameters.

## **2.0 SCOPE**

The following procedure describes the logistics, chain of events, collection techniques, and documentation requirements for collecting surface-soil samples designated for chemical analysis.

## **3.0 RESPONSIBILITY**

- Project Manager — First
- Field Team Leader/Task Manager — Second
- Field Sampling Technicians — Third

## **4.0 SUPPORTING PROCEDURES**

- Atlantic Procedure No. 1060: *Cleaning Procedure for Sampling Devices Used in Environmental Site Investigations*
- Atlantic Procedure No. 1041: *Sample Chain-of-Custody Procedure*

## **5.0 REQUIRED FORMS**

- Field Notebook No. 351, published by J.L. Darling Corporation, Tacoma, Washington.

## **6.0 PROCEDURE**

### **6.1 Selection of Sampling Locations**

The selection of sampling locations in and around a project site will be based on a review of existing site data: site topography and surface features; results of preliminary site surveys

using portable geophysical and air-monitoring equipment; and initial estimates on the extent of contamination and surface migration pathways of the waste present. Only after initial field reconnaissance are the final locations selected. At a minimum, the following general areas should be included as sampling points:

- upgradient soil surfaces to determine background levels;
- soil surfaces within known area(s) of contamination; and
- downgradient soil surfaces to determine any spread of contamination resulting from storm-water runoff.

Specific sampling locations may be selected in:

- areas where chemicals may have been stored, handled, or disposed;
- areas where motor vehicles hauling chemicals may have traveled on the site; and
- areas where water may have ponded during storm events.

## **6.2 Equipment List**

The following items are to be considered a minimum listing of required field equipment for collecting soil samples. Other tools required for accessing soils beneath paved area, etc. should be included, when necessary.

- boots, latex gloves, chemical-resistant gloves, appropriate level of protection;
- appropriate sample containers (supplied by the analytical laboratory, depending on analyses to be performed);
- Teflon®-coated or stainless-steel sample spoons;

- wooden stakes and marking paint and/or ribbons;
- a field notebook and indelible pen;
- sample bottle labels; and
- chain-of-custody forms.

### **6.3 Order of Samples**

Surface-soil samples should be collected *prior to* all other site-sampling events. The reason for this recommended priority is to prevent the possibility of cross-contamination among sampling points by site personnel or equipment (backhoe, drill rigs, equipment vehicles, etc.). For consistency with other sampling programs, the upgradient samples should be collected first.

### **6.4 Location and Collection of Samples**

Surface soils, depending upon the contaminants of interest, can be either discrete or composite samples. Certain state agencies discourage the use of composite samples when looking for aromatic volatile and halogenated volatile organic compounds because of dilution and the difficulty of forming a "true" composite. Prior to sampling, approval of composites should be secured from the appropriate regulatory agency.

If statistical techniques are to be employed in collecting surface-soil samples using a random grid, the procedure provided in the following two sources should be followed: Chapter 5 of *Methods of Soil Analysis, Part I*, by C.A. Black, et al; American Society of Agronomy, Academic Press, NY, 1965, and Section I of EPA-SW 846 *Test Methods for Evaluating Solid Waste*.

Once the locations have been chosen, sampling can begin. Remove the upper 2 inches of surface soil using an appropriately decontaminated or dedicated stainless steel or Teflon® spoon.

Normally, surface sampling begins by collecting soil from the 3-inch to 6-inch interval. However, we will be collecting samples from side walls of an excavation, which will be executed by sampling the representative soil along the wall within a 3-inch to 5-inch radius. If volatile organic analysis is planned, place the soil directly in the volatiles sample jar, filling it completely. Concentrate on collecting finer grains. Avoid leaves, twigs, and gravel. When the sample jar is full, wipe excess soil from the threads using a clean paper towel. Secure the cap firmly.

To collect soil for other analyses (semivolatile organics, metals, cyanide, grain size, etc.) use an appropriately decontaminated stainless steel bowl or tray to facilitate homogenization. Place an ample volume of soil in the tray. Separate and discard leaves, twigs, and gravel. Mix each quarter; combine the quarters and mix again. Fill the sample jars with homogenized soil.

If the microsolvant extraction method (simultaneous analysis of monocyclic aromatic hydrocarbons and polycyclic aromatic hydrocarbons) is planned, fill sample jars as previously described for volatile organic samples. Immediate filling of jars will prevent excess stripping of volatile compounds.

Latex or rubber gloves should be worn and changed after each location to protect sampling personnel and to avoid cross contamination through handling.

All filled jars must be labelled with the following information, as a minimum:

- project number;
- sampling time and date;
- sample number;
- analysis; and
- collector's initials.

The sample chain-of-custody form is then immediately filled out and kept with the sample. The sample is subsequently stored in a cooled container (wet ice or refrigeration) until delivery to the analytical laboratory.

The location, depth of sample, sample type, time of sample, and other associated data (i.e., organic vapor readings, color of the ground, odors, texture, etc.) will be documented in the field notebook when the sample is taken. If sampling is performed under a paved area or in fill, a description of these unique areas will also be included.

**6.5 Sample Verification**

After each soil sample is collected, mark the location to facilitate surveying activities at a later time. Once all the surface-soil samples are collected, the sample numbers and locations should be reviewed before leaving the site or progressing to other tasks in a program. All used sampling devices will be kept together, separate from clean tools for appropriate decontamination. No sample collection device (i.e., a spoon or tray) will be used more than once without proper decontamination previous to the next use.

**7.0 REFERENCES**

*Field Methods Compendium (FMC)*, Draft, United States Environmental Protection Agency, OERR #9285.2-11, Washington, D.C., November, 1993.

***SOIL***

Date Samples Received : 7-13-94

Client Name: Atlantic Envir. Serv.  
Report Date: 7-22-94

CTL Lab No. 74-204-11  
PO/Job No. 1992-01-02

**RESULTS OF ANALYSIS****EP TOXICITY EPA 1310**

Matrix Type	S	S	S	S
CTL Sample No.	8170	8171	8172	8173
Field ID	SBa-1	SS-1	SS-2	SD-1
Arsenic-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05
Barium-mg/L	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Cadmium-mg/L	ND<0.01	ND<0.01	ND<0.01	ND<0.01
Chromium, Total-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05
Lead-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05
Mercury-mg/L	ND<0.002	ND<0.002	ND<0.002	ND<0.002
Selenium-mg/L	ND<0.01	ND<0.01	ND<0.01	ND<0.01
Silver-mg/L	ND<0.01	ND<0.01	ND<0.01	ND<0.01

Matrix Type	S	S	S	S
CTL Sample No.	8170	8171	8172	8173
Field ID	SBa-1	SS-1	SS-2	SD-1
Cyanide, Total-ppm	1.5	ND<1.0	3.6	ND<1.0

Matrix Types : W = Water/Aqueous  
S = Soil/Solid  
O = Oil/Hydrocarbons

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165 Gracey Avenue / Meriden, CT 06451-2268  
(203)-634-3731  
Connecticut Certification No. PH-0547

Date Samples Received : 7-13-94

Client Name: **Atlantic Envir. Serv.**  
 Report Date: 7-22-94

CTL Lab No. 74-204-11  
 PO/Job No. 1992-01-02

**RESULTS OF ANALYSIS****EP TOXICITY EPA 1310**

Matrix Type	S	S	S
CTL Sample No.	8174	8175	8176
Field ID	SD-2	SBb-1	SBC-1
Arsenic-mg/L	ND<0.05	ND<0.05	ND<0.05
Barium-mg/L	ND<0.5	ND<0.5	ND<0.5
Cadmium-mg/L	ND<0.01	ND<0.01	ND<0.01
Chromium, Total-mg/L	ND<0.05	ND<0.05	ND<0.05
Lead-mg/L	ND<0.05	ND<0.05	ND<0.05
Mercury-mg/L	ND<0.002	ND<0.002	ND<0.002
Selenium-mg/L	ND<0.01	ND<0.01	ND<0.01
Silver-mg/L	ND<0.01	ND<0.01	ND<0.01

Matrix Type	S	S	S
CTL Sample No.	8174	8175	8176
Field ID	SD-2	SBb-1	SBC-1
Cyanide, Total-ppm	ND<1.0	ND<1.0	ND<1.0

Matrix Types : W = Water/Aqueous  
 S = Soil/Solid  
 O = Oil/Hydrocarbons

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165 Gracey Avenue / Meriden, CT 06451-2268  
 (203)-634-3731

Connecticut Certification No. PH-0547

Client	: Atlantic Envir. Serv.	Date Extracted	: 7/20-7/21
Lab No.	: 74-199-11	Date Analyzed	: 7/20-7/21
PO No.	: 1992-01-02	Analyst	: YK
Rep. Date	: 7-22-94		

**EPA METHOD 8100 GC/MS**

Date Samples Rec'd : 7-13-94

Matrix Type :	S	S	S	S
CTL SAMPLE # :	8170	8171	8172	8173
Field ID :	SBa-1	SS-1	SS-2	SD-1

	MDL				
Naphthalene	10	BDL	BDL	BDL	BDL
Acenaphthylene	10	BDL	BDL	BDL	BDL
Acenaphthene	10	BDL	BDL	BDL	BDL
Fluorene	10	BDL	BDL	BDL	BDL
Phenanthrene	10	BDL	BDL	BDL	BDL
Anthracene	10	BDL	BDL	BDL	BDL
Fluoranthene	10	118.0	BDL	316.0	BDL
Pyrene	10	173.0	BDL	287.0	BDL
Benzo (a) anthracene	10	45.0	BDL	62.0	BDL
Chrysene	10	50.0	BDL	92.0	BDL
Benzo (b) fluoranthene	10	106.0	BDL	202.0	BDL
Benzo (k) fluoranthene	10	183.0	BDL	285.0	BDL
Benzo (a) pyrene	10	190.0	BDL	196.0	BDL
Ideno (1,2,3-cd) pyrene	50	BDL	BDL	BDL	BDL
Dibenzo (a,h) anthracene	50	BDL	BDL	BDL	BDL
Benzo (ghi) perylene	50	BDL	BDL	BDL	BDL
Benzo (j) fluoranthene	50	BDL	BDL	BDL	BDL
Dibenz (a,h) acridine	50	BDL	BDL	BDL	BDL
Dibenz (a,j) acridine	50	BDL	BDL	BDL	BDL
7H-Dibenzo (c,g) carbazole	50	BDL	BDL	BDL	BDL
3-Methylcholanthrene	50	BDL	BDL	BDL	BDL

**MDL** = Minimum Detectable Level/**BDL** = Below Detection Level/**UNITS** = PPB

Matrix Type : W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons

CONNECTICUT TESTING LABORATORIES, INC.  
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 (203)-634-3731  
 Connecticut Certification No. PH-0547

Client	: Atlantic Envir. Serv.	Date Extracted	: 7/20-7/21
Lab No.	: 74-199-11	Date Analyzed	: 7/20-7/21
PO No.	: 1992-01-02	Analyst	: YK
Rep. Date	: 7-22-94		

**EPA METHOD 8100 GC/MS**

Date Samples Rec'd : 7-13-94

Matrix Type :	S	S	S
CTL SAMPLE # :	8174	8175	8176
Field ID :	SD-2	SBb-1	SBc-1

	MDL			
Naphthalene	10	BDL	BDL	BDL
Acenaphthylene	10	BDL	BDL	BDL
Acenaphthene	10	BDL	BDL	BDL
Fluorene	10	BDL	BDL	BDL
Phenanthrene	10	BDL	BDL	BDL
Anthracene	10	BDL	BDL	BDL
Fluoranthene	10	BDL	BDL	BDL
Pyrene	10	BDL	BDL	BDL
Benzo (a) anthracene	10	BDL	BDL	BDL
Chrysene	10	BDL	BDL	BDL
Benzo (b) fluoranthene	10	BDL	BDL	BDL
Benzo (k) fluoranthene	10	BDL	BDL	BDL
Benzo (a) pyrene	10	BDL	BDL	BDL
Ideno (1,2,3-cd) pyrene	50	BDL	BDL	BDL
Dibenzo (a,h) anthracene	50	BDL	BDL	BDL
Benzo (ghi) perylene	50	BDL	BDL	BDL
Benzo (j) fluoranthene	50	BDL	BDL	BDL
Dibenz (a,h) acridine	50	BDL	BDL	BDL
Dibenz (a,j) acridine	50	BDL	BDL	BDL
7H-Dibenzo (c,g) carbazole	50	BDL	BDL	BDL
3-Methylcholanthrene	50	BDL	BDL	BDL

**MDL= Minimum Detectable Level/BDL= Below Detection Level/UNITS= PPB**

**Matrix Type : W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons**

Client : Atlantic Envir. Serv.	Date Extracted: 7-15-94
Lab No. : 74-130-9	Date Tested : 7-15-94
PO No. : 1992-01-02	Analyst : YK
Rep. Date: 7-19-94	

**EPA METHOD 601/8010**

Date Samples Rec'd : 7-13-94

Matrix Type :	S	S	S	S	
CTL SAMPLE # :	8170	8173	8174	8175	
Field ID :	SBa-1	SD-1	SD-2	SBB-1	
	MDL				
Chloromethane	25	BDL	BDL	BDL	BDL
Bromomethane	25	BDL	BDL	BDL	BDL
Vinylchloride	25	BDL	BDL	BDL	BDL
Chloroethane	25	BDL	BDL	BDL	BDL
Methylenechloride	25	BDL	BDL	BDL	BDL
Trichlorofluoromethane	25	BDL	BDL	BDL	BDL
11-Dichloroethylene	25	BDL	BDL	BDL	BDL
11-Dichloroethane	25	BDL	BDL	BDL	BDL
T12-Dichloroethylene	25	BDL	BDL	BDL	BDL
Chloroform	25	BDL	BDL	BDL	BDL
12-Dichloroethane	25	BDL	BDL	BDL	BDL
111-Trichloroethane	25	BDL	BDL	BDL	BDL
Carbontetrachloride	25	BDL	BDL	BDL	BDL
Bromodichloromethane	25	BDL	BDL	BDL	BDL
12-Dichloropropane	25	BDL	BDL	BDL	BDL
T13-Dichloropropylene	25	BDL	BDL	BDL	BDL
Trichloroethylene	25	BDL	BDL	BDL	BDL
Dibromochloromethane	25	BDL	BDL	BDL	BDL
112-Trichloroethane	25	BDL	BDL	BDL	BDL
Cis13-Dichloropropylene	25	BDL	BDL	BDL	BDL
2-Chlorethylvinylether	25	BDL	BDL	BDL	BDL
Bromoform	25	BDL	BDL	BDL	BDL
1122-Tetrachloroethane	25	BDL	BDL	BDL	BDL
Tetrachloroethylene	25	BDL	BDL	BDL	BDL
Chlorobenzene	25	BDL	BDL	BDL	BDL
Benzyl Chloride	100	BDL	BDL	BDL	BDL
Bis(2-chlorethoxy)methane	100	BDL	BDL	BDL	BDL
Bis(2-chloroisopropyl)eth	100	BDL	BDL	BDL	BDL
Bromobenzene	25	BDL	BDL	BDL	BDL
Chloroacetaldehyde	100	BDL	BDL	BDL	BDL
1-Chlorohexane	25	BDL	BDL	BDL	BDL
Chloromethyl methyl ether	100	BDL	BDL	BDL	BDL
Chlorotoluene	25	BDL	BDL	BDL	BDL
Dibromomethane	25	BDL	BDL	BDL	BDL
12-Dichlorobenzene	25	BDL	BDL	BDL	BDL
13-Dichlorobenzene	25	BDL	BDL	BDL	BDL
14-Dichlorobenzene	25	BDL	BDL	BDL	BDL
Trichloropropane	25	BDL	BDL	BDL	BDL

MDL= Minimum Detectable Level/BDL= Below Detection Level/UNITS= PPB

Matrix Type : W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons

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Client : Atlantic Envir. Serv.	Date Extracted: 7-15-94
Lab No. : 74-130-9	Date Tested : 7-15-94
PO No. : 1992-01-02	Analyst : YK
Rep. Date: 7-19-94	

**EPA METHOD 601/8010**

Date Samples Rec'd : 7-13-94

Matrix Type : S  
 CTL SAMPLE # : 8176  
 Field ID : SBC-1

	MDL				
Chloromethane	25	BDL			
Bromomethane	25	BDL			
Vinylchloride	25	BDL			
Chloroethane	25	BDL			
Methylenechloride	25	BDL			
Trichlorofluoromethane	25	BDL			
11-Dichloroethylene	25	BDL			
11-Dichloroethane	25	BDL			
T12-Dichloroethylene	25	BDL			
Chloroform	25	BDL			
12-Dichloroethane	25	BDL			
111-Trichloroethane	25	BDL			
Carbontetrachloride	25	BDL			
Bromodichloromethane	25	BDL			
12-Dichloropropane	25	BDL			
T13-Dichloropropylene	25	BDL			
Trichloroethylene	25	BDL			
Dibromochloromethane	25	BDL			
112-Trichloroethane	25	BDL			
Cis13-Dichloropropylene	25	BDL			
2-Chlorethylvinylether	25	BDL			
Bromoform	25	BDL			
1122-Tetrachloroethane	25	BDL			
Tetrachloroethylene	25	BDL			
Chlorobenzene	25	BDL			
Benzyl Chloride	100	BDL			
Bis(2-chlorethoxy)methane	100	BDL			
Bis(2-chloroisopropyl)eth	100	BDL			
Bromobenzene	25	BDL			
Chloroacetaldehyde	100	BDL			
1-Chlorohexane	25	BDL			
Chloromethyl methyl ether	100	BDL			
Chlorotoluene	25	BDL			
Dibromomethane	25	BDL			
12-Dichlorobenzene	25	BDL			
13-Dichlorobenzene	25	BDL			
14-Dichlorobenzene	25	BDL			
Trichloropropane	25	BDL			

MDL = Minimum Detectable Level/BDL = Below Detection Level/UNITS = PPB

Matrix Type : W = Water/Aqueous S = Soil/Solid O = Oil/Hydrocarbons

Client : Atlantic Envir. Serv.	Date Extracted: 7-15-94
Lab No. : 74-130-9	Date Tested : 7-15-94
PO No. : 1992-01-02	Analyst : YK
Rep. Date: 7-19-94	

**EPA METHOD 602/8020**

Date Samples Rec'd: 7-13-94

Matrix Type :	S	S	S	S
CTL SAMPLE # :	8170	8173	8174	8175
Field ID :	SBa-1	SD-1	SD-2	SBb-1

	MDL				
Benzene	50	BDL	BDL	BDL	BDL
Toluene	50	BDL	BDL	BDL	BDL
Chlorobenzene	50	BDL	BDL	BDL	BDL
Ethyl Benzene	50	BDL	BDL	BDL	BDL
P & M Xylene	50	BDL	BDL	BDL	BDL
O- Xylene	50	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	50	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	50	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	50	BDL	BDL	BDL	BDL

**MDL = Minimum Detectable Level/ BDL = Below Detection Level/ UNITS= PPB**

**Matrix Type: W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons**

Client : Atlantic Envir. Serv.	Date Extracted: 7-15-94
Lab No. : 74-130-9	Date Tested : 7-15-94
PO No. : 1992-01-02	Analyst : YK
Rep. Date: 7-19-94	

**EPA METHOD 602/8020**

Date Samples Rec'd: 7-13-94

Matrix Type : **S**  
 CTL SAMPLE # : **8176**  
 Field ID : **SBC-1**

	MDL				
Benzene _____	50	BDL			
Toluene _____	50	BDL			
Chlorobenzene _____	50	BDL			
Ethyl Benzene _____	50	BDL			
P & M Xylene _____	50	BDL			
O- Xylene _____	50	BDL			
1,4-Dichlorobenzene _____	50	BDL			
1,3-Dichlorobenzene _____	50	BDL			
1,2-Dichlorobenzene _____	50	BDL			
_____					
_____					
_____					

**MDL = Minimum Detectable Level/ BDL = Below Detection Level/ UNITS= PPB**

**Matrix Type: W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons**

Date Samples Received : 7-13-94

Client Name: Atlantic Envir. Serv.  
Report Date: 7-29-94

CTL Lab No. 74-304-11  
PO/Job No. 1992-01-02

**RESULTS OF ANALYSIS**

**EPA 8080**

Matrix Type	W	W	W	W
CTL Sample No.	8166	8167	8168	8169
Field ID	MW-1	MW-2	MW-3	MW-4

Total PCB's-ppb	ND<1	ND<1	ND<1	ND<1
-----------------	------	------	------	------

Matrix Type	S	S	S	S
CTL Sample No.	8170	8171	8172	8173
Field ID	SBa-1	SS-1	SS-2	SD-1

Total PCB's-ppm	ND<0.1	ND<0.1	ND<0.1	ND<0.1
-----------------	--------	--------	--------	--------

Matrix Type	S	S	S
CTL Sample No.	8174	8175	8176
Field ID	SD-2	SBb-1	SBC-1

Total PCB's-ppm	ND<0.1	ND<0.1	ND<0.1	
-----------------	--------	--------	--------	--

Matrix Types : W = Water/Aqueous  
S = Soil/Solid  
O = Oil/Hydrocarbons

## ***GROUNDWATER***

Date Samples Received : 7-13-94

Client Name: **Atlantic Envir. Serv.**  
 Report Date: 7-22-94

CTL Lab No. 74-204-11  
 PO/Job No. 1992-01-02

**RESULTS OF ANALYSIS****Total Metals**

Matrix Type	W	W	W	W
CTL Sample No.	8166	8167	8168	8169
Field ID	MW-1	MW-2	MW-3	MW-4
Arsenic-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05
Barium-mg/L	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Cadmium-mg/L	ND<0.01	ND<0.01	ND<0.01	ND<0.01
Chromium, Total-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05
Lead-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05
Mercury-mg/L	ND<0.002	ND<0.002	ND<0.002	ND<0.002
Selenium-mg/L	ND<0.01	ND<0.01	ND<0.01	ND<0.01
Silver-mg/L	ND<0.01	ND<0.01	ND<0.01	ND<0.01
Cyanide, Total-mg/L	ND<0.05	ND<0.05	ND<0.05	ND<0.05

Matrix Types : W = Water/Aqueous  
 S = Soil/Solid  
 O = Oil/Hydrocarbons

Client	: Atlantic Envir. Serv.	Date Extracted	: 7/20-7/21
Lab No.	: 74-199-11	Date Analyzed	: 7/20-7/21
PO No.	: 1992-01-02	Analyst	: YK
Rep. Date	: 7-22-94		

**EPA METHOD 8100 GC/MS**

Date Samples Rec'd : 7-13-94

Matrix Type :	W	W	W	W	
CTL SAMPLE # :	8166	8167	8168	8169	
Field ID :	MW-1	MW-2	MW-3	MW-4	
	MDL				
Naphthalene	2	BDL	BDL	BDL	BDL
Acenaphthylene	2	BDL	BDL	BDL	BDL
Acenaphthene	2	BDL	BDL	BDL	BDL
Fluorene	2	BDL	BDL	BDL	BDL
Phenanthrene	2	BDL	BDL	BDL	BDL
Anthracene	2	BDL	BDL	BDL	BDL
Fluoranthene	2	BDL	BDL	BDL	BDL
Pyrene	2	BDL	BDL	BDL	BDL
Benzo (a) anthracene	2	BDL	BDL	BDL	BDL
Chrysene	2	BDL	BDL	BDL	BDL
Benzo (b) fluoranthene	2	BDL	BDL	BDL	BDL
Benzo (k) fluoranthene	2	BDL	BDL	BDL	BDL
Benzo (a) pyrene	2	BDL	BDL	BDL	BDL
Indeno (1,2,3-cd) pyrene	20	BDL	BDL	BDL	BDL
Dibenzo (a,h) anthracene	20	BDL	BDL	BDL	BDL
Benzo (ghi) perylene	20	BDL	BDL	BDL	BDL
Benzo (j) fluoranthene	20	BDL	BDL	BDL	BDL
Dibenz (a,h) acridine	20	BDL	BDL	BDL	BDL
Dibenz (a,j) acridine	20	BDL	BDL	BDL	BDL
7H-Dibenzo (c,g) carbazole	20	BDL	BDL	BDL	BDL
3-Methylcholanthrene	20	BDL	BDL	BDL	BDL

MDL= Minimum Detectable Level/BDL= Below Detection Level/UNITS= PPB

Matrix Type : W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons

CONNECTICUT TESTING LABORATORIES, INC.  
165 Gracey Ave / Meriden, CT 06451-2268  
(203)-634-3731  
Connecticut Certification No. PH-0547

Client : Atlantic Envir. Serv.	Date Tested : 7/15--7/18/94
Lab No. : 74-130-9	Analyst : YK
PO No. : 1992-01-02	
Rep. Date : 7-19-94	

**EPA METHOD 601/8010**

Date Samples Rec'd: 7-13-94

Matrix Type :	W	W	W	W	
Field ID :	MW-1	MW-2	MW-3	MW-4	
	MDL				
Chloromethane	2	BDL	BDL	BDL	BDL
Bromomethane	2	BDL	BDL	BDL	BDL
Vinylchloride	2	BDL	BDL	BDL	BDL
Chloroethane	2	BDL	BDL	BDL	BDL
Methylenechloride	1	BDL	BDL	BDL	BDL
Trichlorofluoromethane	1	BDL	BDL	BDL	BDL
11-Dichloroethylene	1	BDL	BDL	BDL	BDL
11-Dichloroethane	1	BDL	BDL	BDL	BDL
T12-Dichloroethylene	1	BDL	BDL	BDL	BDL
Chloroform	1	BDL	BDL	BDL	BDL
12-Dichloroethane	1	BDL	BDL	BDL	BDL
111-Trichloroethane	1	BDL	BDL	BDL	BDL
Carbontetrachloride	1	BDL	BDL	BDL	BDL
Bromodichloromethane	1	BDL	BDL	BDL	BDL
12-Dichloropropane	1	BDL	BDL	BDL	BDL
T13-Dichloropropylene	1	BDL	BDL	BDL	BDL
Trichloroethylene	1	BDL	BDL	BDL	BDL
Dibromochloromethane	1	BDL	BDL	BDL	BDL
112-Trichloroethane	1	BDL	BDL	BDL	BDL
Cis13-Dichloropropylene	1	BDL	BDL	BDL	BDL
2-Chlorethylvinylether	1	BDL	BDL	BDL	BDL
Bromoform	1	BDL	BDL	BDL	BDL
1122-Tetrachloroethane	1	BDL	BDL	BDL	BDL
Tetrachloroethylene	1	BDL	BDL	BDL	BDL
Chlorobenzene	1	BDL	BDL	BDL	BDL
Benzyl Chloride	10	BDL	BDL	BDL	BDL
Bis(2-chlorethoxy)methane	10	BDL	BDL	BDL	BDL
Bis(2-chloroisopropyl)eth	10	BDL	BDL	BDL	BDL
Bromobenzene	1	BDL	BDL	BDL	BDL
Chloroacetaldehyde	10	BDL	BDL	BDL	BDL
1-Chlorohexane	1	BDL	BDL	BDL	BDL
Chloromethyl methyl ether	10	BDL	BDL	BDL	BDL
Chlorotoluene	1	BDL	BDL	BDL	BDL
Dibromomethane	1	BDL	BDL	BDL	BDL
12-Dichlorobenzene	1	BDL	BDL	BDL	BDL
13-Dichlorobenzene	1	BDL	BDL	BDL	BDL
14-Dichlorobenzene	1	BDL	BDL	BDL	BDL
Trichloropropane	1	BDL	BDL	BDL	BDL

MDL = Minimum Detectable Level/BDL = Below Detection Level/UNITS = PPB

Matrix Type : W = Water/Aqueous S = Soil/Solid O = Oil/Hydrocarbons

Client : Atlantic Envir. Serv.	Date Tested : 7/15--7/18/94
Lab No. : 74-130-9	Analyst : YK
PO No. : 1992-01-02	
Rep. Date : 7-19-94	

**EPA METHOD 602/8020**

Date Samples Rec'd: 7-13-94

Matrix Type :	W	W	W	W
Field ID :	MW-1	MW-2	MW-3	MW-4

	MDL				
Benzene	1	BDL	BDL	BDL	BDL
Toluene	1	BDL	BDL	BDL	BDL
Chlorobenzene	1	BDL	BDL	BDL	BDL
Ethyl Benzene	1	BDL	BDL	BDL	BDL
P & M Xylene	1	BDL	BDL	BDL	BDL
O- Xylene	1	BDL	BDL	BDL	BDL
1,4-Dichlorobenzene	1	BDL	BDL	BDL	BDL
1,3-Dichlorobenzene	1	BDL	BDL	BDL	BDL
1,2-Dichlorobenzene	1	BDL	BDL	BDL	BDL

**MDL = Minimum Detectable Level/ BDL = Below Detection Level/ UNITS= PPB**

**Matrix Type: W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbons**

Date Samples Received : 7-13-94

Client Name: Atlantic Envir. Serv.  
Report Date: 7-29-94

CTL Lab No. 74-304-11  
PO/Job No. 1992-01-02

**RESULTS OF ANALYSIS**

**EPA 8080**

Matrix Type	W	W	W	W
CTL Sample No.	8166	8167	8168	8169
Field ID	MW-1	MW-2	MW-3	MW-4

Total PCB's-ppb	ND<1	ND<1	ND<1	ND<1
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Matrix Type	S	S	S	S
CTL Sample No.	8170	8171	8172	8173
Field ID	SBa-1	SS-1	SS-2	SD-1

Total PCB's-ppm	ND<0.1	ND<0.1	ND<0.1	ND<0.1
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Matrix Type	S	S	S
CTL Sample No.	8174	8175	8176
Field ID	SD-2	SBB-1	SBC-1

Total PCB's-ppm	ND<0.1	ND<0.1	ND<0.1
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Matrix Types : W = Water/Aqueous  
S = Soil/Solid  
O = Oil/Hydrocarbons