DRAFT

PHASE II
FIELD INVESTIGATION

Property Location:

123 GREENMANVILLE ROAD
MYSTIC, CONNECTICUT

Prepared For:

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Atlantic Project No. 2168-01-01

November 30, 1995

CONTENTS

CONTENTS (continued)

SECTION PAGE

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

The purpose of this report is to document the results of the Phase II Field Investigation performed by Atlantic Environmental Services, Inc. (Atlantic) at the subject property located at 123 Greenmanville Road, Mystic, Connecticut. The site location map is provided as Figure 1. Sampling locations are provided in Figure 2. The Phase II Field Investigation was based on conclusions and recommendations contained in a March 1995 Phase I Environmental Site Assessment (ESA) prepared by Catalyst Environmental Consulting, Inc. (Catalyst) of Simsbury, Connecticut, which was reviewed by Atlantic. Complete details regarding the site property description, site history, and site environmental issues are presented in the Phase I ESA report. A summary of the site description and site history is provided in Section 2.0 of this report. The Phase II Field Investigation was conducted to evaluate potential impacts to the site soil and groundwater. These impacts are discussed in detail in Section 3.0 of this report.

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LEGEND

GP–1 ⊕ GEOPROBE GROUNDWATER GRAB SAMPLE LOCATION

GP–3 ● GEOPROBE BORING LOCATION

APPROXIMATE PROPERTY BOUNDARY

MYSTIC RIVER

GP–1

FOUNDATION REMAINS OF FORMER GAS ENGINE HOUSE

APPARENT OUTFALL AREA

GP–3

GP–2

APPROXIMATE UNDERGROIUND TUNNEL LOCATIONS

GP–4

GP–10

GP–7

GP–6

GP–5

GARAGE

GREENMANVILLE ROAD

FORMER ROSSIE VELVET INDUSTRIAL COMPLEX

POOL

RESIDENCE

GP–8

GP–9

SEAMEN'S INN

24 12 0 24 48

APPROXIMATE GRAPHIC SCALE IN METERS

80 40 0 80 160

APPROXIMATE GRAPHIC SCALE IN FEET

ATLANTIC
ENVIRONMENTAL SERVICES, INC.

FIGURE 2
SAMPLING LOCATIONS

123 GREENMANVILLE ROAD
MYSTIC, CONNECTICUT

2.0 SITE BACKGROUND

2.1 Site Description

The subject property consists of approximately 1.5 acres of land and is currently occupied by two structures, a residence, and a multi-car garage. Catalyst identified a possible underground storage tank (UST) by the presence of a fill pipe located along the northern side of the garage, adjacent to the remnants of a foundation associated with a former gas engine house. However, Atlantic was unable to confirm the presence of this fill pipe during a preliminary inspection of the subject property prior to drilling activities.

A large circular aboveground storage tank (AST) was observed in a crawl space in the southeastern corner of the garage; this tank was also identified by Catalyst. The use and purpose of this tank is unknown, but based on its construction (riveted steel), this AST is possibly associated with the original construction of the garage. Further inspection of the crawl space revealed large pipes (6±-inch diameter) leading in and out of the AST area. It is not known whether this tank stored petroleum product or was in some way associated with the former steam heating system (possible water storage tank).

A hole in the floor of the garage located along the eastern wall led down to an underground tunnel located beneath Greenmanville Road and extending through the subject site, eventually terminating on site in the westernmost portion of the property, adjacent to the Mystic River. Catalyst had previously inspected this tunnel from the site and also at its origin, beneath the boiler room of the adjacently east former industrial complex, located across Greenmanville Road.

Previously, oily water was reportedly encountered beneath the sidewalk of the subject site's side of Greenmanville Road. A sample collected by Catalyst and analyzed for total petroleum hydrocarbons (TPH via EPA Method 418.1) revealed a concentration of 7,340 parts per million (ppm). A sample from the crawl space analyzed for TPH indicated 890 ppm. Both of these concentrations exceed the draft CTDEP cleanup criteria. Catalyst also collected a soil sample from the beach; total metals analysis revealed concentrations of arsenic and lead in excess of the draft CTDEP Direct Exposure Criteria.

2.2 Site History

Relying on information contained in the Catalyst report, historic industrial uses of the property include associations with the former Mystic Manufacturing Company and Rossie Velvet Company (apparently in operation at the adjacent mill site from the turn of the century until circa 1962), automotive painting (circa 1950s), and warehousing for Electric Boat (circa 1960s). Specific past on-site activities are not entirely known.

3.0 FIELD INVESTIGATION

3.1 Objective

The objective of the field investigation was to screen for potential contaminants in the on-site soil and groundwater. The environmental concerns noted in Catalyst's previous report are summarized below.

- Historic industrial uses of the property include associations with the former Mystic Manufacturing Company and Rossie Velvet Company (apparently in operation at the adjacent mill site from the turn of the century until circa 1962), automotive painting (circa 1950s), and warehousing for Electric Boat (circa 1960s). Specific past on-site activities are not entirely known.

- Apparently inactive USTs and ASTs are present on site. The contents, ages, and structural integrity of these tanks are not known.

- Suspect fill material is present in the western portion of the site, adjacent to the Mystic River. Historical information suggests that the fill was placed on site between circa 1900 and 1924; the specific source of the fill is not documented. Catalyst preliminarily characterized the material as incineration residue and/or slag; a tar/oily mixture was noted within the fill. A soil sample collected from the fill material was found to contain arsenic and lead in concentrations exceeding CTDEP soil cleanup criteria. Other metals were also present in this soil sample; however, levels were below cleanup criteria.

During Atlantic's reconnaissance of the site prior to drilling activities, the presence of an AST located in the crawl space of the garage was confirmed. However, no evidence (e.g., fill/vent piles) of a UST was observed.

3.2 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 Geoprobe™ test boring/temporary groundwater monitoring wells, and also for the selection of soil samples, is summarized in Table 1. Sample locations are depicted in Figure 2.

Ten Geoprobe™ test borings were drilled, with two of the borings utilized as temporary monitoring wells. Soil and groundwater samples were collected for analysis to screen for potential contamination resulting from the concerns cited in subsection 3.1. The purpose of the 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.

TABLE 1
SITE SAMPLING SUMMARY

Sample ID: Sample Location	Boring Depth: Sampling Specifications	Location Rationale	Soil Sample Depth (ft): Rationale	Analysis
Geoprobe™ Test Borings				
GP-1: [Temporary Well] Northern end of property	12 feet: Continuous sampling	Generally upgradient to screen for potential off-site sources of contamination	0 to 2: Assess on-site fill material quality.	Soil: 0 to 2 feet: Metals, VOCs, PCBs SVOCs and TPH Water: Metals, VOCs and SVOCs
GP-2: Adjacently north of garage	4.25 feet: Continuous sampling	Within former gas engine house foundation	No soil sample selected	---
GP-3: Adjacently north of garage and west of former gas engine house	3 feet: Continuous sampling	Potential UST location	No soil sample selected	---
GP-4: Northwestern corner of garage	10 feet: Continuous sampling	Downgradient of potential UST	No soil sample selected	---
GP-5: Southwestern corner of garage	10 feet: Continuous sampling	Downgradient of basement AST	6 to 8: highest OVA reading (7 ppm), slight petroleum odor	Soil: Lead, VOCs and TPH
GP-6: [Temporary Well] Central portion of property	10 feet: Continuous sampling	General screening of fill material and underground tunnel	4 to 6: highest OVA reading (3 ppm), black staining of fill material	Soil: Metals, VOCs, PCBs, SVOCs and TPH Water: Metals, VOCs and SVOCs
GP-7: Western end of property	10 feet: Continuous sampling	General screening of fill material and underground tunnel	No soil sample selected	---
GP-8: Southwestern portion of property	8 feet: Continuous sampling	General screening of fill material	4 to 6: black staining of fill material	Soil: Metals, VOCs, PCBs, SVOCs and TPH
GP-9: South of residence	8 feet: Continuous sampling	General screening of fill material	No soil sample selected	---
GP-10: Western edge of property	10 feet: Continuous sampling	General screening of fill material and outfall area of underground tunnel	0 to 4 and 4 to 8: petroleum odors noted throughout	Soil: Lead, VOCs and TPH

Notes:

OVA	-	indicates field screening for VOCs with portable organic vapor analyzer.
ppm	-	parts per million
Metals	-	Analyses for metals in soil include mass (total) analysis and synthetic precipitation leaching procedures (SPLP); metals in groundwater represent dissolved constituents.
VOCs	-	Volatile organic compounds: soil using EPA Methods 8240 and 8020; water using EPA Methods 8010/8020.
SVOCs	-	Semivolatile organic compounds using EPA Method 8100.
TPH	-	Total petroleum hydrocarbon analysis using EPA Method 418.1.
PCBs	-	Polychlorinated biphenyl analysis using EPA Method 8080.

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TABLE 2
SOIL ANALYTICAL RESULTS SUMMARY

Parameters	CTDEP Draft Criteria		Sample ID/Depth (feet)					
	Pollutant Mobility Criteria (GB)	Direct Exposure Criteria (residential)	GP-1 0 to 2	GP-5 6 to 8	GP-6 4 to 6	GP-8 4 to 6	GP-10 0 to 4	GP-10 4 to 8
Volatile Organic Compounds (VOCs) (ppb)								
2-Butanone (MEK)	8,000	500,000	ND	NA	78	ND	ND	NA
Trichloroethane	100	56,000	ND	NA	ND	ND	25	NA
Semi-Volatile Organic Compounds (SVOCs) (ppb)								
Naphthalene	56,000	1,000,000	23	NA	ND	5,425	ND	NA
Acenaphthene	---	---	57	NA	ND	6,150	ND	NA
Acenaphthylene	84,000	1,000,000	ND	NA	ND	ND	22	NA
Phenanthrene	40,000	1,000,000	547	NA	14	72,879	146	NA
Fluorene	56,000	1,000,000	59	NA	ND	11,650	ND	NA
Anthracene	400,000	1,000,000	123	NA	ND	18,187	26	NA
Fluoranthene	56,000	1,000,000	422	NA	29	52,981	172	NA
Pyrene	40,000	1,000,000	435	NA	31	50,268	172	NA
Benzo(a)anthracene	1,000	840	134	NA	17	12,562	45	NA
Chrysene	---	---	137	NA	22	12,473	51	NA
Benzo(b)fluoranthene	1,000	840	32	NA	24	10,390	25	NA
Benzo(k)fluoranthene	1,000	8,400	49	NA	22	10,102	21	NA
Benzo(a)pyrene	1,000	660	55	NA	26	8,975	33	NA
Ideno(1,2,3-cd)pyrene	---	---	ND	NA	ND	4,888	ND	NA
Dibenz(a,h)anthracene	---	---	ND	NA	ND	903	ND	NA
Benzo(g,h,i)perylene	---	---	ND	NA	ND	4,080	ND	NA
7H-Dibenzo(c,g)carbazole	---	---	ND	NA	ND	4,410	ND	NA
Metals ppm								
Lead-SPLP	0.015	---	ND	ND	0.020	ND	ND	ND
Lead-Total	---	500	55.5	16.8	71.4	15.2	47.6	59.9
Arsenic*	---	10	ND	NA	ND	ND	24.2	NA
Barium*	---	4,700	44.5	NA	8.5	17.8	52.1	NA
Chromium*	---	100	5.9	NA	78.5	9.1	4.3	NA
Mercury*	---	20	0.09	NA	0.44	0.08	0.42	NA
Polychlorinated Biphenyls (PCBs) ppm								
PCBs	10	2	ND	NA	ND	ND	ND	NA
Total Petroleum Hydrocarbons (TPH) ppm								
TPH	500	500	56	ND	200	44	152	235

Notes:
1. Only those parameters detected are shown.
2. NA = Not analyzed
3. ND = Not detected
4. ppb = parts per billion
5. ppm = parts per million
6. Shaded values indicate concentration exceeds criteria
7. - - - = No standard provided
8. * = SPLP analysis for these constituents was non-detect.

No PCBs were found in any of the analyzed soil samples. VOCs were detected in the ollowing soil samples: GP-6 (4 to 6 feet) detected 2-Butanone (MEK) at a concentration of 78 arts per billion (ppb); GP-10 (0 to 4 feet) detected trichloroethylene (TCE) at 25 ppb. Both etected concentrations were below the draft CTDEP PMC (for GB groundwater areas) and residential) DEC. GP-6 was collected from soil within the groundwater adjacent to the nderground tunnel; this preferential pathway may be transporting contaminants, likely from ome off-site source. No VOCs were found in the remaining samples.

TPH was found in the majority of the analyzed soil samples. As all of the samples contained fill material of a combustion product [ash and cinders] nature, low levels of TPH would be expected. All of the detected TPH concentrations were well below the CTDEP draft PMC and DEC of 500 ppm. Based on olfactory observations of test borings adjacent to the underground tunnel, an unidentified petroleum product may be migrating within groundwater or along this preferential pathway. The highest TPH concentrations were detected in samples collected apparently adjacent to the underground tunnel. However, none of the detected TPH concentrations require action based on the draft cleanup standards.

Several SVOC constituents were detected in all of the collected soil samples analyzed for these parameters. The SVOCs detected are generally typical of waste combustion products and are likely associated with those visually observed in the on-site fill material. With the exception of SVOC concentrations found in sample GP-8 (4 to 6 feet), all of the remaining samples containing SVOCs were below both the CTDEP PMC and DEC criteria. Sample GP-8 (4 to 6 feet) detected numerous SVOC constituents in excess of the CTDEP cleanup standards. This sample, collected southwest of the residence, was observed to be stained with an unknown black product (no petroleum odor was noted). As this black staining is apparently not the result of a petroleum product release, the staining may be indicative of historic releases of dye from the former adjacently east velvet mill.

Metals (mass-based) were detected in soil samples collected from GP-1 (0 to 2 feet), GP-5 (6 to 8 feet), GP-6 (4 to 6 feet), GP-8 (4 to 6 feet), GP-10 (0 to 4 feet) and GP-10 (4 to 8 feet). Arsenic, barium, chromium, lead and mercury were detected in these samples; only GP-10 (0 to 4 feet) was found to exceed CTDEP DEC for one of the metal constituents (arsenic). All other detected total metals were below their respective DEC. GP-10 (0 to 4 feet) detected total arsenic at 24.2 ppm; the CTDEP DEC for arsenic is 10 ppm. Leachable lead was the only metal constituent to be detected via SPLP method in the soil samples discussed above. Lead was detected only in soil sample GP-6 (4 to 6 feet) at 0.020 ppm above the CTDEP PMC of 0.015 ppm.

Arsenic was not detected in any of the other samples analyzed for this constituent. Barium (detected at concentrations ranging from 8.5 ppm to 52.1 ppm) can be present as background at concentrations reaching 1,600 ppm. Total chromium concentrations in site soil samples ranged from 4.3 ppm to 78.5 ppm; chromium can be found at background concentrations as high as 223 ppm. Total lead was found in several soil samples at concentrations ranging from 15.2 ppm to 71.4 ppm. Background concentrations of lead can be as high as 53.2 ppm. Mercury in site soil samples ranged from 0.08 ppm to 0.42 ppm; background concentrations are reported as high as 0.51 ppm.

4.2.3 Groundwater Analytical Results

Groundwater was encountered at 9.7± feet in GP-1, and 4.1± feet in GP-6.

Site groundwater grab samples were collected at two locations to provide a preliminary screening to assess both on-site and off-site groundwater quality. No dissolved metals or SVOCs were detected in either groundwater sample. Toluene (5 ppb) and xylene (2 ppb) were detected at very low concentrations in the upgradient temporary groundwater monitoring well (GP-1) sample, apparently indicating an off-site source of the contaminants. No VOCs were present in the groundwater sample collected from the second temporary monitoring well (GP-6). These constituents were detected well below the respective Groundwater Protection Criteria, 1,000 and 530 ppb. In addition, the detected concentration of these two constituents is well below the Surface-Water Protection and Residential Volatilization Criteria. Complete groundwater analytical results are provided in Appendix B.

5.0 SUMMARY/CONCLUSIONS

A subsurface investigation consisting of the collection and analysis of soil samples and two groundwater grab samples was conducted at 123 Greenmanville Road in Mystic, Connecticut. The site currently consists of a residence and multi-car garage. The purpose of the study was to assess the potential impacts on the site from historic on-site and off-site commercial/industrial uses.

A general screening of site groundwater detected no dissolved metals or SVOCs. VOC constituents (toluene and xylene) were detected at very low concentrations in the upgradient temporary groundwater monitoring well sample, apparently indicating an off-site source of the contaminants. These constituents were detected well below the respective Groundwater Protection, Surface-Water Protection and Residential Volatilization Criteria. Based on these results, Atlantic recommends no further action regarding groundwater issues at the site.

No PCBs were found in any of the analyzed soil samples. Low concentrations of VOCs were detected at the following locations: 2-Butanone (MEK) at GP-6; and trichloroethylene (TCE) at GP-10. Both detected concentrations were below the draft CTDEP PMC (for GB groundwater areas) and (residential) DEC. GP-6 was collected from soil within the groundwater (saturated zone) adjacent to the underground tunnel; this preferential pathway may be transporting contaminants, likely from some off-site source.

TPH was found in the majority of the analyzed soil samples. As all of the samples contained fill material apparently associated with combustion product [ash and cinders], low levels of TPH would be expected. All of the detected TPH concentrations were well below the CTDEP draft PMC and DEC of 500 ppm. Based on olfactory observations of test borings adjacent to the underground tunnel, an unknown petroleum product is apparently migrating within or along this preferential pathway. The highest TPH concentrations were detected in samples collected adjacent to the underground tunnel. However, none of the detected TPH concentrations require action based on the draft cleanup standards.

Several SVOC constituents were detected in all of the collected soil samples analyzed for these parameters. The SVOCs detected are generally typical of waste combustion products visually observed in the on-site fill material. Sample GP-8 (4 to 6 feet) was the only sample to detect SVOC constituents in excess of the CTDEP cleanup standards. This sample, collected southwest of the residence, was observed to be stained with an unknown black product (no petroleum odor was noted). As this black staining is apparently not the result of a petroleum product release, the staining may be indicative of historic releases of dye from the former adjacently east velvet mill.

Metals (mass-based) were detected in soil samples collected from GP-1 (0 to 2 feet), GP-5 (6 to 8 feet), GP-6 (4 to 6 feet), GP-8 (4 to 6 feet), GP-10 (0 to 4 feet) and GP-10 (4 to 8 feet). Arsenic, barium, chromium, lead and mercury were detected in these samples; only GP-10 (0 to 4 feet) was found to exceed CTDEP DEC for one of the metal constituents (arsenic). All other detected total metals were below their respective DEC. GP-10 (0 to 4 feet) detected total arsenic at 24.2 ppm; the CTDEP DEC for arsenic is 10 ppm. Leachable lead was

the only metal constituent to be detected via SPLP method in the soil samples discussed above. Lead was detected only in soil sample GP-6 (4 to 6 feet) at 0.020 ppm, above the CTDEP PMC of 0.015 ppm.

Based on the results of this investigation, several contaminants were found to be associated with the site's fill material. The fill material appears to cover the majority of the site to a typical depth of 6± feet. Three locations detected contaminants (arsenic, lead, and SVOCs) in concentrations exceeding the draft CTDEP cleanup criteria. Although these impacts do not appear to be widespread across the site (based on analytical results), the full extent of soil impact associated with these locations (GP-6, GP-8, and GP-10) is unknown at this time.

Relying on information gathered during this investigation, Atlantic provides the following recommendations.

1. Current proposed Remediation Standards Regulations have not been adopted as final by CTDEP. Additional modifications to these regulations may occur, some of which could directly affect the future course of action at the subject property. It is possible that alternative criteria may be made available which might reduce the remediation requirements. If possible, waiting for the final version of the new regulations to be adopted appears prudent prior to determining any remedial action (if necessary) at the site.

2. Conversely, if immediate action at the site is warranted, we would recommend additional sampling in those areas exhibiting elevated levels of contamination to determine the lateral extent of impact.

3. The underground tunnel, which travels from the adjacent former industrial complex through the site, is apparently discharging an unknown petroleum product/waste to the site. The integrity and contents of this tunnel on the site are currently unknown. Limited test pitting should be considered to determine the exact location, structural integrity and contents of this tunnel at the site. In addition, the tunnel should be properly closed out (sealed with cement) to prevent future discharges onto the site.