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February 16, 1999

Board of Selectmen
Town of Ashburnham
Town Hall
Main Street
Ashburnham, MA 01430

Re: Notification of Immediate Response Action Completion and Response Action Outcome Statement, Gasoline Underground Storage Tank (UST) Release, Ashburnham Highway Department, 17 Central Street, Ashburnham, MA, Release Tracking Number (RTN) 2-12224

Dear Board of Selectmen:

As required by the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000 at 310 CMR 40.1403: (3)(f) Minimum Public Involvement Activities in Response Actions, this letter serves as notification of the filing of a Response Action Outcome (RAO) Statement and report for the disposal site, RTN 2-12224, listed above.

Briefly, during the removal of a 4,000 gallon gasoline UST, a release of petroleum was discovered. A total of about 104 tons of gasoline and diesel fuel contaminated soils were removed from the disposal site, and transported to American Reclamation Corporation in Charlton, MA for disposal by recycling into asphalt. The RAO states that there is residual petroleum contamination at the disposal site, but there is no significant risk to human health, public welfare, or the environment at the site based on the results of a Method 1 Risk Characterization.

Should you have any questions regarding the RAO please contact William Brennan, Jr. Superintendent, Ashburnham Highway Department, 17 Central Street, Ashburnham, MA, telephone 978-827-4120 or myself.

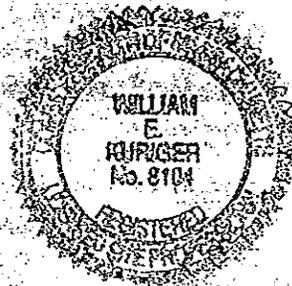
Sincerely,

William E. Kuriger, Ph.D., L.S.P. 8104

Environmental Scientist

Licensed Site Professional 8104

cc: Board of Health





ASHBURNHAM DEPARTMENT OF PUBLIC WORKS
Underground Storage Tank Fuel Release
Ashburnham, Massachusetts

DISPOSAL SITE NO. 2-10039

PHASE I
INITIAL SITE INVESTIGATION REPORT

March 18, 1996

Prepared By:
S E A CONSULTANTS INC.
Science/Engineering/Architecture
Cambridge, Massachusetts
Rocky Hill, Connecticut
Londonderry, New Hampshire

95250.01

1.0 GENERAL DISPOSAL SITE INFORMATION

Based on available records, a release of diesel fuel occurred from an on-site underground storage tank (UST). The 1,000-gallon UST was removed on September 23, 1993.

Closure documentation indicated that soil appeared to be impacted. The Ashburnham Fire Chief, who witnessed the tank removal, subsequently notified the Massachusetts Department of Environmental Protection (DEP) of the 72-hour release condition. At the time of tank removal and with DEP concurrence, the Town stockpiled approximately eight cubic yards of contaminated soil under a tarp within the DPW yard and backfilled the excavation.

In an attempt to evaluate the release, soil and groundwater samples were collected by Environmental Products & Services (EPS) as documented in their October 8, 1993 report. Diesel fuel oil was detected in soil samples at levels as high as 6,350 mg/kg along the walls of the UST excavation.

The site is presently listed as Disposal Site No. 2-10039. The site is currently used by the Ashburnham Department of Public Works (DPW) and is located along Central Street in Ashburnham, Massachusetts. The site has been used by the DPW for at least the past fifty years. The site was historically used as a railroad station from approximately the late 19th century to the early 20th century.

The Town received a letter on September 26, 1994 from DEP indicating that, under the Massachusetts Contingency Plan, the Town needed to submit either a Response Action Outcome (RAO) Statement or a Tier Classification prior to October 1, 1994. Neither document was filed with the DEP. The Town contacted S E A Consultants to conduct a Phase I Initial Site Investigation of the release site, in accordance with 310 CMR 40.0000, and to prepare a report and LSP Evaluation Opinion suitable for submission to the Massachusetts Department of Environmental Protection (DEP). The objectives of this Phase I Initial Site Investigation are as follows:

Determine, to the extent possible, the distribution and impact, if any, of residual diesel fuel in soils and groundwater at the Underground Storage Tank release site;

Determine potential migration pathways of the diesel fuel;

Determine if the release poses an Imminent Hazard as per 310 CMR 40.0321 or Substantial Release Migration conditions as per 310 CMR 40.0413; and

Determine if the release requires further comprehensive response actions and, if so, the scope of those activities

S E A conducted a review of publicly-available records, previous investigation reports and conducted subsurface investigations at the UST release site on October 5 and 19, 1994. Subsurface investigations included advancing one (1) test pit, the collection of subsurface soil samples from the UST excavation area, and the collection of two (2) groundwater samples (one sample each from two previously installed monitoring wells).

Soil was excavated under a presumed Limited Removal Action (LRA), failing to recognize that the DEP had been previously notified of the release by the Ashburnham Fire Chief. On October 5 and 19, 1994, approximately 35 to 40 cubic yards of impacted soil were excavated from the UST pit and stockpiled on-site. The impacted soil was transported off-site under a Bill of Lading on December 27, 1994. The average exposure point concentration of 318 mg/Kg total petroleum hydrocarbons is below applicable cleanup standards for release site soils classified as S-2/S-3/GW-2/GW-3, in accordance with the Massachusetts Contingency Plan (MCP). No groundwater impacts from this release were detected.

An activity and use limitation (AUL) is not required for the release site, pursuant to 310 CMR 40.1012(3)(d). Potential risks were characterized using Method I (310 CMR 40.0970) and levels of oil and hazardous waste materials in soil are at or below applicable Method I category S-1 soil standard, considering the historic use of the site as a railroad station.

1.1 DEP DISPOSAL SITE NUMBER

The DEP Disposal Site Number assigned to the site is 2-10039.

1.2 SITE LOCATION

1.2.1 Address: 19 Central Street, Ashburnham, Massachusetts

1.2.2 Latitude: N: 42° 38' 41"
Longitude: E: 72° 56' 10"

1.2.3 UTM Coordinates: N: 4,724,040
E: 261,500

1.3 DISPOSAL SITE LOCUS MAP

A Disposal Site Locus Map is provided in Figure 1-1. A Site Plan is provided in Figure 1-2.

1.4 ON-SITE WORKERS

There are eleven (11) permanent on-site workers. Non-permanent workers who come into contact with the site include contractors who deposit sand and gravel at the site; the frequency of this activity occurs approximately thirty (30) times per year and involves one (1) to two (2) people per event.

1.5 RESIDENTIAL POPULATION

According to the Town of Ashburnham Assessor's Department, the Town contains approximately 39.15 square miles of land. Based on the population reported in 1994 by the United States Census Bureau, there are approximately 109 people living within a one-half mile radius of the site.

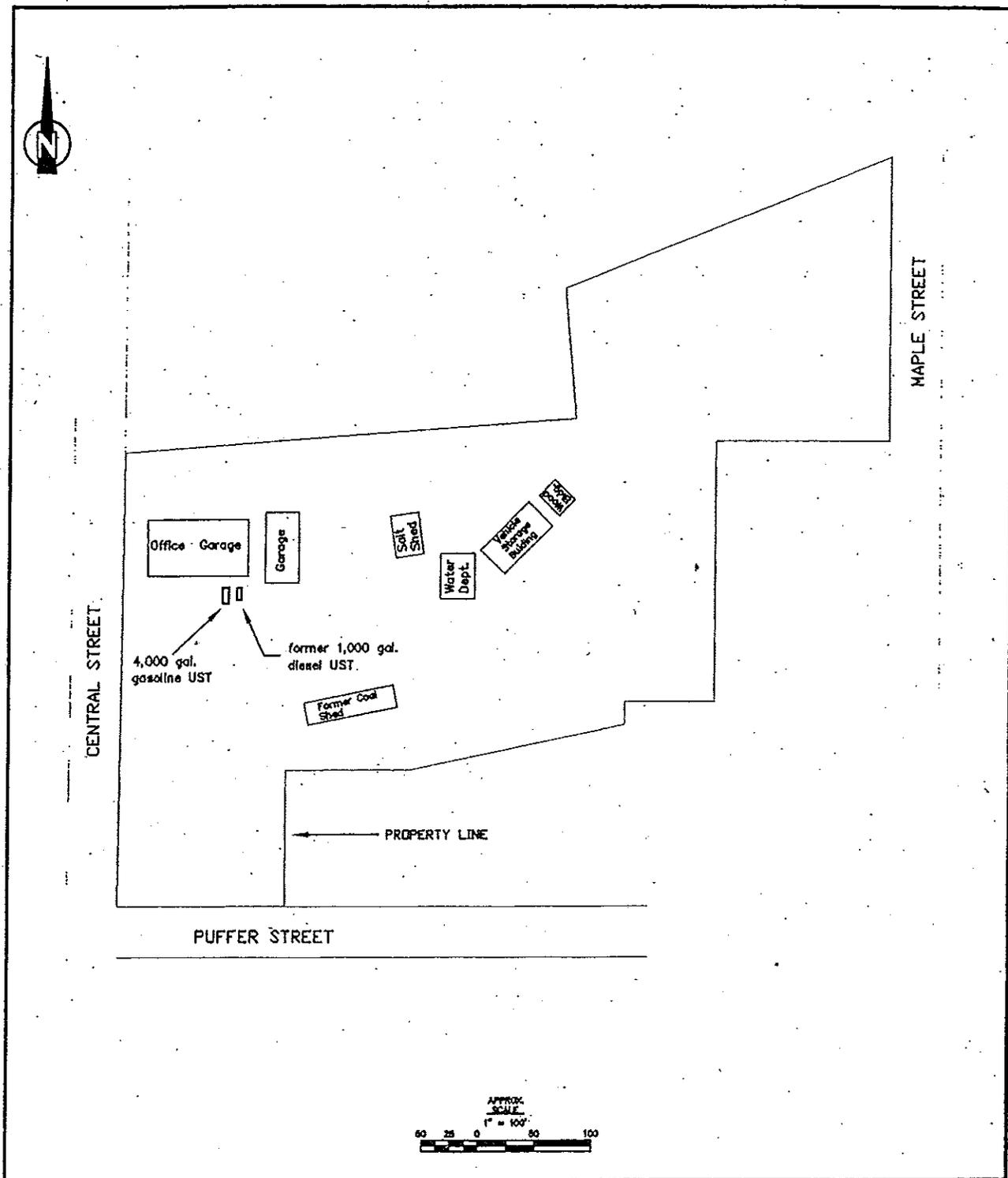


Figure 1-2
 Site Map
 RTN: 2-10039

Ashburnham Department
 of Public Works
 Ashburnham, Massachusetts

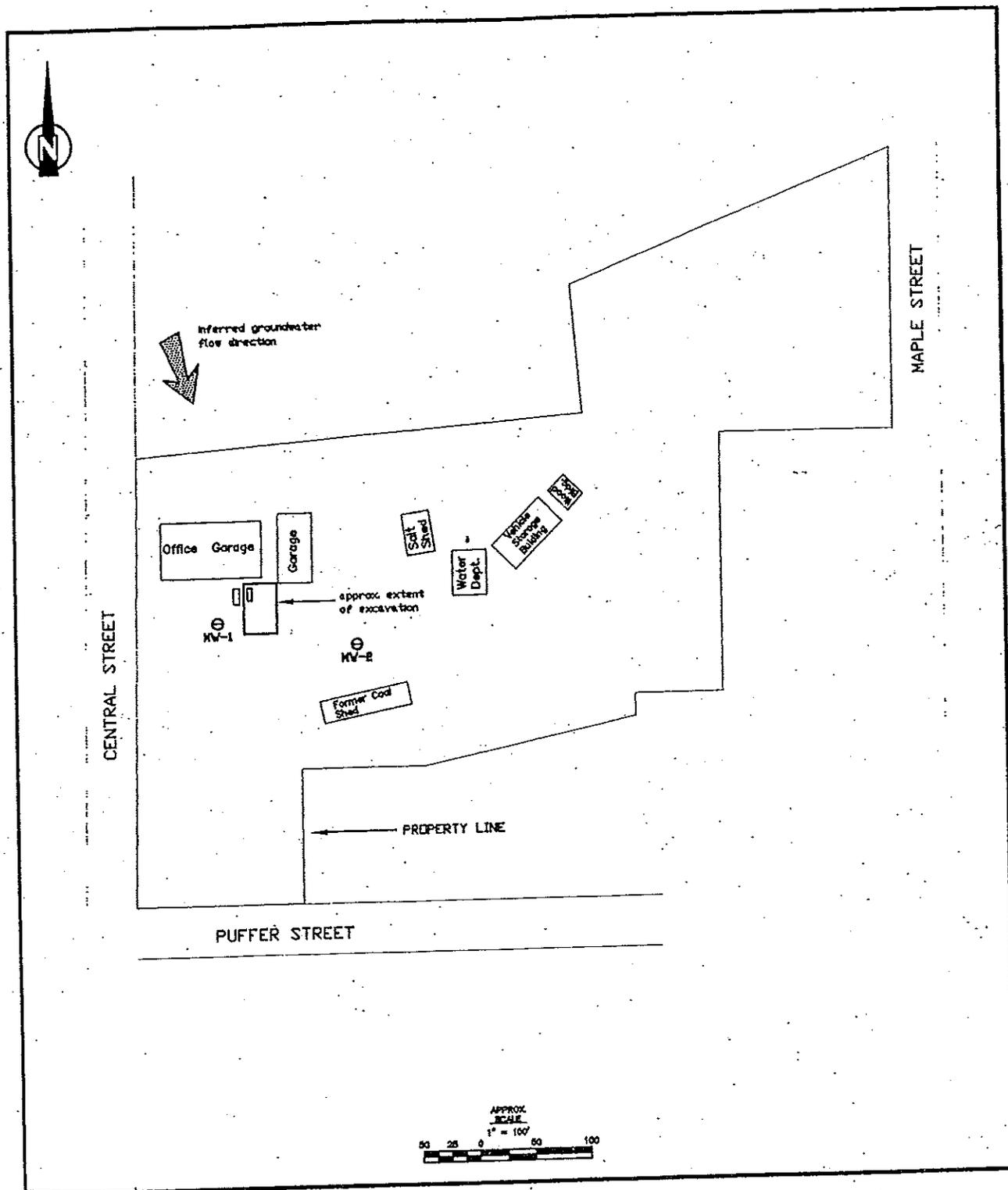


Figure 2-1
 Disposal Site Map
 RTN: 2-10039

LEGEND

- ⊖ approx. monitoring well location (sampled)
- 4,000 gal. gasoline UST
- former 1,000 gal. diesel UST

Ashburnham Department
 of Public Works
 Ashburnham, Massachusetts

3.1 OWNER/OPERATOR HISTORY

The DPW is located on a parcel of land approximately 4.2 acres in size. The DPW Garage Yard is a gravel area which is used for access to the Town garage, and for storage of sand, gravel, road salt and DPW equipment.

The site has been owned by the Town of Ashburnham and has been operated as the Ashburnham DPW for at least fifty years. A building permit for an addition at the site was granted on 5/14/91. On 11/5/92 Robert and Florence Saccone bought a small portion on the eastern border of the site.

The site was used as a railroad rotary station from approximately the late 1800s and to the 1930s. Based on town records and local and municipal interviews, it could not be ascertained what was present at the site prior to the railroad station.

3.2 RELEASE HISTORY

On September 23, 1993 a release of diesel fuel was encountered during the removal of one (1) 1,000-gallon diesel underground storage tank (UST) from the front of the DPW Garage. The UST was owned by Roy Brothers and was used by the Town of Ashburnham. Upon removal of the UST, it was observed that the UST had approximately six (6) holes in the bottom up to one inch in diameter, and that the ground beneath the tank showed signs of contamination. The Ashburnham Fire Chief, who witnessed the tank removal, subsequently notified the DEP of the 72-hour release condition.

At the time of tank removal and with DEP concurrence, the Town stockpiled approximately eight cubic yards of contaminated soil under a tarp within the DPW yard and backfilled the excavation. The backfilling of the excavation was allowed by the DEP with the understanding that the backfill, plus additional contaminated soil would be excavated and disposed of at a later date.

In an attempt to evaluate the release, soil and groundwater samples were collected by Environmental Products & Services (EPS) as documented in their October 8, 1993 report. Diesel fuel oil was detected in soil samples at concentrations as high as 6,350 mg/kg along the walls of the UST excavation. The Town contacted S E A to review the existing available data concerning the release and oversee remediation activities.

The Town received a letter on September 26, 1994 from DEP indicating that, under the Massachusetts Contingency Plan, the Town needed to submit either a Response Action Outcome (RAO) Statement or a Tier Classification prior to October 1, 1994. Neither document was filed with the DEP. The Town contacted S E A Consultants to review the existing available data concerning the release and oversee the remediation activities.

S E A Consultants conducted a subsurface investigation on October 5 and 19, 1994 that involved sampling two (2) monitoring wells, advancing a test pit, and obtaining soil samples from the excavation. Soil was excavated from the release site under a presumed Limited Removal Action (LRA), failing to recognize that the DEP had been previously notified of the release. On October 5 and 19, 1994, approximately 35 to 40 cubic yards of impacted soil were excavated from the UST pit and stockpiled on-site. The impacted soil was transported off-site under a Bill of Lading on December 27, 1994.

3.3 OIL AND HAZARDOUS MATERIALS USE AND STORAGE HISTORY

One (1) 1,000-gallon diesel UST was removed on September 23, 1993 from the site. The UST was located just south of the vehicle maintenance garage on the property. Figure 1-2 shows the location of the former UST. There are currently three (3) storage tanks located on the site: one (1) 4,000-gallon gasoline UST; one (1) 330-gallon diesel above-ground storage tank (AST) located in the garage, and; one (1) 275-gallon heating fuel AST located in the garage. As compared below, Fire Department records are not consistent with the current number of storage tanks located on-site.

A review of records regarding storage tanks was conducted at the Fire Department and Town Clerk's Department. As indicated in Section 3.3, the former diesel UST was removed on April 20, 1993 due to a release of diesel fuel. The most current records from the Town Clerk's Department indicate that on April 5, 1995 certificates of registration were granted for one (1) 1,000-gallon diesel UST and for one (1) 4,000-gallon gasoline UST. The certificate of registration for the diesel UST indicates that this tank was removed (see Appendix D for Fire Department record).

A review of records at the Fire Department indicates that the Ashburnham Highway Department has operated several USTs and ASTs on the premises since at least the mid-1960s. The following are the most current records: An application filed on April 25, 1986 lists several USTs at the site: one (1) 1,000-gallon diesel UST; one (1) 4,000-gallon gasoline UST installed 5/11/84; and two (2) 4,000-gallon and one (1) 3,000-gallon gasoline USTs installed 15 to 20 years ago. A permit was issued on August 20, 1992 for the installation of one (1) 500-gallon AST. A permit was filed on October 10, 1993 for a 330-gallon diesel AST. On October 3, 1994 an application was filed to install or alter a fuel oil burning equipment for a #2 fuel oil burner located in the garage. On April 20, 1994 an application was filed to install or alter fuel oil burning equipment in the basement.

Material Safety Data Sheets (MSDS) for the site were on file at the Fire Department for the following products: No. 2 fuel oil, diesel fuel, mineral spirits-safety-kleen 105 solvent-ms, solvent resin solution, Dexron II - petroleum hydrocarbons, SAE 15 w/40 multi-grade motor oil, Citgo super unleaded gasoline, Citgo regular gasoline, and Citgo unleaded gasoline.

ASTs are located in the general area near the site. Records from the DEP indicate that three releases occurred near the site:

(1) DEP Site No. 2-10733: A release of No. 2 fuel oil from a leaky feed line to an AST occurred at 8 Central Street on April 18, 1995; the volume of release was less than ten gallons. Based on the information provided, it appears that the extent of the release is limited to the boundaries of this site.

(2) DEP Site No. 2-10620: A release of approximately 100 gallons of #2 fuel oil from a copper feedline occurred at 19 Puffer Street, located approximately 150 feet to the east of the site. Two (2) monitoring wells were installed at this site. Contaminated soil was removed. Based on the information provided, the release of #2 fuel oil appears to be limited to the boundaries of this site.

TPH at a concentration of 14,390 mg/kg was detected in soil samples collected upgradient of the release on the 19 Puffer Street site. Groundwater flow direction, as measured, was not provided.

** LSP for 19 Puffer Street believes this soil area of contamination is emanating from the DPW yard*

(3) DEP Site No. 2-10584: A spill from drums and a dumpster occurred at 14 Maple Avenue. The DEP OHM Release Log Form indicates that this spill was reported to the DEP on December 16, 1994. An unknown amount of heavy metal containing pigments was released into the air and onto the ground. A complaint was filed of colored dust blowing in air resulting from cleanup of the plant. Dye pigment containing heavy metals was observed on the ground.

Groundwater flow direction was not provided. The dust blowing in air could potentially impact the Ashburnham DPW depending on wind flow, however it would not impact the investigation of the release under consideration which is a subsurface fuel oil release.

3.4 WASTE MANAGEMENT HISTORY

Solid waste from the site is picked up once a week and transported to the Ashburnham Landfill. Solid waste is composed of materials such as rags, plastic, and paper. No hazardous waste is generated at the site, as reported by DPW Supervisor William Brennan.

Waste oil is stored inside the garage and is picked up by Cyn Environmental on an as needed basis. Wastewater from hosing off trucks discharges into the ground.

3.5 ENVIRONMENTAL PERMITS AND COMPLIANCE HISTORY

The site is currently used as a facility for the Department of Public Works and was historically used as a railroad station depot. A permit was granted on April 14, 1986 to maintain an existing/new underground storage facility. See Section 3.3 for additional information on storage tank permits.

There were no recorded violations of environmental permits associated with the release site or the property on which it is located noted during the records review. S E A did not discover environmental permits or compliance history information on the former users of the property.

3.6 POTENTIALLY RESPONSIBLE PARTIES

The Town of Ashburnham is the owner of the property where the release took place, the Ashburnham Highway Department is the operator of this property, and Roy Brothers Oil Co, Inc. were the owners of the tank. Their addresses are as follows:

1. Town of Ashburnham
Town Hall
32 Main Street
Ashburnham, Massachusetts 01430
2. Roy Brothers Oil Co., Inc.
4 South Main Street Box 802
Ashburnham, MA 01430

Additional Potentially Responsible Parties (PRPs) have not been identified at this date, but may include any other party or parties, which may be identified at a later date.

4.0 SITE HYDROGEOLOGICAL CHARACTERISTICS

4.1 PREVIOUS SUBSURFACE INVESTIGATIONS

Following the removal of one (1) 1,000-gal. diesel UST, Environmental Products & Services, Inc. (EPS) was contracted to perform a subsurface investigation associated with the tank removal. Soil and groundwater sampling was performed by EPS and analyzed by Contest Inc. See Appendix A for the Environmental Products & Services, Inc. report dated October 8, 1993.

Soil and groundwater were sampled on September 24, 1993 from the tank pit at the release site. EPS observed that soil along the sidewalls of the tank excavation was darkly colored at grade and had a distinct petroleum odor. Free product was not observed in the soil above the top of the UST. EPS also observed standing water in the bottom of the tank excavation, but attributed this to rainwater from the previous night's rainfall.

Evidence of the diesel fuel release was detected in soil and water samples collected in the UST pit. Soil samples collected from the limits of the UST pit indicated the presence of hydrocarbons similar to No. 2/No. 4 diesel fuel. TPH was detected at a concentration of 6,350 mg/k in a soil sample from the south wall of the excavation pit. Water samples collected from the UST pit indicated a much reduced level of TPH at 6.63 mg/L, and also trace quantities of MTBE at <50 ug/L. BTEX was detected at a total concentration of 150 ug/l in water samples.

For the purpose of this Phase I report, the release site is limited to the excavation area around the former UST as shown in Figure 2-1.

The EPS report indicates the presence of five (5) two-inch monitoring wells located at the site. These monitoring wells were not installed in association with the UST removal, as the wells were installed previous to the date of the UST removal. Two of the monitoring wells were considered useful in monitoring transport of fuel oil potentially released to the

groundwater as a result of the leaking 1,000-gallon UST. These monitoring wells are indicated as MW-1 and MW-2 on Figure 2-1. The sampling locations MW-1 and MW-2 allowed determination of whether the groundwater had been affected by the release.

4.2 BORING ADVANCEMENT AND WELL CONSTRUCTION

The Town of Ashburnham retained S E A Consultants to conduct remedial activities at the release site and to prepare a Phase I report in accordance with 310 CMR 40.0000. The objectives of S E A's investigation are stated in Section 1.0.

As indicated in Section 4.1, five (5) two-inch monitoring wells had previously been advanced on the property. The subsurface investigation included collecting groundwater samples from two of these monitoring wells, advancing a test pit, and collecting soil samples from the UST pit. The locations of the monitoring wells and test pit are shown in Figure 2-1.

Two (2) monitoring wells (MW-1 and MW-2) were considered to be appropriate for groundwater sampling. The inferred groundwater flow direction is to the south-southeast, as indicated in Section 4.5. MW-2 is downgradient of the release. MW-1 was utilized also as the gradient is relatively flat to assess whether potentially impacted groundwater could be spreading laterally.

4.3 SITE TOPOGRAPHY

The topography on the site is generally flat with a slight slope to the south. The general surrounding area gradually slopes to the south. Surface water is located approximately 300 feet to the south of the site.

4.4 Soil Stratigraphy and Bedrock

The soils grade from a native till to a clay layer at approximately the depth of the tank pit, according to the Environmental Products & Services, Inc. report. Also according to this report, the soil is porous glacial till, composed of poorly sorted pebbles, boulders, clays, and sands.

Based on the Bedrock Geologic Map of Massachusetts (Zen, 1983), the bedrock beneath the site is part of the Littleton Formation within the Merrimack Belt. The terrane is generally composed of Devonian age black to aluminous mica schist, quartzose schist, and aluminous phyllite. Depth to bedrock was measured to be approximately 9.25 feet at MW-1 and 14.00 feet at MW-2.

4.5 CONCEPTUAL GROUNDWATER FLOW

In an effort to determine groundwater flow direction, S E A attempted to survey the five (5) monitoring wells that were installed previous to the release, and performed a round of groundwater level measurements. Data gathered from the survey and groundwater level measurement are shown in Table 4.1.

Information obtained from two (2) of the five (5) monitoring wells could be surveyed due to satisfactory conditions. Based on topography, depth to water of monitoring wells MW-1 and MW-2, and the location of a wetland area to the south of the site and a stream to the east of the site, groundwater is inferred to flow to the south-southeast. In relation to the release site, monitoring wells MW-1 is cross-gradient and MW-2 is downgradient of the excavation.

5.0 NATURE AND EXTENT OF CONTAMINATION

5.1 EVIDENCE OF A RELEASE

One (1) 1,000-gal. diesel underground storage tank was removed from the site on September 23, 1993. The closure documentation indicated that soil appeared to be impacted by the release. Approximately 8 cubic yards of contaminated soil was stockpiled in September 1994, and approximately 35-40 cubic yards of contaminated soil was stockpiled in October 1994. Laboratory analytical results are attached in Appendix C.

The DEP was notified of the 72-hour condition release on October 1, 1993. In September 1993, Environmental Products & Services, Inc. (EPS) performed a subsurface investigation of the release. EPS observed standing water to be present in the excavation; EPS attributed this water to rainwater from the previous night's rainfall trapped by an impervious layer of blue clay which underlain native till. Soil and groundwater samples taken from the excavation pit were analyzed for BTEX, TPH, and MTBE. TPH was detected in soil samples at a range of 393 mg/k to 6,350 mg/k. No MTBE was detected in soil samples. Total BTEX was detected in groundwater at 150 mg/l. Trace quantities (<50 ug/l) of MTBE were detected in groundwater samples. Tables 5.1 and 5.2 provide a summary of the soil and groundwater analytical results from the EPS subsurface investigation.

On October 5, 1994 S E A sampled soil at the release site and oversaw the excavation of soil in the area of the former tank. Groundwater samples were not collected on October 5, 1994. Approximately 20-25 cubic yards of soil were removed from the excavation and stockpiled, based on visual and olfactory observations, and field screening with a photoionization detector (PID) using the jar headspace method. PID analytical results are summarized in Table 5.3.

Five (5) closure soil samples was taken on October 5, 1995 around the perimeter of the excavation. Soil samples were submitted to a DEP-certified laboratory for analysis. Soil samples taken one on each of the northern, southern, eastern, and western faces of the

excavation (ASH-1, ASH-2, ASH-3, and ASH-5) and one at the center bottom of the excavation (ASH-4) were analyzed for TPH. TPH was detected in soil samples at 1,600 mg/Kg at the Southern Face and at 11,000 mg/Kg at the Western Face. Soil samples from the Eastern Face were additionally analyzed for VOCs and PAHs as this sidewall sample location was considered to be at clean limits. No VOCs or PAHs were detected. Soil analytical results are summarized in Table 5.4.

On October 19, 1994, S E A sampled soil and groundwater and oversaw additional excavation at the release site. The excavation was extended in the southerly direction and as far in the westerly direction as the existing gasoline UST would allow. Approximately 10 to 15 cubic yards of contaminated soil were excavated based on field screening analyses with a PID using the jar headspace method. A test pit was also advanced on the western side of the gasoline UST to confirm that the diesel contaminated soil did not extend beyond the gasoline tank area. PID analytical results are summarized in Table 5.5.

Six (6) closure soil samples were taken on October 19, 1994 from the excavation sidewalls and middle/bottom. Soil samples were sent to a DEP-certified laboratory for analysis of VOCs, PAHs, and TPH. Soil samples were taken one each at the southeastern corner, southwestern corner, southern face, southwestern corner, and western face of the excavation (ASH-6, ASH-7, ASH-8, ASH-9, and ASH-10) and one at the test pit west of the gasoline UST (ASH-TEST PIT-6').

Analytical results for soil samples from October 19, 1994 indicated the following: TPH and VOCs were not detected in soil samples collected from the test pit. TPH was detected in soil samples at 780 mg/Kg at the southeastern corner and at 910 mg/Kg at the southern face. The average exposure point concentration of 318 mg/Kg for TPH is below the MCP Standards for the release site. The average exposure point concentrations for VOCs and PAHs are below the determined MCP Standards for the release site. Xylenes were detected in soil samples at 12,000 ug/Kg at the southern face and at 32 ug/Kg at the southeastern corner. Various PAH compounds were detected in soil samples at the southeastern corner, southern face, and at the test pit. These are attributable to the use of

the site as a railroad rotary station for 50 years in the era of coal burning locomotives. Soil analytical results with the associated MCP Standard are summarized in Tables 5.6 and 5.7.

Two (2) groundwater samples were taken on October 19, 1994 from two previously existing monitoring wells (MW-1 and MW-2) at the site. Groundwater samples were sent to a DEP-certified laboratory for analysis of VOCs and PAHs. MW-1 is located southwest of the former diesel UST. MW-2 is located southeast of the former diesel UST. Tetrachloroethene (TCE) was detected at 13 ug/l in the groundwater sample collected from monitoring well (MW-2), located downgradient from the former tank. The detected concentration of TCE is below the determined MCP Groundwater Standards for the site. No PAHs were detected in the groundwater samples from MW-1 or MW-2. Groundwater analytical results with the associated MCP Standard are summarized in Table 5.8.

Table 5.1

Summary of Analytical Data for Soil from Previous Study

Sampling Date: 9/24/93

1,000-Gallon Diesel UST
19 Central Street
Ashburnham, Massachusetts

(Source: Environmental Products & Services, Inc. October 8, 1993 report)

Sample ID	Sample Location	Depth of Sample (inches)	Compounds Detected
632A	North Wall	44"	393 mg/k TPH ¹
632B	East Wall	44"	<0.5 mg/k ethylbenzene 1,130 mg/k TPH
632C	South Wall	44"	6,350 mg/k TPH
632D	West Wall	44"	<0.5 mg/k toluene 1 mg/k ethylbenzene 5 mg/k xylene 4,610 mg/k TPH

Note: ¹TPH = Total Petroleum Hydrocarbon

Table 5.2

Summary of Analytical Data for Water from Previous Study

Sampling Date: 9/24/93

1,000-Gallon Diesel UST
19 Central Street
Ashburnham, Massachusetts

(Source: Environmental Products & Services, Inc. October 8, 1993 report)

Sample ID	Sample Location	Depth of Sample (inches)	Compounds Detected
632E & E1	Water at bottom of excavation	64"	30 ug/l benzene 40 ug/l toluene 10 ug/l ethylbenzene 70 ug/l xylene <50 ug/l MTBE ¹

Note: ¹MTBE = methyl tertiary butyl ether

Table 5.4

Summary of Closure Sampling Analytical Results for Soil

Sampling Date: 10/5/94

1,000-Gallon Diesel UST
19 Central Street
Ashburnham, Massachusetts

Sample ID	Sample Location	Depth of Sample (inches)	TPH ¹ (mg/Kg)	VOC ² (ug/Kg)	PAHs ³ (ug/Kg)
ASH-1	Eastern Face	6-7	ND ⁴	ND	ND
ASH-2	Northern Face (toward Garage)	5-7	ND	NT ⁵	NT
ASH-3	Southern Face	7-8	1,600 (diesel)	NT	NT
ASH-4	Middle/Bottom of Excavation	10	ND	NT	NT
ASH-5	Western Face (Next to gasoline UST)	5-6	11,000 (Diesel)	NT	NT

Notes:

¹TPH = Total Petroleum Hydrocarbons

²VOCs = Volatile Organic Compounds

³PAHs = Polynuclear Aromatic Hydrocarbons

⁴ND = Not Detected at or below instrument detection limit.

⁵NT = Not Tested

Table 5.6

Summary of Final Closure Analytical Results -
Total Petroleum Hydrocarbon and Volatile Organic Compounds in Soil

Sampling Date: 10/19/94

1,000-Gallon Diesel UST
19 Central Street
Ashburnham, Massachusetts

Analysis	ASH-6	ASH-7	ASH-8	ASH-9	ASH-10	ASH-TEST PIT-6'	Average Exposure Point Concentration ¹	MCP Standard ²
Hydrocarbon Scan (Units = mg/Kg)								
Total Petroleum Hydrocarbons (TPH)	780 (diesel)	ND ³	910 (diesel)	ND	ND	ND	318	2,500
Volatile Organic Compounds (VOCs) (Units = µg/Kg)								
Xylenes	32	ND	3,800	ND	ND	ND	640	500,000
Naphthalene	ND	ND	7,800	ND	ND	ND	1,311	1,000,000
p-Isopropyltoluene	57	ND	ND	ND	ND	ND	285	**
1,3,5-Trimethylbenzene	94	ND	3,900	ND	ND	ND	675	*
1,2,4-Trimethylbenzene	150	ND	12,000	ND	ND	ND	2,034	*

Notes:

- ¹ In order to determine the exposure point concentration for those compounds with a ND, half of the laboratory detection limit was used. The average exposure point concentrations for TPH and VOCs are to be used for comparison to MCP Standards.
- ² MCP Standards were taken from the minimum of soil type of S-2 or S-3 and groundwater type of GW-2 or GW-3.
- ³ ND = Not Detected at or below instrument detection limit.
- ⁴ * MCP Method I Standards were not available for these compounds. Because the mass of these chemicals was included in the mass being reported in the TPH value, then the TPH standard is applicable and a separate Method 2 Standard need not be developed.

Locations of Samples were as follows:

- ASH-6 Southeastern Corner at a depth of 4 to 6 feet.
- ASH-7 Southwestern Corner at a depth of 5 to 7 feet.
- ASH-8 Southern Face at a depth of 5 to 7 feet.
- ASH-9 Southwestern Corner at a depth of 5 to 10 feet.
- ASH-10 Western Face at a depth of 1 to 5 feet.
- ASH-TEST Pit-6' Test Pit West of Gasoline UST at a depth of 6 feet.

Table 5.7

**Summary of Final Closure Analytical Results -
Polynuclear Aromatic Hydrocarbons in Soil**

Sampling Date: 10/5/94

1,000-Gallon Diesel UST
19 Central Street, Ashburnham, Massachusetts

Analysis	ASH-6	ASH-7	ASH-8	ASH-9	ASH-10	ASH-TEST PIT-6'	Average Exposure Point Concentration ¹	MCP Standard ²
Polynuclear Aromatic Hydrocarbons (PAHs) (Units = µg/Kg)								
Fluoranthene	4,300	ND ³	390	ND	ND	160	858	600,000
Naphthalene	1,100	ND	2,500	ND	ND	ND	648	1,000,000
Benzo (a) anthracene	2,900	ND	ND	ND	ND	ND	539	1,000
Benzo (a) pyrene	3,400	ND	ND	ND	ND	ND	692	700
Benzo (b,k) fluoranthene	6,700	ND	ND	ND	ND	220	1,257	*
Chrysene	4,200	ND	ND	ND	ND	ND	805	10,000
Acenaphthylene	750	ND	ND	ND	ND	ND	211	800,000
Benzo (ghi) perylene	3,000	ND	ND	ND	ND	ND	664	100,000
Phenanthrene	1,700	ND	3,800	ND	ND	ND	974	100,000
Indeno (1,2,3-cd) pyrene	2,700	ND	ND	ND	ND	ND	608	1,000
Pyrene	4,700	ND	700	ND	ND	ND	962	500,000
1-Methylnaphthalene	ND	ND	10,000	ND	ND	ND	1,971	**
2-Methylnaphthalene	3,200	ND	15,000	ND	ND	ND	3,073	7,000
Acenaphthene	ND	ND	550	ND	ND	ND	212	2,000,000
Fluorene	ND	ND	2,000	ND	ND	ND	453	1,000,000

Notes:

¹ In order to determine the exposure point concentration for those compounds with a ND, half of the laboratory detection limit was used. The average exposure point concentrations for PAHs are to be used for comparison to MCP Standards.

² MCP Standards were taken from the minimum of soil type of S-2 or S-3 and groundwater type of GW-2 or GW-3.

³ ND = Not Detected at or below instrument detection limit.

⁴ * A MCP Method-I Standard was not available for this compound. Because the mass of this chemical was included in the mass being reported in the TPH value, then the TPH standard is applicable and a separate Method 2 Standard need not be developed.

Locations of Samples were as follows:

ASH-6 Southeastern Corner at a depth of 4 to 6 feet.

ASH-7 Southwestern Corner at a depth of 5 to 7 feet.

ASH-8 Southern Face at a depth of 5 to 7 feet.

ASH-9 Southwestern Corner at a depth of 5 to 10 feet.

ASH-10 Western Face at a depth of 1 to 5 feet.

ASH-TEST Pit-6' Test Pit West of Gasoline UST at a depth of 6 feet.

Table 5.8

Summary of Analytical Results for Groundwater

Sampling Date: 10/19/94

1,000-Gallon Diesel UST
19 Central Street
Ashburnham, Massachusetts

Well Designation	Well Location	Volatile Organic Compounds	Polynuclear Aromatic Hydrocarbons	MCP Standard ¹
MW-1	50 ft. West of Former Diesel UST	ND ²	NT ³	3,000 ug/L (Tetrachloroethene)
MW-2	Southeast of Former Diesel UST	13 ug/l Tetrachloroethene	ND	3,000 ug/L (Tetrachloroethene)

Notes:

¹ MCP Standards were taken from the minimum of soil type of S-2 or S-3 and groundwater type of GW-2 or GW-3.

² ND = Not Detected at or below instrument detection limit.

³ NT = Not Tested

5.2 EXTENT OF CONTAMINATION

During excavation, PID analysis and laboratory analysis of soil and groundwater samples were used to locate diesel contaminated soil to be removed. On October 5, 1994 the contaminated soil was removed by advancing the excavation to the north in the direction of the DPW garage, to the east and in the center of the excavation. The analytical results showed that impacted soil remained along the southern face (1,600 mg/Kg TPH) and western face (11,000 mg/Kg TPH). Based on analytical results of soil samples it appears that soil impacted by diesel fuel was removed in the north face and east face of the excavation.

On October 19, 1994 the excavation was extended to the south and as far west as the existing gasoline UST would allow. A test pit was also advanced on the western side of the gasoline UST to confirm that the diesel contaminated soil did not extend beyond the gasoline tank area. Analytical results of soil samples taken from the test pit and western face, and of a groundwater sample taken from MW-1, located west and downgradient of the release location, indicated that the diesel fuel did not laterally migrate west of the excavation area.

Tetrachloroethene was the only compound detected in the groundwater sample taken from the downgradient monitoring well (MW-2); tetrachloroethene is not a component of diesel fuel as based on the Massachusetts Oil and Hazardous Materials List (310 CMR 40.16). Therefore, based on analytical results from the groundwater sample taken from MW-2, it appears that the diesel fuel did not migrate downgradient of the excavation. The extent of contamination is shown in Figure 2-1.

6.0 MIGRATION PATHWAYS AND EXPOSURE POTENTIAL

6.1 MIGRATION PATHWAYS

The three potential migration pathways present on the site are:

- volatilization into the air
- transport through the soil
- transport via groundwater

All of these potential pathways will be discussed in the sections below.

6.1.1 Air Pathways

Transport of contaminants after volatilization into the air is considered to be a potential threat to humans at the site. This potential migration pathway is due to the depth of groundwater (approximately five (5) feet below grade), the proximity of the building to the release, and the depth at which VOCs were detected in subsurface soils. Potential exposure to on-site workers could occur if the unpaved lot is disturbed. However, the concentration of VOCs in soil is below S-1 standards.

6.1.2 Soil Pathways

Migration through soil is expected to occur in two directions, downward and horizontally. Downward migration is expected in the areas directly under the contaminants released. Horizontal migration is expected to occur just above the groundwater capillary fringe for LNAPL's (light non-aqueous phase liquids) and on top of dense soil strata for DNAPL's (dense non-aqueous phase liquid). The specific gravity of diesel fuel is less than that of water; therefore, diesel fuel would generally become "hung up" in soils above the capillary fringe of the watertable. Since diesel fuel contains LNAPL fractions, horizontal migration of contaminants would be expected to occur above the groundwater and in the general

direction of groundwater flow.

6.1.3 Groundwater Pathways

Concentrations of TPH were detected at soil sample intervals from the excavation area that were in contact with groundwater. However, groundwater samples collected downgradient of the excavation area showed no detectable concentrations of VOCs or PAHs that are found in diesel fuel. Migration of the diesel fuel in groundwater was not evidenced by the groundwater sampling results.

6.2 KNOWN AND POTENTIAL HUMAN EXPOSURE TO ON-SITE CONTAMINANTS

The most common health risks associated with contaminants from diesel fuel are ingestion or direct contact with contaminated materials (e.g. surface soil/water). Impacts to soils at the release site were detected in subsurface soil samples. Human exposure to on-site contaminants could occur during subsurface trenching or excavation work during utility installation, repair, or site development and grading. Due to the location of the contamination below an unpaved lot and the use of the site, there is a potential risk for humans to be exposed to the contaminants. As there is no fence or other barriers to limit access to the site, children and adults residing in the area have free access.

Potential exposure to groundwater includes the monitoring wells at the facility.

Laboratory results indicate that compounds associated with diesel fuel were not detected in groundwater samples. Tetrachloroethene was detected at a concentration of 13 ug/l in the groundwater from an unknown source. Additionally, the concentration level of tetrachloroethene is below the GW-2 and GW-3 Groundwater Standards that were determined for the release site (see Section 7.2). The fate and transport of tetrachloroethene are beyond the limits of this Phase I Site Investigation for the release site.

6.3 KNOWN AND POTENTIAL IMPACTS OF OHM ON ENVIRONMENTAL RECEPTORS

The reported environmental receptors include two streams located approximately 200 feet to the west and 200 feet to the east of the site. A freshwater nonforested wetland area is located approximately 300 feet to the south of the site. No additional potential environmental receptors have been identified.

Because groundwater concentrations recorded for the contaminants are below both GW-1 and GW-3 concentration limits, there are no significant impacts likely to environmental receptors.