DRAFT REPORT

FOR REVIEW

PHASE 1

LIMITED SITE INVESTIGATION

OF THE

HENDRICK STREET WELLFIELD

TOWN OF EASTHAMPTON, MASSACHUSETTS

AUGUST 1990

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EXECUTIVE SUMMARY

This report summarizes the Phase I-Limited Site Investigation of the Hendrick Street Wellfield performed by S E A Consultants, Inc. on behalf of the Town of Easthampton, Massachusetts. The investigation was completed pursuant to the Massachusetts Contingency Plan to address groundwater contamination identified at the Hendrick Street Wellfield, a municipal water supply owned and operated by the Town of Easthampton since 1908.

The Hendrick Street Wellfield is a tubular wellfield consisting of 106 wellheads. The site was placed on the Massachusetts Department of Environmental Protection (DEP) List of Sites to be Investigated following the detection of Trichloroethylene (TCE) in groundwater at concentrations exceeding the Maximum Contaminant Level (MCL) of 5 micrograms per liter (ug/L). Concentrations of TCE have slowly increased at the wellfield since detection in 1984. The groundwater samples collected from the Hendrick Street Wellfield in May, 1990, indicate that the average concentration of TCE is 10.0 ug/L.

The Pines Well, an individual gravel-packed municipal water supply well also owned and operated by the Town of Easthampton, is located adjacent to the Hendrick Street Wellfield. TCE was first detected in samples from the Pines Well in 1986. TCE concentrations have slowly risen since that time, but have been consistently lower than at the Hendrick Street Wellfield. A water sample collected from the Pines Well in May, 1990, contained 5.6 ug/L TCE.

Both the Hendrick Street Wellfield and the Pines Well draw groundwater from the Barnes Aquifer, a glacial outwash formation which extends southward from the Hendrick Street Wellfield into Holyoke, Southampton and Westfield. The aquifer is thought to be unconfined south of the Plain Street area in Easthampton and confined north of this area.

Conditions at the Hendrick Street Wellfield are semi-confined and the wells are artesian. The principal recharge area for the aquifer is expected to be south of Plain Street, where the aquifer is unconfined and precipitation can percolate directly into the aquifer through the overlying sediments. The aquifer may also be recharged by surface waters, chiefly Broad Brook, which flows through the Hendrick Street Wellfield. Groundwater flow direction is north-northeasterly in the vicinity of the Hendrick Street Wellfield.

Based on the expected major recharge areas, the most probable locations for the TCE source or sources are expected to be along Broad Brook or south of Plain Street, extending into Holyoke and Southampton. Sites within these expected recharge areas where present or former land use may involve the storage, generation or use of TCE have been identified within this report. These sites constitute a preliminary listing of potential land uses which warrant further investigation.

A calibrated aquifer simulation model was used to generate groundwater flow patterns and travel time contours. Several potential sites for single or multiple monitoring wells have been selected downgradient of the land use areas considered most likely to have contributed to TCE contamination of the Hendrick Street Wellfield and the Pines Well. Additional information on the distribution of TCE within the Barnes Aquifer obtained from sampling these proposed wells will help to narrow the focus of the investigation and ultimately identify the source or sources of TCE contamination in the aquifer.

CHAPTER 1
INTRODUCTION

General

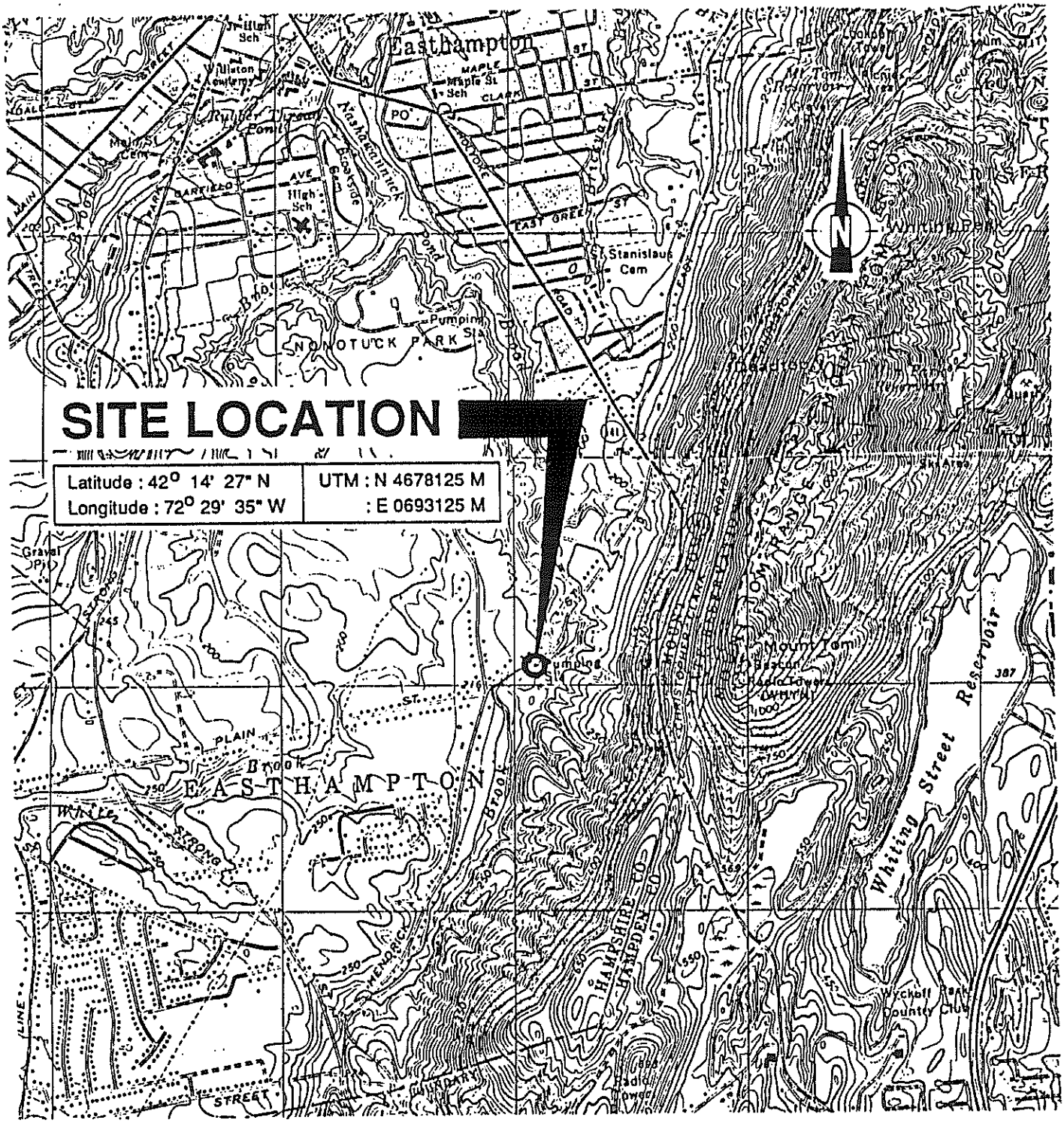
This report summarizes the Hendrick Street Wellfield Phase I-Limited Site Investigation performed by S E A Consultants on behalf of the Town of Easthampton, Massachusetts. The subject location is defined as the Hendrick Street Wellfield, located on Hendrick Street, Easthampton, and includes the Pines Well located on adjacent property southeast of the wellfield.

The Hendrick Street Wellfield is the most prolific of four wellfields providing public drinking water for the Town of Easthampton. The Pines Well and the Hendrick Street Wellfield draw water from the Barnes Aquifer, which extends southward into the towns of Southampton and Holyoke.

This investigation was initiated following the detection of Trichloroethylene (TCE) in water samples collected from both the Hendrick Street and Pines Wells. The site is listed by the Massachusetts Department of Environmental Protection (DEP) as Site No. 1-0639, "Property off Hendrick Street" in the Massachusetts Bureau of Waste Cleanup List of Confirmed Sites and Locations to be Investigated, 1990. The site location is shown in Figure 1.1.

Purpose and Scope

The Scope of Work ("Scope") outlining the proposed remedial investigation at the Hendrick Street Wellfield was developed specifically for this site and approved by the Massachusetts Department of Environmental Protection (DEP). The Preliminary Evaluation outlined in the Scope consists of a non-drilling and a drilling phase. The Phase I-Limited Site Investigation was performed under the non-drilling



0' 2000'

Scale In Feet

Figure 1.1

Reference:

From the U.S.G.S. Topographic Map of the Mount Tom Quadrangle.

HENDRICK STREET WELLFIELD

Town of Easthampton, Massachusetts

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phase, in accordance with 310 CMR 40.00, the Massachusetts Contingency Plan (MCP), with the following objectives:

* To determine whether or not the location is a "disposal site" as defined in 310 CMR 40.020;

* To determine whether or not the disposal site (if any) poses an imminent hazard; and

* To provide information necessary for the Massachusetts Department of Environmental Protection (DEP) to classify the site as a priority or a non-priority site pursuant to 310 CMR 40.544.

The following tasks were performed under the Phase I-Limited Site Investigation:

1. The site history was defined through review of records maintained by the Town of Easthampton, interviews with selected individuals familiar with the site, and review of aerial photographs. The investigation focused on defining past land use and the potential for hazardous waste generation, disposal or discharge onto the site.

2. The site description was defined based on site inspections performed by S E A personnel, review of Town of Easthampton and DEP records, and review of available environmental and geological studies regarding the site and surrounding area. Site investigations focused on confirming geographical placement; geologic, hydrologic and hydrogeologic conditions; evidence of possible releases on-site and in the area surrounding the site; potential migration pathways; and location of underground utilities.

3. Initial groundwater sampling from selected wells was performed to evaluate the type and concentrations of contaminants in groundwater at the site.

Background

The Hendrick Street Wellfield and the Pines Well are potable water supply wells owned and operated by the Town of Easthampton and are located on a 15.77 acre parcel in southern Easthampton. The Hendrick Street Wellfield is a tubular wellfield consisting of 106 wells, with a calculated safe yield of 3.5 million gallons per day (mgd). The Hendrick Street Wellfield was developed as a drinking water supply source in 1908. The wellfield was taken off-line in 1988 after TCE was detected at concentrations above the United States Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL).

The Hendrick Street Wellfield was put on-line as of July 13, 1990, after heavy water usage and a heat wave caused water levels in the Easthampton water supply system to drop. Verbal approval to put the wellfield on-line was given to Thomas Newton of the Easthampton Department of Public Works by Kurt Boisjolie, Section Chief of the DEP Drinking Water Supply Section in Springfield. A sample of the combined outflow from the wellfield collected on July 23, 1990, shows a concentration of 9.1 ug/L TCE (Appendix B).

Currently water is being pumped from the Hendrick Street Wellfield only when water levels in the water system reservoirs fall below a certain level. The wellfield is being pumped at approximately 0.850 mgd.

The Pines Well is a single, 10-inch diameter, 98 foot deep, gravel packed well, installed as a drinking water source in 1957, which is currently providing water to the Town of Easthampton. The Pines Well has a calculated safe yield of 1 mgd.

Water samples from the Hendrick Street, Pines, Nonotuck and Lovefield Wellfields in Easthampton are routinely tested to ensure drinking water quality. The Nonotuck and Lovefield wells are both individual, gravel-packed wells. A summary of historic results of TCE analyses from these wells is included in Tables 1.1 and 1.2. TCE has only been detected in the Hendrick and Pines wells, which are located adjacent to each other and south of the Nonotuck and Lovefield wells.

TCE was first detected in the Hendrick Street Wellfield in a sample collected on October 4, 1984. The TCE concentration at that time was 3.2 ppb, which is below the EPA MCL of 5 ppb. The wellfield had previously been sampled on February 4, 1980, when neither TCE nor other volatile organic compounds (VOCs) were detected. Levels of TCE have slowly increased since 1984 and are presently at approximately 10 ug/L (based on analysis performed during this investigation).

TCE has also been detected in samples from the Pines Well, located adjacent to and south east of the Hendrick Street Wellfield. The contaminant was first detected here, at a concentration of 1.9 ug/L, in May, 1986. TCE concentrations have also increased over time in this well. In samples collected as part of the current investigation, 5.6 ug/L TCE was detected.

TCE contaminated groundwater has also been identified south of Easthampton in Holyoke. The City of Holyoke owns two municipal wells, known as the Pequot Wells, located approximately 2.5 miles south of the Hendrick Street Wellfield. These wells were taken out of service in 1987 due to TCE contamination detected in the well water. The two Pequot Wells are 92 and 83 feet deep, respectively, and are located along Broad Brook in Holyoke. According to records furnished by Mr. Butch Seidel, Chemist for the Holyoke Water Department, TCE has been detected in the Pequot Wells at the following concentrations:

Year	TCE Concentration (ug/L)
	12.1
1980	4.4
1982	9.13
1988	

A small amount (1.1 ug/L) of TCE was detected in April, 1986 in the Coronet Homes Wellfield located south of Route 202 in westernmost Holyoke, approximately 2 miles south of the Pequot Wells. A small quantity on the order of 1 ug/L may be due to laboratory or sampling error. See Appendix A for Laboratory Analysis Data.

Trichloroethylene (TCE) is a chlorinated solvent commonly found in degreasers and cleaners. TCE is heavier than water and will tend to sink within an aquifer. Therefore, it may be present in groundwater samples from a deep well and not present in an adjacent, shallower well. Because it is a volatile organic compound (VOC), TCE vaporizes readily and it will tend to come out of water which is well aerated.

Because the common use of TCE is in degreasing metal parts, TCE-contaminated groundwater often contains other contaminants, especially petroleum products. In the Barnes Aquifer, only TCE, but no petroleum compounds, has been detected thus far, possibly suggesting that the source may be a spill of virgin TCE-containing material.

Table 1.1

Summary of Trichloroethylene Concentrations
for Easthampton Drinking Water Wells
(Sampling and Analyses Performed by DEP, 1980-1988)

	Wells			
Date	Hendrick	Pines	Nonotuck	Maloney
02-4-80	ND	ND	ND	ND
03-3-80	.	.	.	ND
08-2-84	.	.	ND	ND
10-4-84	3.2	< 1	.	.
12-5-84	2.7	< 1	.	.
01-7-86	.	.	.	ND
02-6-86	.	.	.	ND
05-6-86	4.5	1.9	.	ND
07-8-86	4.7	1.7	ND	.
10-2-87	6.7	2.9	ND	.
02-2-88	5.7	3.5	ND	ND
07-4-88	7.6	3.5	.	.

All concentrations reported in ug/l
"ND" means not detected
"." means not tested

NOTE: Samples from the Hendrick Street Wellfield were taken from the pump station sink, which would be a combined outflow from multiple wells within the wellfield.

Table 1.2

Summary of Trichloroethylene Concentrations
for Easthampton Drinking Water Wells
(Sampling and Analysis Performed by Town of Easthampton)

Date	Hendrick Street Wellfield	Pines Well
4-30-88	8.5	3.0
7-4-88	2.8 (7.6)*	2.2
7-11-88	7.7	2.0
12-88	8.3	4.0
6-5-89	6.1	Not Sampled
8-14-89	11	5.0
8-16-89	8.2	5.4
8-18-89	8.3	4.9
9-5-89	8.5	4.6
9-25-89	11	4.6
10-10-89	Not Sampled	4.6
11-27-89	8.1	4.9
11-6-89	4.5	3.0
12-29-89	11	5.5
3-13-90	6.3	3.8
6-6-90	4.1	6.4
6-18-90	7.1	3.3
7-23-90	9.1	Not Sampled

* Sampling procedure for this sample was deemed incorrect. Results of the DEP split sample are given in parenthesis and are considered valid.

Table 1.2 (Continued)

See Appendix B for the 1989-90 laboratory reports

NOTE: All concentrations are reported in ug/L

Hendrick Street Wellfield samples were obtained from a combined outflow from multiple wells within the wellfield.

Location History

The Hendrick Street Wellfield was installed in 1908. Additional wells were installed in the 1950's and wells have been replaced in subsequent years; currently 106 wells are on the site.

The pumps at the Hendrick Street Wellfield are electrically powered. The original pumps, which now serve as a backup in case of power outage, are powered by diesel engines. There is a 500 gallon above-ground diesel fuel tank on the property to supply the diesel engines in emergencies. Information concerning the age or integrity of this tank is not available.

Previously, diesel fuel was stored in two 5,100 gallon, steel, underground storage tanks. According to local Fire Department records, these tanks were removed in May, 1988. The tanks were approximately 40 years of age and were taken out of service in the early 1970's. The Easthampton Fire Department also has record of a 1,000 gallon, steel, diesel fuel underground storage tank adjacent to the other two tanks. This tank was apparently removed prior to May, 1988, according to a notation on the plot plan included with the tank removal application for the two 5,100 gallon tanks. According to Armand Lapointe, Fire Prevention Officer with the Easthampton Fire Department, who supervised the tank excavation, there was no indication of contamination in the excavation pit and the tanks appeared tight and in good condition at the time of removal.

Past operations at the site mainly consisted of maintenance work associated with the wellfield machinery. The potential exists for oil, lubricants and cleaning fluids to have been present on the property, but probably in small quantities. A section of the property has also been used as a borrow pit for fill. This area is on the northern side of the access road between the property entrance and the Pines Well. Spare unused AC and steel water pipes have been stored in this general area in the past.

Aerial photographs of the site and surrounding area were reviewed at the Office of Resource Mapping/Land Information Systems, University of Massachusetts at Amherst. A photo taken on July 6, 1952, showed the area surrounding the site to be undeveloped with some parcels under cultiviation as farm land. In 1971, photographs show the area to be partially developed with some residential land use. A color infra-red photo taken in 1985 showed continued residential development in the area. According to David Goodwin, Project Manager at the Information Systems office, the infra-red photo did not indicate any stressed vegetation around the subject property.

CHAPTER 2

SITE CHARACTERIZATION

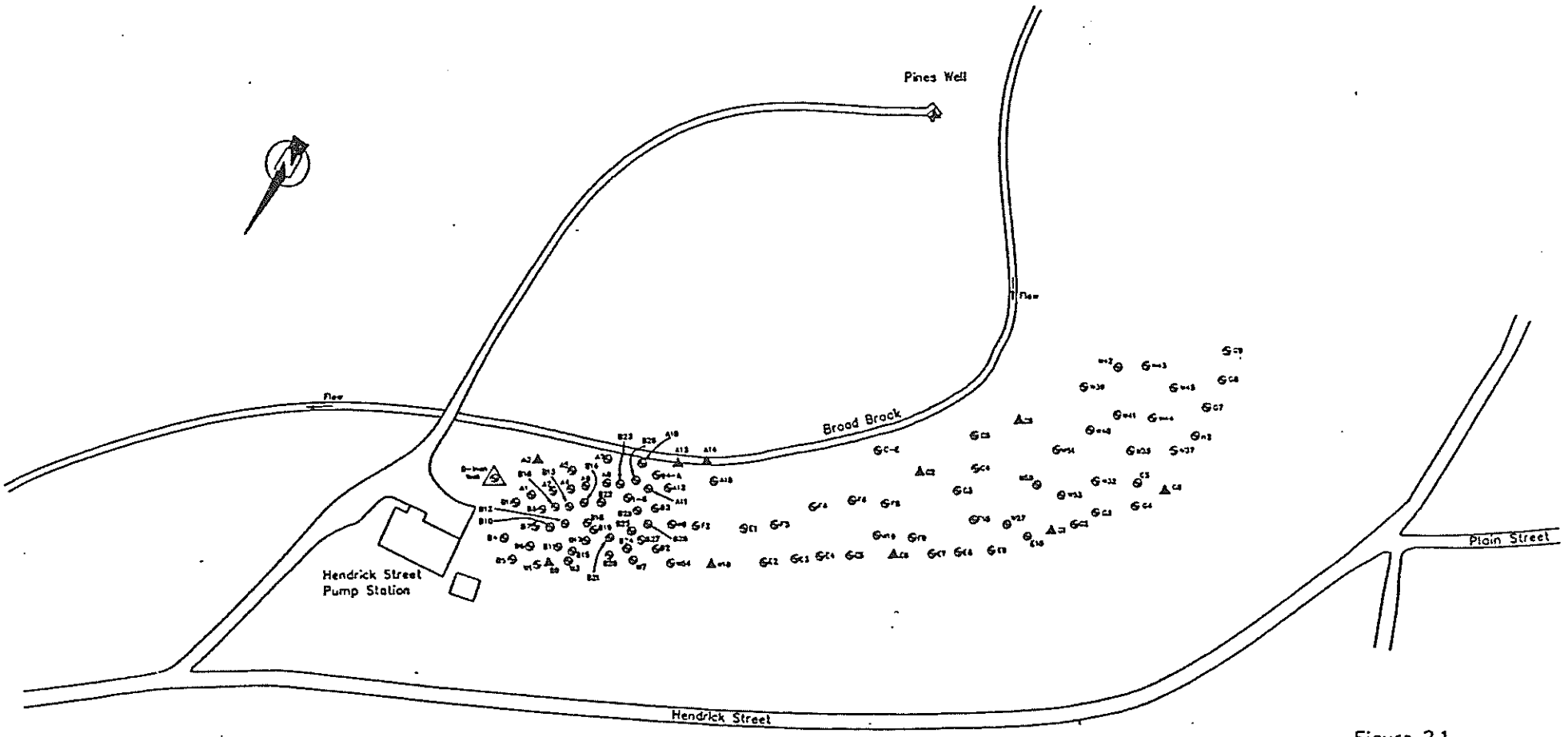
Site Description

The subject site is located on the eastern side of Hendrick Street, Easthampton, Massachusetts, Latitude 42° 14' 27" North, Longitude 72° 9' 35" West, Universal Transverse Mercator (UTM) Coordinates N 4678125 M, E 0693125 M (Figure 1.1). The site containing the Hendrick Street Wellfield and the Pines Well consists of a 15.77 acre parcel described as Lots 15 and 15A, Map 75 on the Town of Easthampton Assessors' maps.

The site is positioned in a low-lying area incised by Broad Brook, just west of the base of the Mt. Tom Range. According to the United States Geological Survey (USGS) Mt. Tom Quadrangle Map, the site is at approximately 200 feet above sea level. Broad Brook flows north-northeastward through the property.

The site is within Zone B, an area subject to 100 year to 500 year flooding, as mapped by the Federal Emergency Management Agency (FEMA).

The property slopes southeastward from the road toward the wellfield and Broad Brook. Three one-story buildings occupy the parcel (Figure 2.1). The Hendrick Street Wellfield pumphouse and a garage/utility building are located at the northern corner of the property and a small pumphouse for the Pines Well is located across Broad Brook, southeast of these buildings. The Hendrick Wells are located south of the pumphouse, on the western bank of Broad Brook. An access road leads over the brook to the Pines Well, on the east side of the brook. The site is heavily vegetated with grasses and trees. The portion of the property where the Hendrick Street Wellfield is located is a grassy wetland area which apparently discharges to Broad Brook when the wellfield is not being pumped. Under pumping conditions, the Broad Brook may recharge the aquifer.



LEGEND

Well

Sampled Well

0 30 60 120 180

SCALE IN FEET

Figure 2.1

Site Locus Plan
Hendrick Street Well Field

Town of Easthampton, Massachusetts

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The area which served as a borrow pit (discussed above) is unvegetated, but there are no obvious indications of waste dumping in this area. No areas of stressed vegetation were observed which could indicate prior on-site waste disposal activities.

The Hendrick Street Pumphouse contains the diesel and electric engines and pumps which service the wellfield. As of July 13, 1990, the Hendrick Street Wellfield is providing drinking water to the Town of Easthampton on an emergency basis. Between November, 1988 and July, 1990, the wellfield was off-line and one pump was being used to pump well water to "waste" into the Broad Brook. This procedure was recommended by DEP so that TCE could be drawn away from the Pines Well, which supplies water to the Town. The smaller garage-like building south of the pumphouse appears to be unused with miscellaneous motor parts being stored inside.

Electricity is supplied to the site via overhead lines which run from Hendrick Street to the pump house. There is no sewer service to the site, nor is there an on-site septic system. A double-walled, steel, 12-inch diameter town sewer line installed in 1972 or 1973 traverses the property. This line consists of an inner AC pipe encased by a steel pipe.

Surface Drainage

On a regional scale, the site is located within the Manhan River sub-basin of the Connecticut Lowlands Drainage Basin. The Connecticut River is located approximately two miles east of the site, on the opposite side of the Mt. Tom Range. The Manhan River sub-basin is bounded by Little Mountain to the west and the Mt. Tom Range to the east. The headwaters of the Manhan River are located west of Whiteloaf Mountain. The Manhan then flows north of Easthampton town center and discharges into The Oxbow, a cut-off meander of the Connecticut River.

The local drainage basin, the Broad Brook sub-sub basin of the Connecticut Basin, is bounded by Whiteloaf Mountain to the west and the

Mount Tom Range to the east. The southern boundary lies to the north of Pequot Pond. Broad Brook flows southerly from a wetland south of Mt. Tom and loops around to a northerly direction at Rock Valley. The brook discharges to Nashawannuck Pond in Easthampton Center. The area south of Rock Valley is within the Westfield River Basin and local drainage is to the south.

In the vicinity of the subject site, the mean annual runoff (including surface and groundwater runoff), as mapped by the USGS (Brackley and Thomas, 1979), is 19 to 20 inches per year or 0.90 to 0.95 million gallons per day per square mile.

Hydrogeology

The Barnes Aquifer, the water supply source for the Hendrick Street and Pines Wells, is composed of Pleistocene outwash sands and gravel. The Barnes Aquifer is an unconfined system south of Plain Street in Easthampton. North of Plain Street, the aquifer is confined by an overlying clay layer and is artesian. Bedrock underlying the surficial deposits is an arkosic sandstone/conglomerate/siltstone of the Sugarloaf Formation. Groundwater can be expected to infiltrate the bedrock via bedding planes, fractures, faults and joints.

Groundwater flow direction in the study area is to the north-northeast with a hydraulic gradient of 0.0042 (IEP, 1988). The zone of contribution and secondary recharge zone for the Hendrick Street Wellfield is shown in Figure 2.2 This zone constitutes the area of the aquifer from which groundwater flows to the Hendrick Street Wellfield under pumping conditions. The delineation of this zone has been modified from Motts (1990), which showed the combined Hendrick Street and Nonotuck Park zone of contribution, in order to isolate the Hendrick Street Wellfield zone of contribution from that of the

Nonotuck Park Wells. The Motts zone of contribution was also modified to eliminate any portion of Pequot Pond on its surface or ground watershed. Motts modeled the zone of contribution under conditions of maximum pumping at Holyoke's Pequot Wells. However, these wells are not currently in service, and the southern limit of the zone we have delineated reflects the static groundwater divide as modified from Motts.

The secondary recharge area for the Hendrick Street Wellfield and Pines Well, consisting of glacial till and bedrock within the surface watershed of the zone of contribution, is also shown on Figure 2.2. This secondary zone recharges both groundwater and surface water to the zone of contribution, though less intensively per unit area than comparable areas within the primary zone of contribution.

The delineated zone of contribution corresponds in general to Zone II as defined by DEP, and the secondary recharge area corresponds to Zone III. However, we have chosen not to use the Zone II, III labels for these areas because of the implication anything labeled Zone II or III must correspond exactly to the offically approved zones.

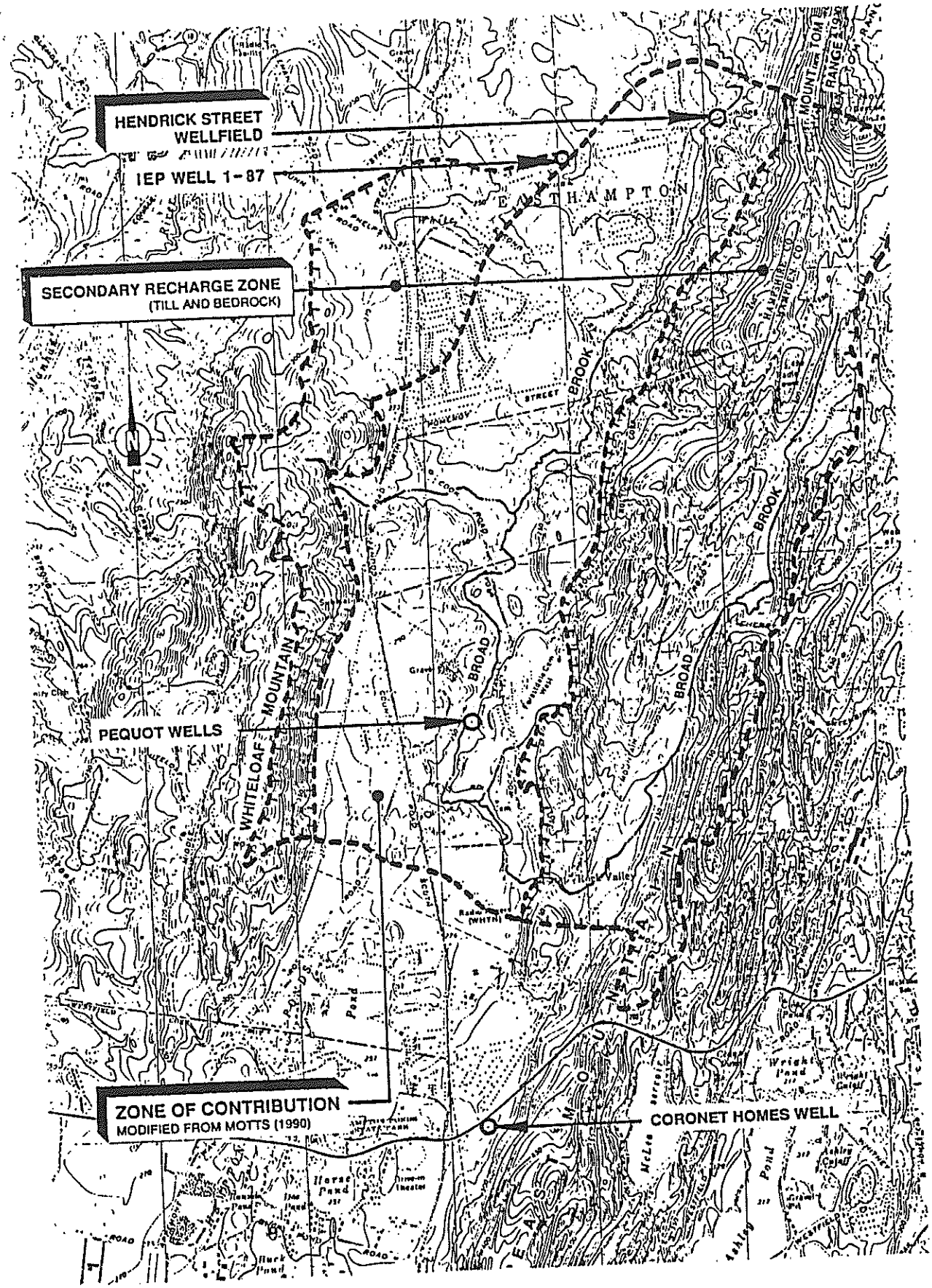
Sources of recharge for the aquifer in the vicinity of the subject site include the following:

(1) Precipitation percolating through surficial sediments south of Plain Street;

(2) Infiltration from surface water, mainly the Broad Brook, south of Plain Street;

(3) Slow percolation through the confining layer to the confined portion of the aquifer;

(4) Recharge from the underlying bedrock; and



Reference:

From the U.S.G.S. Topographic Map of the Mount Tom Quadrangle.

Figure 2.2

ZONE OF CONTRIBUTION
HENDRICK STREET WELLFIELD

Town of Easthampton, Massachusetts

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(5) Percolation of precipitation and runoff through the extensively jointed rocks of the Mt. Tom Range east of the study area and migration into the Barnes Aquifer.

Given that the zone of contribution for the Hendrick Street Wellfield lies mainly to the south of Plain Street, where the aquifer is unconfined, the first two sources of recharge listed are anticipated to be the primary sources. Due to the unconfined conditions, percolation through surficial sediments is probably the major recharge source. Also, it is anticipated that there is hydrologic communication between the Broad Brook and the aquifer south of the Hendrick Street Wellfield, and possible limited connection at the wellfield site, so that surface water infiltration may also be a major recharge source. Percolation through the confining layer is probably a less important recharge source since the aquifer is unconfined within most of the zone of contribution for the wellfield. The underlying bedrock, which exhibits bedding planes and fractures, could also have sufficiently high transmissivity to serve as a source of recharge. Recharge from the Mt. Tom Range is also possible.

Geology

The site lies in the Broad Brook valley at the western foot of the basaltic Mt. Tom Range. Glacial outwash sands capped by varved clay deposits overlie arkosic bedrock in the study area.

Descriptive studies of geology in the Mt. Tom area are contained in a doctoral dissertation by Larsen (1972) and a masters thesis by Hinthorne (1967). These two sources, along with a report prepared by IEP, Inc. (1988) are the main sources of the following discussion of the geology and hydrogeology in the study area. Other sources consulted are included in the reference section of this report.

Bedrock Geology

Bedrock in the study area consists of sedimentary and igneous rocks of the Late Triassic Newark Series (approximate age - 225 million years). The belt west of the Mt. Tom Range, in the area of the subject site, is underlain by the Upper Triassic Sugarloaf Arkose. These continentally-derived rocks were deposited over highly metamorphosed Paleozoic rocks (approximate age - 400 million years), in the northwest portion of a graben tilted 20 to 25 degrees east-southeast.

The Sugarloaf Arkose is composed of alluvial fan and fluvial deposits of arkosic sandstones, conglomerates and siltstones, chiefly coarse-grained arkose. The arkosic rocks are easily eroded and exhibit cross bedding and scour-and-fill features. Groundwater can percolate through bedding planes, joints and faults in this bedrock.

The Mt. Tom Range is mainly composed of Late Triassic Basaltic rocks, primarily the Holyoke Basalt, which were deposited after the Sugarloaf Arkose. The Holyoke Basalt is a dense, homogenous, medium to dark gray, very fine to fine-grained, basalt which exhibits intense vertical jointing along the western face of the Mt. Tom Range. An arkosic sandstone to siltstone of the East Berlin Formation conformably overlies the Holyoke Basalt. Overlying the East Berlin Formation is the Hampden Basalt which is similar in lithology to the Holyoke Basalt.

The Manhan River Basin was formed by glacial scouring during the last major glacial advance. Ridges of more resistant Sugarloaf Arkose, such as Whiteloaf Mountain, divide the Manhan Basin. The bedrock surface in this area is undulating, ranging from 22 feet above sea level north of Broad Brook, to 85 feet below sea level south of Broad Brook near Hampton Ponds (Pequot, Horse, Buck and Doe Ponds). This irregular surface has been filled with till and glacial outwash deposits. Depth to bedrock in this area will therefore vary greatly.

Surficial Geology

All of the Mt. Tom Range was covered by ice during the last glacial advance, as evidenced by striations observed on rocks at an elevation of 1,205 feet on Mt. Tom. The ice advanced in a southerly direction through this area. Till found west of the Mt. Tom Range, in the study area, is derived from the underlying arkose bedrock and is reddish-brown and sandy. Larsen (1972) describes this till as 68.5 - 73.5% sand, 13.6 - 27.4% silt and 2.6 - 15.2% clay. Such a sandy till can be a relatively permeable deposit.

The northward retreat of the ice sheet was punctuated by four ice-edge standstills, during which glacial outwash deltas and proglacial lake sediments were deposited in the Broad Brook valley (Larsen, 1972). These deltas comprise the highly permeable Barnes Aquifer system from which the Hendrick wells draw. The Barnes Outwash Plain, which is 100 to 300 feet thick, was built out southward from the ice margin, positioned approximately 0.3 miles south of Pomeroy Street, into a proglacial lake south of the ice edge. This outwash plain comprises approximately 10 square miles.

As the ice margin retreated, subsequent outwash deltas were deposited north of the Barnes Outwash Plain. The Pomeroy Street Delta was deposited off an ice margin situated just north of Phelps Street, 1.2 to 1.5 miles north of the previous stand-still position. The ice sheet again retreated, to a position near Plain Street, 0.4 miles from its prior position, with the White Brook delta deposited into a small glacial lake off its flank. During the subsequent glacial retreat, glacial Lake Hitchcock spread from the east side of the Mt. Tom Range, through the Holyoke Narrows, and occupied the area north of Plain Street in Easthampton. The clay deposited in glacial Lake Hitchcock serves as the aquiclude for the confined aquifer at the Hendrick Street Wellfield.

Description of Surrounding Area

The parcel is located in a partially developed residential area within the Aquifer Protection District designated in the Town of Easthampton Zoning Bylaw. The property lies on the dividing line between R-40 and R-80 zones. These are both designated residential areas with minimum lot requirements of 40,000 and 80,000 square feet, respectively.

Property abutting the subject site is either undeveloped or residential. Owners of the property abutting the subject site are listed in Table 2.1. Based on review of aerial photographs and interviews with Town of Easthampton personnel, the surrounding area was previously either undeveloped or used as farm land, with development of residential housing occurring within the past 15 to 20 years. There are some industrial land uses in the area which will be discussed below.

By Easthampton ordinance, it was required that all developed properties be tied to the municipal sewer line by October 1, 1989. Properties where the premises are 150 feet or more from the sewer line are exempt from the sewer hook-up requirement. With a few exceptions, the properties surrounding the subject site are serviced by sewer.

Table 2.1

Hendrick Street Wellfield, Easthampton
List of Abuttors

Location with respect to site	Map	Parcel	Owner	Use
Northeast	75	7	J.D. Polito	Residential
Northeast	75	8	J.P. Henchey	Residential
Northeast	75	9	G.C. Marhefka	Residential
North	75	10	F.D. Gawle, Est.	Residential
North	75	11	E.J. Samuel	Residential
North	70	41	J.M. Besko	Residential
North	70	42	T.E. Besko	Residential
North	70	17	B.C. Johnson	Residential
East	75	16	H.L. Breton	Vacant
South	75	14-A	D.B. Daigle Easthampton Conservation Commission	Vacant
West	75	13	J.P. Read	Residential
Southwest	75	13-A	F.G. Root	Residential

NOTE: Information taken from the Town of Easthampton Assessors' maps.

Potential Contaminant Receptors

All of Easthampton is serviced by municipal water except for an area around Drury Lane and Mineral Street, near the Westhampton town line. These properties have private wells. The Hendrick Street Wellfield did not pump water into the Easthampton public water supply system between November, 1988 and July, 1990. On Friday, July 13, 1990, DEP gave the Town of Easthampton verbal approval to use the Hendrick Street Wellfield as a water source due to low water levels in the Easthampton water supply system.

When the wellfield is operating, it is the major source of water for the Town of Easthampton. Depending on the pumping rates of this and other wells in the town at any given time, the Hendrick Street Wellfield may service only the area surrounding Hendrick Street in the southern part of Easthampton, or water from the well may be circulated to service the northern section of town. The Pines Well is used to partially supply the public water system.

Based on existing geological information, limited hydrologic interaction between Broad Brook and the main confined aquifer is predicted at the subject site. South of the wellfield, the main aquifer is unconfined, and direct hydrologic interaction between surface water and the aquifer may occur. This interaction may result in contaminant transfer. Depending on the source area of the contamination, Broad Brook may or may not serve as a conduit for contaminant transport. Because the only contaminant identified, TCE, is a volatile organic compound, it is unlikely that detectable concentrations of TCE would be present in the sections of Broad Brook where flow is swift and water is well aerated. However, TCE may accumulate in the low energy reaches of the brook if the contaminant source is positioned near these areas.

According to the Town of Easthampton Wetlands Master Plan Map (based on the National Wetlands Inventory and dated 1987), the wetlands area closest to the subject site is located along Broad Brook approximately 1500 feet northwest of the Hendrick Street Wellfield. These wetlands may be impacted by the TCE contamination because groundwater may be discharging to Broad Brook through a leaky confining layer when the wellfield is not in operation.

Endangered or rare species reported sighted in the vicinity of the Hendrick Street Wellfield identified by the Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife include the Marbled Salamander (Ambystoma opacum) and the Wood Turtle (Clemmys insculpta). Descriptions of these animals, along with information about their habitats and biology, are included in Appendix C. The Marbled Salamander is classified as a Threatened Species and the Wood Turtle is listed as a Special Concern Species. There is little probability that the low concentrations of TCE detected in groundwater would adversely impact these animals.

CHAPTER 3
POTENTIAL CONTAMINANT SOURCES

To screen the area within the Hendrick Street Wellfield zone of contribution for potential contaminant sources, the following reviews and inspections were performed:

1. Review of state and local files;
2. Interviews with town officials in Easthampton, Southampton and Holyoke;
3. Preliminary "area reconnaissance"; and
4. On-site inspection of the Hendrick Street Wellfield.

Trichloroethylene (TCE) is an organic solvent found in degreasers, paints, dry cleaning chemicals and dye coloring. Particular attention was given to land use in the area which may involve use or storage of any of these materials.

Survey of On-Site Operations

To determine the probability of an on-site contaminant source, a site inspection of the wellfield was performed by SEA personnel, accompanied by Thomas Newton, Supervisor for the Easthampton Water Department, on July 5, 1990.

The pumphouse, located in the northern corner of the site, is divided into four sections. The main area is the pump room, which has a concrete floor. There was visual evidence of oily spills on the floor around the engines. One floor drain, which Mr. Newton believes leads to Broad Brook, was observed adjacent to one of the diesel engines.

East of the pump room is an area divided into two sections. One section was apparently a bathroom previously. A sink in the room was heavily stained. The other area is a small storage room where

miscellaneous parts, paint and several containers of Carborundum Finishing Compound were observed.

South of the pump room is a maintenance room. According to Mr. Newton, all major maintenance is performed off-site, and, to his knowledge, has never been performed on-site. A lawnmower and miscellaneous parts were stored here. Also, containers of the following substances were noted:

Paint	(1)	5 gallon
	(1)	1 quart
Gasoline	(1)	5 gallon
	(1)	Empty
Husqvarna Bar and Chain Lubricant		
	(1)	1 gallon
Motor Oil	(1	1 quart
	(2)	open gallon jugs
	(2)	55 gallon drums with spigots
Propane	(1)	tank

South of the main building is a garage which does not appear to be in use and contains miscellaneous machinery parts. The concrete floor was heavily stained. Also observed was a very old 55-gallon drum labeled "Malco Specialized Chemical Service, National Aluminate Corporation," which was full of an unidentified substance that appeared to be oil.

Southeast of the Hendrick Street wells is the Pines Well, a separate groundwater source. The Pines pumphouse is a small, concrete block-walled, concrete floored structure. The floor is stained in some areas and there is a floor drain, which apparently discharges to Broad Brook. One 5-gallon container of lubricant was found to be stored here.

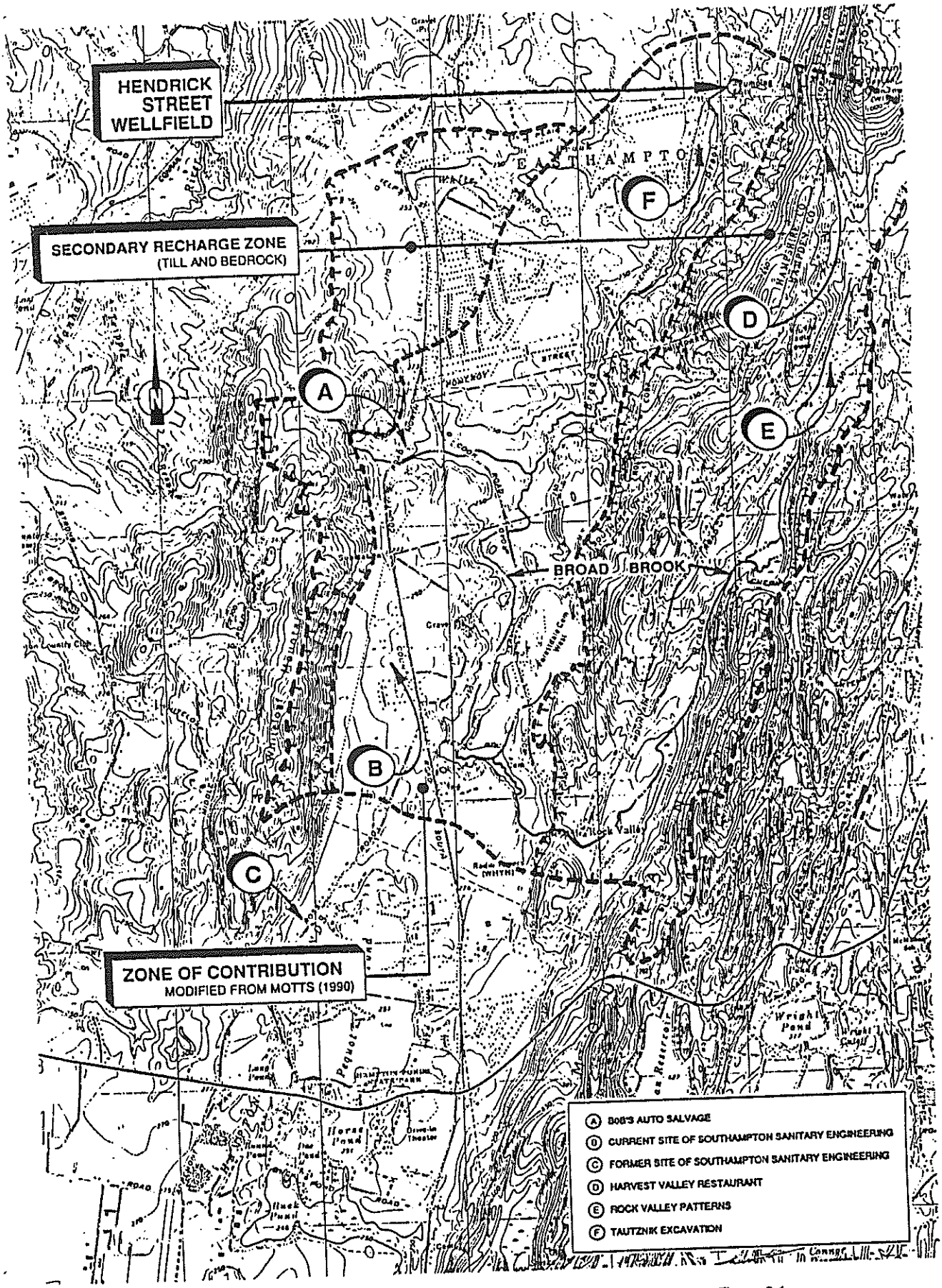
Based on the quantities and types of chemicals stored at the site and past and present operational activities, the probability is low that there is, or was in the past, an on-site source of contamination capable of impacting soil or groundwater. The floor drains in the pumphouses are potential discharge points, but it is improbable that a substantial amount of waste has been generated on the site and dumped down the drains. Also, these floor drains discharge to Broad Brook, which is thought to have limited hydrologic connection to the confined portion of the Barnes Aquifer in this immediate area. Site-specific information can also be found in the Preliminary Assessment Form in Appendix D.

Off-Site Potential Contaminant Sources

The results of a survey of local and state release incident files, interviews with local officials and observations of S E A personnel regarding land use and spill incident reports within the study area are summarized in Appendix E. Because the concentrations of TCE detected in the Barnes Aquifer are very low, it is possible that the source could be a relatively small, isolated spill incident. However, the low concentrations do not rule out the possiblity of a larger, continuing source. The slowly increasing concentrations could reflect the migration of a larger plume across the Hendrick Street Wellfield area. The majority of the spill reports listed in Appendix E did not involve TCE-containing materials, or were followed-up by DEP, and are not probable groundwater contaminant sources. The sites listed below are considered to warrant further investigation as potential TCE sources. These sites were identified because files indicate past discharges or land use indicates that relevant hazardous materials may have been used or generated. Also, only those sites where there is a mechanism for transport of the TCE from the site to the Barnes Aquifer in the Hendrick Street Wellfield area have been listed as warranting further study. It should be noted that, thus far, only TCE has been detected

in groundwater and most of the sites identified as potential sources would generate other contaminants, especially petroleum products, along with the TCE. The lack of petroleum contaminants in any of the samples previously analyzed may be due to any petroleum contaminants being adsorbed by the soil particles with which they have come into contact. The following list is arranged in alphabetical order. Listed sites are located on Figure 3.1.

Low concentrations of TCE have been detected in samples from Westfield municipal water wells #6 and #7, located adjacent to the airport to the west. Levels of TCE detected in the Pequot Wells are higher than TCE levels found in the Westfield wells. Given the hydrogeology of the area, the presence of TCE in the Westfield wells, Holyoke's Pequot wells and at the Hendrick Street Wellfield suggest a possible source near the groundwater divide between the Manhan and Westfield River basins.



Reference:

From the U.S.G.S. Topographic Map
Of the Mount Tom Quadrangle

0' 2000'
Scale in Feet

Figure 3.1

PHASE I SITE ASSESSMENT
LAND USE REQUIRING FURTHER INVESTIGATION

Town of Easthampton, Massachusetts

SEA Consultants Inc.
Engineers / Architects

Bob's Auto Salvage, 113 County Road, Southampton

This site is located approximately 2 miles southwest of the Hendrick Street Wellfield, within the mapped zone of contribution. A site inspection was not performed at the facility; however, junkyards may use solvents for metal parts cleaning, machinery maintenance and degreasing. Based on the area reconnaissance survey performed by S E A, it appears that a tributary of Broad Brook runs through or along the property line of the salvage yard, which could serve as a conduit for transport of discharge from the site to the aquifer. Hydrogeologic mapping of the area suggests that the aquifer is probably unconfined in this area.

Current Site of Southampton Sanitary Engineering Corporation, 168 County Road, Southampton

Since the 1970's, the Southampton Sanitary Engineering Corporation (SSE) facility has been located at 168 County Road in the Town of Southampton, approximately 1.7 miles north of the intersection of Route 202 and County Road. The facility is a container and tank storage operation which serves western Massachusetts.

The facility handles hazardous wastes such as oil and chemical wastes obtained from spill clean-ups, metal finishing and machining, chemical, electronic, paint and other manufacturing, as well as commercial and public hazardous waste generators.

All wastes which are collected from generators and spill clean-up activities are transported to a permitted treatment, recycling, and/or disposal facility. No treatment, reclamation, or disposal of hazardous wastes occurs at the SSE facility which currently operates as a storage site. DEP has no current records of spills or releases at this site. However, because this is the only EPA Hazardous Waste generator identified within the Zone of contribution defined for the Hendrick Street Wellfield it should be given consideration as a potential source of TCE contamination.

Former Site of Southampton Sanitary Engineering Corporation, Pequot Road, Southampton

Prior to the 1970's, SSE was located on Pequot Road. Until the late 1970's to early 1980's, SSE was operating as a septage hauler. SSE collected septage from residential, commercial and industrial subsurface disposal systems in Southampton and disposed of it in lagoons and/or pits located at their Pequot Road facility.

Septage is a highly concentrated waste with a variable composition. Some common constituents of septage that are potential groundwater contaminants include pathogenic bacteria and viruses, heavy metals, nitrates, sodium, chloride, and volatile organic compounds such as benzene, toluene, 1,1,1-trichloroethane (TCA), 1,1,2-trichloroethane, and trichloroethylene (TCE). Heavy metals and volatile organic compounds are typically found in the waste streams from a variety of commercial and industrial facilities. In Southampton, subsurface disposal systems were used to dispose of the sanitary sewage from these

types of businesses. The presence of heavy metals and volatile organic compounds in septage can also be attributed to the improper disposal of household hazardous waste, and the use of toilet bowl and septic system cleaners.

The lagoon and pits provided a system for the dewatering of septage. They are usually unlined and sited in well-drained, permeable soils. Lagoons and pits provide minimal no treatment of septage and, therefore, pose a serious threat to groundwater quality. Although the site is not located within the Zone of Contribution modelled for the Hendrick Street Wellfield, contamination could have been drawn into the zone when the Holyoke Pequot Wells were pumping. Residual contamination could be impacting the Barnes Aquifer at the Hendrick Street Wellfield.

Harvest Valley Restaurant, Rte. 41, Easthampton

This site is currently a restaurant, located on the flank of the ridge east of the Hendrick Street Wellfield. Formerly, a gas station and well drilling business were operated on the property. There is no information in Easthampton Fire Department files regarding underground storage tanks at the site, but Armand Lapointe, Fire Prevention Officer, believes that there were tanks removed before 1960. The site is located within the secondary recharge area for the Hendrick Street Wellfield. It is possible that any spills from the site could flow through joints and fractures of the basalt ridge and flow in groundwater to the Hendrick Street Wellfield.

Rock Valley Patterns, 111 Southampton Road, Holyoke

Rock Valley Patterns is a former cottage industry which operated out of the basement of a home located at 11 Southampton Road, south of the intersection of Route 141 and Southampton Road in Holyoke,

Massachusetts. The house is located on the banks of the Broad Brook, approximately 100 feet from the brook which could potentially serve as a conduit for contaminants to be transported to the Barnes Aquifer. The land surrounding the house is frequently flooded by the brook.

Rock Valley Patterns began manufacturing metal and wood patterns for the machine tool industry in the mid-1940's. The business was closed in the early 1980's. At that time, Rock Valley Patterns employed approximately thirty (30) people. According to Connie Baker, member of the Holyoke Conservation Commission who performed several site inspections of the property, drums containing unidentified materials were stored, unprotected, outside the house. The house was served by a septic system.

Machine shops and metal working operations typically perform many different processes which generate grinding sludges and wastewater. Oil is generally used in the machining or stamping process as a lubricant. Most machine shops use degreasing solvents for routine maintenance on machinery and for cleaning metal parts. Trichloroethylene is a typical solvent used for these purposes. Process wastewaters and spent machinery cleanser from the Rock Valley Patterns operations could have been disposed of via the domestic septic system. The cleanser used by Rock Valley Patterns employees to clean parts and machinery may have contained TCE. The former Rock Valley Patterns site should be considered a potential source of TCE contamination, since the Broad Brook could possibly serve as a conduit for transport of TCE from the site to the Barnes Aquifer at the Hendrick Street Wellfield.

Tautznik Excavation, 165 Hendrick Street, Easthampton

Heavy equipment related to this excavation business is stored behind a residence located on Hendrick Street. The storage area is on the western bank of Broad Brook, approximately 1500 feet south of the

Hendrick Street Wellfield. Solvents are routinely used in vehicle maintenance and may be expected to be stored on this property. Any spills at this site could be transported via Broad Brook to the Barnes Aquifer at the Hendrick Street Wellfield. This site was identified during the area reconnaissance survey and an on-site inspection was not performed. Further investigation into waste generation and disposal at this business is warranted.

CHAPTER 4
INITIAL GROUNDWATER SAMPLING AND SITE HYDROGEOLOGY

General

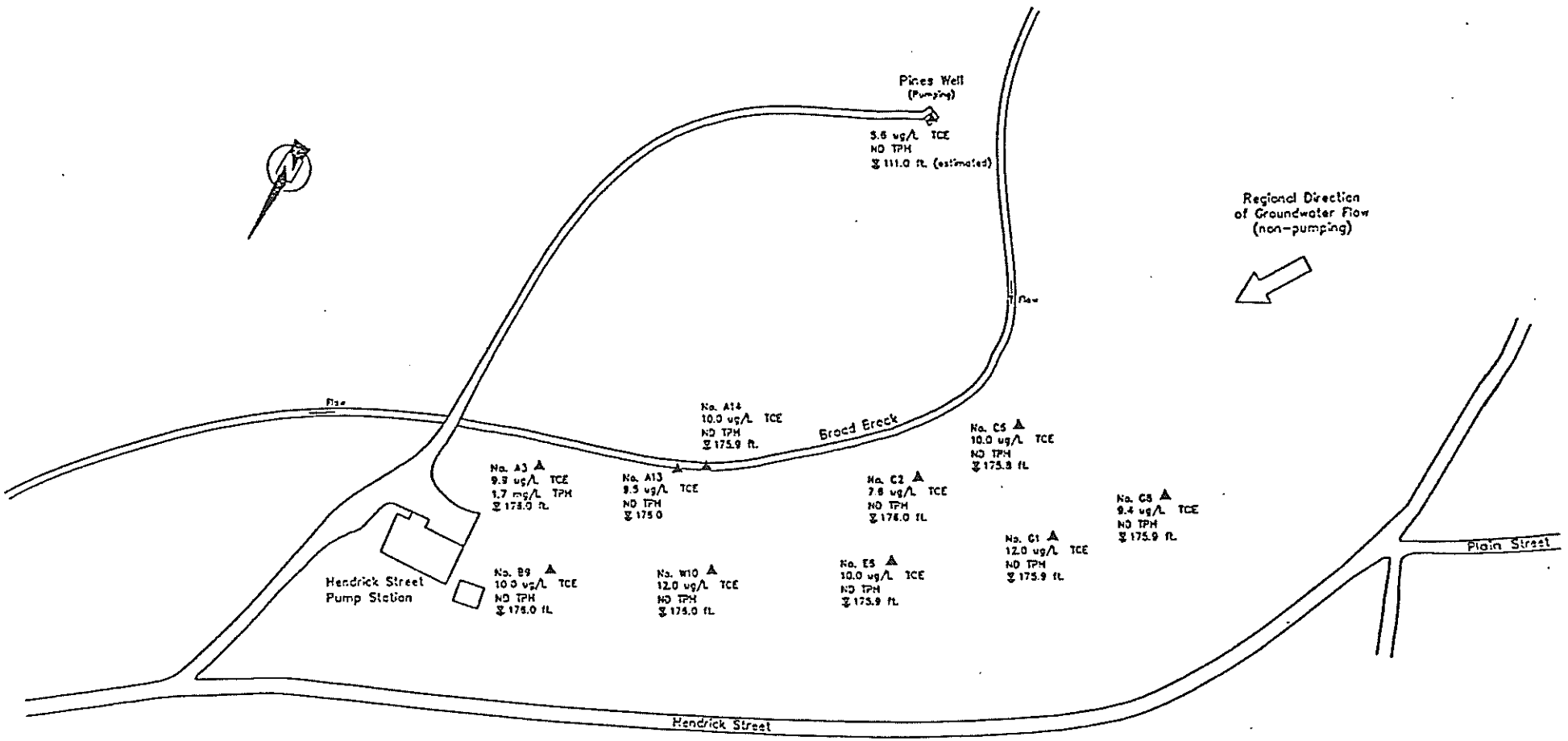
Initial groundwater sampling was performed to confirm levels of TCE in groundwater at the Hendrick Street Wellfield, the Pines Well and a monitoring well installed by IEP, Inc. (Well 1-87) located on Plain Street, west of the Hendrick Street Wellfield (Figure 2.2). Ten wells within the Hendrick Street Wellfield were sampled to evaluate contaminant distribution at the wellfield. The wells sampled were located around the perimeter of the wellfield, as depicted in Figure 4.1. Analytical results are summarized in Table 4.1 and laboratory data is included as Appendix C. All samples were analyzed for VOCs by EPA Method 524.2 and for total petroleum hydrocarbons by Method 503, BE. One sample (G-6) from the Hendrick Street Wellfield and a sample from the Pines Wells were analyzed for Radon, Gross Beta and Gross Alpha. Duplicate samples were analyzed for Radon.

Well 1-87 is located on Plain Street in Easthampton, approximately 4000 feet west of the Hendrick Street Wellfield. The well is the shallow component of a couplet installed by IEP, Inc. in 1987. It is 50 feet deep, and screened from 40 to 50 feet. The deeper well of the couplet could not be located by SEA personnel.

Sampling Procedures

The Quality Assurance/Quality Control Program followed during sampling is included as Appendix F and the specific sampling protocal followed is included in Appendix H. The Site-Specific Health and Safety Plan is included as Appendix G. Samples were collected on May 24, 1990. The Hendrick Street Wellfield was not being pumped at the time of

sampling. All the wells sampled within the Hendrick Street Wellfield were under artesian conditions, with water surface either above the ground surface within the opened casing, or flowing over the top of the opened casing. The Pines Well was pumping during sampling and it could not be determined whether or not it was artesian. Well 1-87 was under water table (non-artesian) conditions.



LEGEND

Sampled Well ▲

No. A3 – Well Number
9.9 ug/L TCE – Trichloroethylene Concentration in Micrograms per Liter.
1.7 mg/L TPH – Total Petroleum Hydrocarbon Concentration in Milligrams per Liter (ND = None Detected).
▽ 175.9 ft. – Groundwater Elevation (estimated datum / rounded to nearest tenth of a foot).

0 30 60 120 180

SCALE IN FEET

Figure 4.1

Groundwater Sampling Locations
Hendrick Street Well Field

Town of Easthampton, Massachusetts

SEA Consultants Inc.
Engineers/Architects

At each sampling location, water quality samples were obtained after three well volumes of water were removed. Four sampling methods were used depending on the type of well being sampled. These methods included pumping, siphoning, flowing, and using a spigot. A WaTerra Pump was used on IEP well 1-87. The WaTerra Pump consists of a piece of High Density Polyethylene (HDPE sole service) tubing, the length of the well, inserted into a foot valve. Through continuous movement of the tubing (raising and lowering) the water column rises within the tubing and is prevented from falling by the foot valve. It then flows out the open end of the tubing with no loss of volatiles. Because of its increased efficiency in comparison to bailing, this pumping procedure was used to purge IEP well 1-87 where the water table was approximately 25 feet below the ground surface.

The siphoning procedure was used with wells in the Hendrick Street Well Field where the water table within the pipe was above ground but not above the top of the casing. A 3-foot long piece of sole-service HDPE tubing was inserted into the well to its maximum extent and then withdrawn, with the upper orifice blocked. This allowed the water to flow at a measurable rate under laminar flow conditions to prevent loss of volatiles.

The procedure followed for sampling the artesian wells in the Hendrick Street Well field consisted of inserting a piece of sole service HDPE tubing into the steady flow of the well so that samples could be drawn without the loss of volatiles.

The final method used was the spigot method, which was used with the Pines Well, under pumping conditions. An existing spigot in the pumphouse was opened to bleed water off the supply line and obtain a sample for water quality testing.

Table 4.1 provides essential information concerning the sampled wells.

Table 4.1
Sampled Wells

Sampled Well No.	Well Depth (ft.)	Top of Casing[1] (ft.)	Potentiometric Surface Elevation (ft.)
A3	58	174.73	175.95
A13	48	174.75	175.95
A14	95	174.57	175.87
B9	99	175.96	175.96
W10	Not Available	176.00	176.02
C2	73	174.90	175.99
C6	77	175.78	175.82
E6	91	176.17	175.93
G1	93	177.45	175.90
G6	94	177.84	175.86
IEP 1-87	50	215.00	189.46
Pines Well	98	178.99	*111.00

[1]Based on an assumed datum of 173.28 feet above sea level (referenced to the National Geodetic Vertical Datum) for the Hendrick Street Pump Station floor slab.

* estimated

Analysis Results

Analytical results are included in Appendix I and summarized in Table 4.2. The Hendrick Street Well Field had measured Trichlorethylene (TCE) concentrations within the range of 7.6 - 12.0, micrograms per liter (ug/L), averaging 10.0 ug/L with a standard deviation of 1.3 ug/L. The shallow/deep couplet, A13 & A14, varied in concentration by only 0.5 ug/L, although the well depths vary by 47 feet.

The groundwater sample from the Pines Well contained the lowest concentration of TCE, although at 5.6 ug/L the concentration exceeds the MCL of 5 ug/L. Because the Pines Well adjacent to the Hendrick Street Wellfield, comparable concentrations of TCE would be expected. The lower TCE concentrations detected at the Pines Well may be due to the submersible pump action. Groundwater could be aerated during pumping, resulting in loss of TCE through volatilization. The Hendrick Street Wellfield is pumped by suction pumps and aeration and volatilization during pumping would be minimized.

The IEP well (1-87) showed no detected concentration of TCE.

Total Petroleum Hydrocarbons (TPH) were detectable only in well A3 of the Hendrick Street Well field. The TPH concentration in well A3 was 1.7 milligrams per liter (mg/L). The source of TPH may be due to the proximity of A3 to the Parking area for the well field. Oily runoff from vehicles in the parking area could impact Well A3.

Due to the small and inconsistent variations in contaminant concentrations and poteniometric surface elevations within the Hendrick Street Well field, the construction of contour maps illustrating contaminant concentrations in both plan and profile is inappropriate for this scale of variability. Additional water quality sampling must be performed at a greater number of off site locations before a reasonable contaminant contour mapping can be generated.

Gross Alpha, Gross Beta and Radon results for Well G-6 and the Pines Well are within acceptable ranges. Analytical results are included in Appendix I and are summarized in Table 4.3.

Table 4.3

Radionuclide Analytical Results

	Gross Alpha	Gross Beta	Radon
Hendrick Well G-6	0.3 ± 0.6	1.1 ± 0.5	100 ± 20
G-6 Duplicate			120 ± 20
Pines Well	0.2 ± 0.5	0.8 ± 0.4	30 ± 12
Pines Duplicate			35 ± 12
MCL	15	Concentration producing annual dose of 4 mrem/yr	10,000

* reported in pCi/L

Table 4.2

Summary of Trichloroethylene Concentrations
for Hendrick Street and Pines Wells
(Sampling Performed by SEA Consultants, Inc.
May 24, 1990)

Sampled Well No.	TCE Concentration (ug/L)	TPH Concentration (mg/L)	Well Depth (ft.)
A3	9.9	1.7	58
A13	9.5	ND	48
A14	10.0	ND	95
B9	10.0	ND	99
W10	12.0	ND	Not Available
C2	7.6	ND	73
C6	10.0	ND	77
E6	10.0	ND	91
G1	12.0	ND	93
G6	9.4	ND	94
IEP 1-87	ND	ND	50
Pines Well	5.6	ND	98

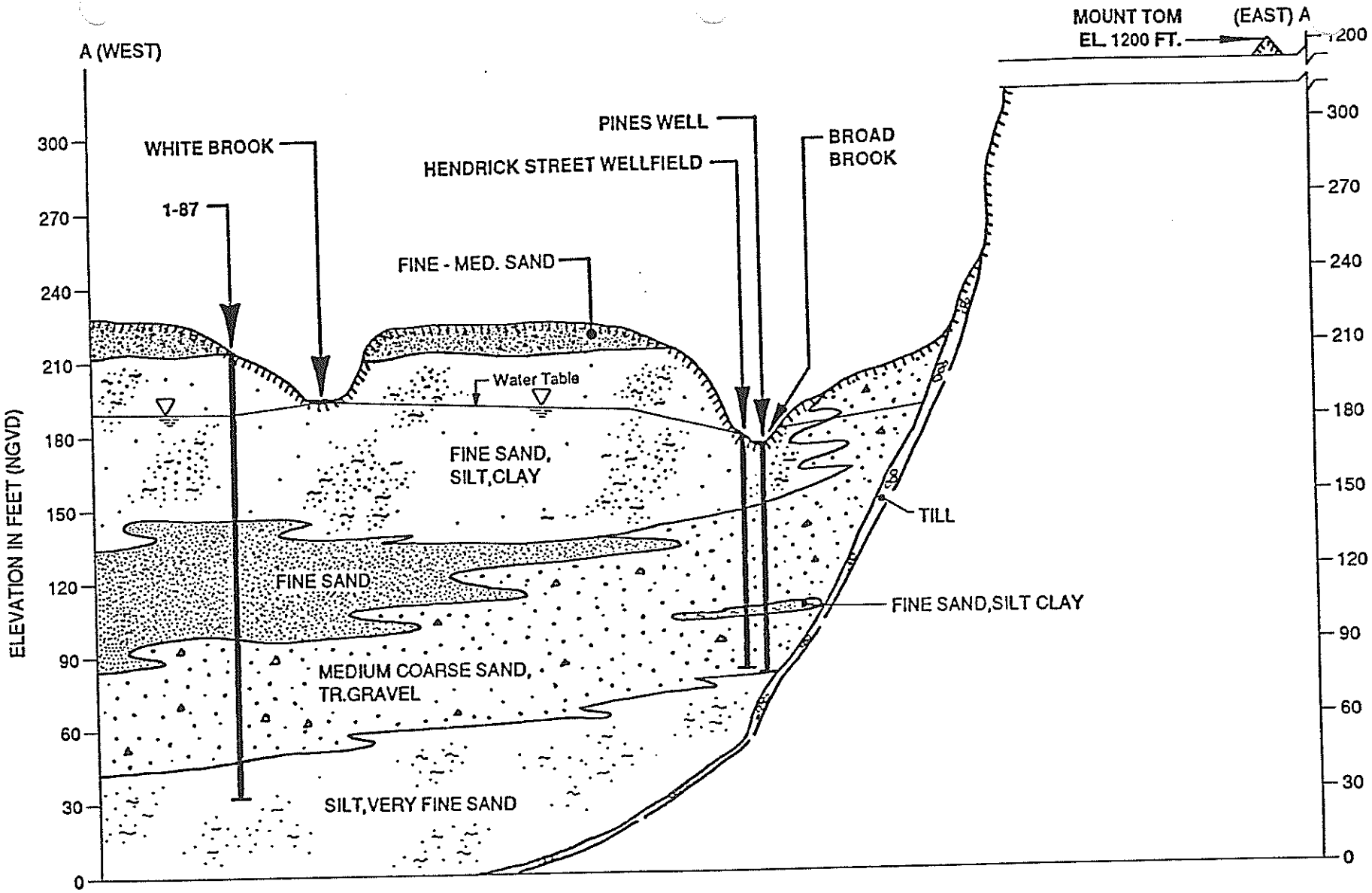
ND means not detected

See Appendix I for laboratory analysis certificates.

Site Hydrogeology

The Hendrick Street Wellfield and the Pines Well are located in the Barnes Aquifer system. Lithologic logs from well installations at the Hendrick Street Wellfield indicate that the aquifer at the site consists primarily of medium to coarse sand with a trace of gravel. The gravel is overlain by a thin, discontinuous layer of fine sand, silt and clay at the wellfield. These conditions produce a leaky confined aquifer system which has a certain degree of hydrologic connection to Broad Brook at the Hendrick Street Wellfield. The Hendrick Street Wellfield is located in a grassy wetland which appears to discharge to Broad Brook when the wellfield is not being pumped. Under pumping conditions, Broad Brook probably recharges the aquifer. Groundwater flow is expected to be South-Southwest to North-Northeast.

Two regional geologic cross-sections are provided in Figures 4.2 and 4.3. Cross-section A-A' (Figure 4.2) is oriented along a west-east axis, approximately perpendicular to the direction of groundwater flow. The direction of groundwater flow is south-southwest to north-northeast. Cross-section B-B' (Figure 4.3) is oriented along a south-north axis through Easthampton approximately parallel to the direction of groundwater flow.



HORIZONTAL SCALE : 1" = 900'
VERTICAL SCALE : 1" = 60'
VERTICAL EXAGGERATION = 15X
CONTACTS ARE ASSUMED

Figure 4.2

GEOLOGIC CROSS-SECTION A - A'

Easthampton, Massachusetts

SEA Consultants Inc.
Engineers /Architects

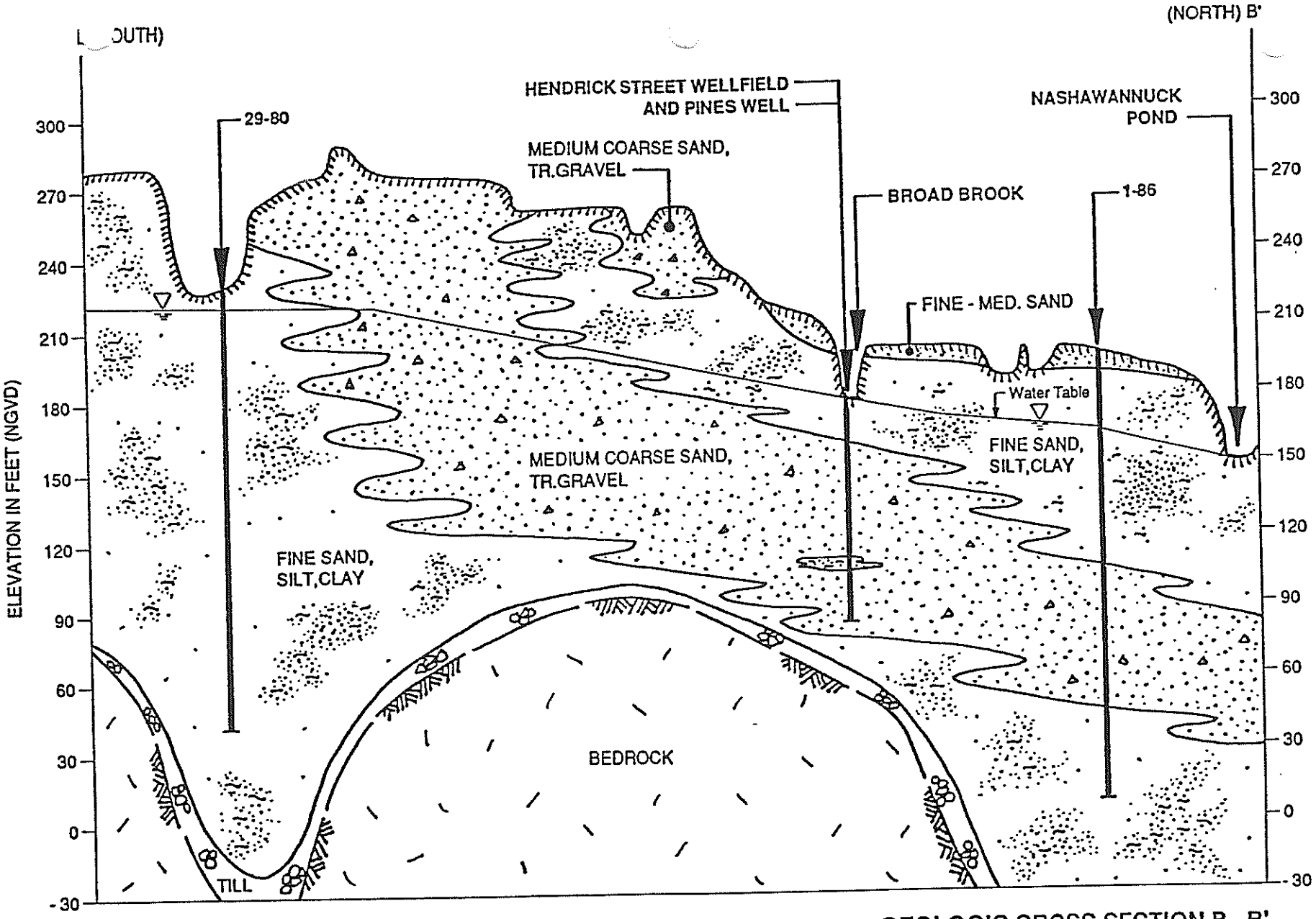


Figure 4.3

GEOLOGIC CROSS-SECTION B - B'

Easthampton, Massachusetts

HORIZONTAL SCALE : 1" = 2083'
VERTICAL SCALE : 1" = 60'
VERTICAL EXAGGERATION = 34.7X
CONTACTS ARE ASSUMED

SEA Consultants Inc.
Engineers /Architects

Groundwater Flow Simulation

The numerical groundwater model "AQUIFER" was used to simulate the Barnes Aquifer system. The model employs a 24 column by 45 row node-centered finite difference grid with variable grid spacings ranging from 260 feet to 2080 feet at various locations within the model. The output from this model can be used as input into CONTRANS (a contaminant transport simulation model). This model can generate computer simulated travel times. The original "AQUIFER" model and travel time contours were developed by James C. Hall, Ph.D, for the report "Aquifer-Protection Study of Barnes Aquifer For Easthampton, Massachusetts" (Motts, 1990).

This model was obtained by S E A and a steady state water table map was generated with the Lovefield and Nonotuck Park Wells pumping at 1.5 million gallons per day (mgd), and the Hendrick Street Wells pumping at 4.3 mgd. Pumping rates are those used in the Motts (1990) study. The water table elevation output from this run was then used as the water table input for the next run, which utilized pumping rates for the Pines Well at 700 gallons per minute (gpm) and the Lovefield and Nonotuck Park Wells at 1.5 (mgd). This run was intended to simulate the conditions under which the water quality samples and groundwater elevations were obtained. From this computer output a groundwater flownet was developed (see Figure 4.4). Through the use of the flownet, the locations of proposed groundwater monitoring wells could be determined so as to follow groundwater flow patterns downgradient of the suspected sources of contamination. The proposed initial monitoring well network is shown in Figure 4.5. The intent of the proposed monitoring program is to implement a 2 phase sampling program. The first phase will eliminate or confirm potential sources of contamination. The second phase monitoring well locations will be determined based on confirmed contaminant sources established in the first phase.

Although the model initially selected to simulate the Barnes Aquifer was the MODFLOW code developed by IEP, the AQUIFER code developed by Dr. Hall was developed more recently and incorporates several refinements:

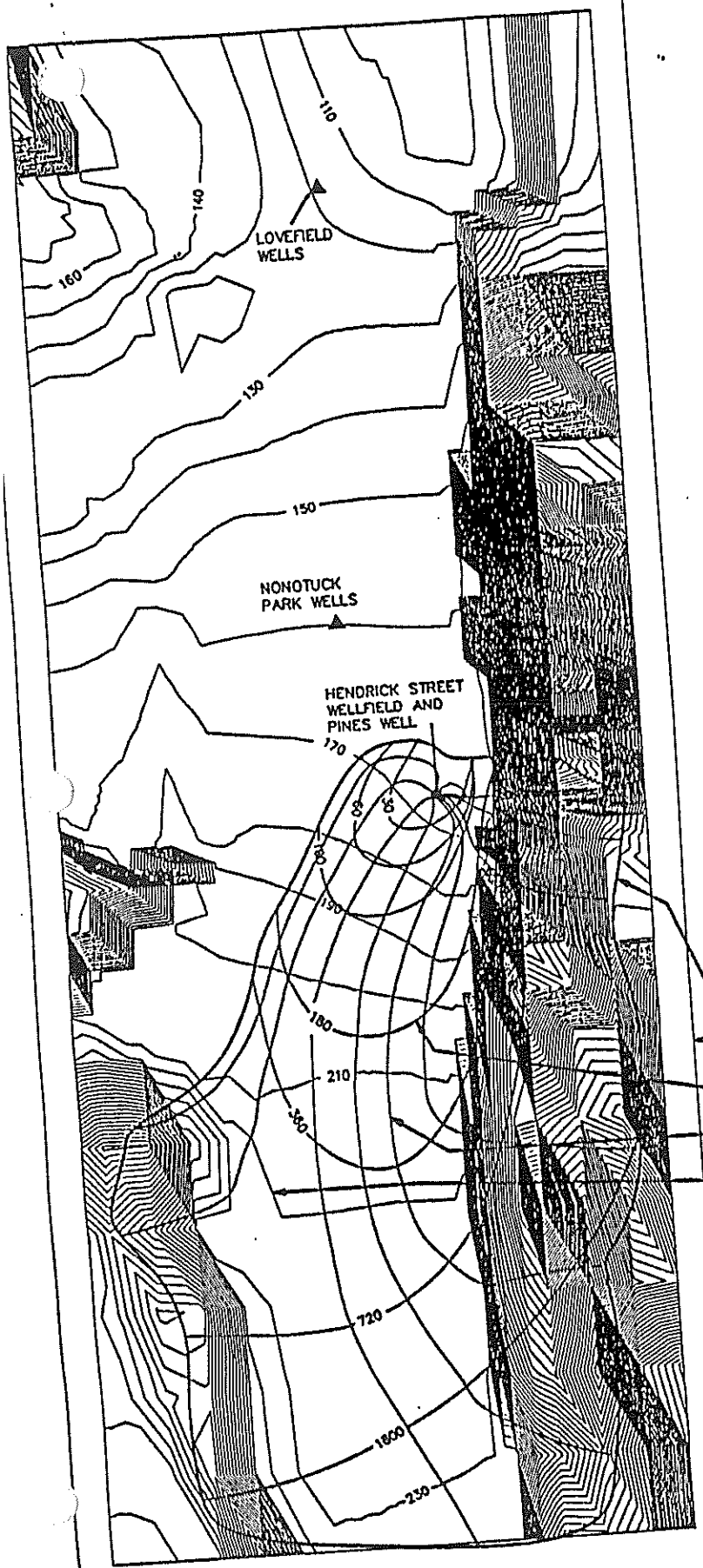
1. The multi-layer nature of AQUIFER allows true hydraulic conductivities to be used, rather than ficticious permeabilities which are an artifact of the 2-layer model developed by IEP.

2. With AQUIFER, true groundwater velocity and travel time data can be drived from the water table and hydraulic conductivity input data.

3. AQUIFER takes into account recharge from the highlands to the east and west, unlike the MODFLOW code.

4. AQUIFER accounts for the thinning of the clay layer along the eastern and western flanks of the valley, thus allowing for a more realistic depiction of the head differential between the lower and upper aquifer layers.

Three monitoring locations in the southern portion of the aquifer will initially be designated as sites for single-level wells. These wells will be screened from 10 to 30 feet below the water table or top of the first confining layer encountered. The well located southeast of the Hendrick Street Wellfield will also be constructed as a single-level well because the saturated thickness there is expected to be thin. The remaining two wells north of Pomeroy Street will be constructed as couplets, with shallow and deep wells located in close proximity. The monitoring well immediately downgradient of land use No. 3 (Rock Valley Patterns) will be a shallow hand-driven well point.



Zone of Influence

Modeled Area

Time of Travel Contours (days)

Groundwater Flow Lines

Groundwater Elevation Contours (feet)

2000 0 2000 4000

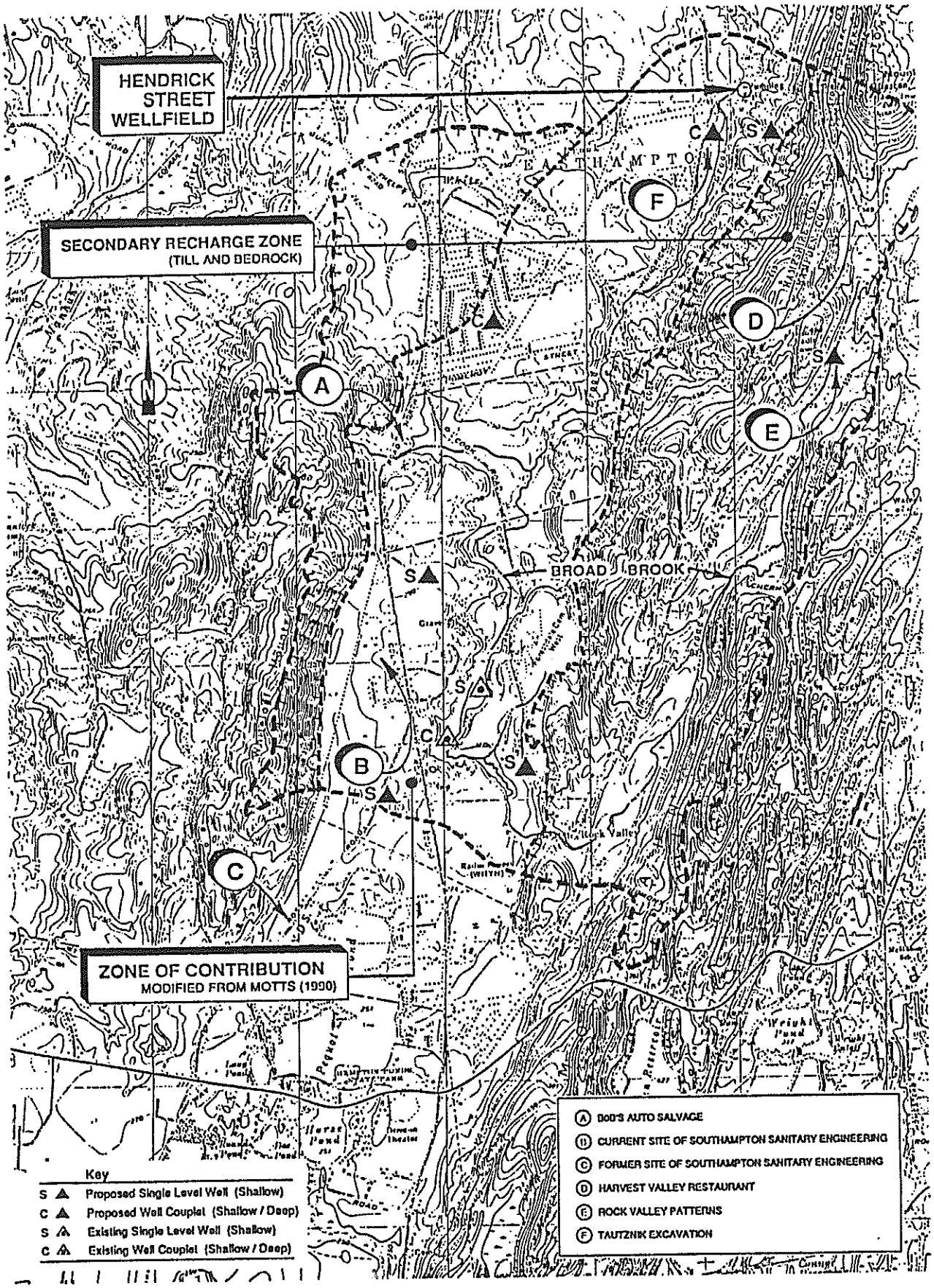
SCALE IN FEET

FIGURE 4.4

GROUNDWATER FLOW MAP

TOWN OF EASTHAMPTON, MASSACHUSETTS

SEA Consultants Inc.
Engineers/Architects



Reference:

From the U.S.G.S. Topographic Map
Of the Mount Tom Quadrangle

Figure 4.5

PHASE II MONITORING WELL LOCATIONS

Town of Easthampton, Massachusetts

SEA Consultants Inc.
Engineers / Architects

CHAPTER 5
FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Findings

1. TCE has been detected in both the Hendrick and Pines wells. Levels have been slowly increasing in both wells. TCE was first detected in the Hendrick Street Wellfield in 1984. Analysis of groundwater samples collected during this investigation indicate an average TCE concentration of 10 ug/L. TCE was detected in the Pines well in 1986 and the current level reported is 5.6 ug/L. The Maximum Contaminant Level for TCE is 5 ug/L.

2. The Hendrick Street Wellfield and Pines Well draw water from the Barnes Aquifer. The Barnes Aquifer extends southward into Holyoke, Southampton and Westfield. It is believed to be an unconfined aquifer south of Plain Street, Easthampton. North of Plain Street, the aquifer is thought to confined by an overlying silt/clay layer. This layer appears to be a "leaky" confining layer in the vicinity of the Hendrick Street Wellfield.

3. Due to the semi-confined nature of the Barnes Aquifer at the Hendrick Street site, Broad Brook is thought to have a limited hydrologic connection to the aquifer at the site.

4. The Hendrick Street Wellfield was installed in 1908. Prior to that time, the land was undeveloped, and with the exception of the wellfield and appurtenances, it remains undeveloped.

5. Small quantities of oil, lubricant, gasoline and cleaners have been used on the property for equipment maintenance.

6. No surficial indications of contaminant discharge from the site were observed or reported.

7. Discharge from the Hendrick Street Wellfield site to the Barnes Aquifer via Broad Brook could occur through floor drains in the two pump houses on the site.

8. Two underground diesel storage tanks, of approximately 40 years of age were removed from the northwest section of the property in 1988. No signs of contamination were noted during excavation and the tanks appeared tight.

9. The primary potential receptors of TCE in groundwater are the residents of Easthampton who draw drinking water from the Barnes Aquifer. The Hendrick Street Wellfield is the major source of water for Easthampton. This well has been predominantly off-line since 1988 due to the TCE contamination, but is currently in service under emergency conditions.

10. It is believed that the unconfined portion of the Barnes Aquifer, occurring south of Plain Street, Easthampton, recharges the contined portion of the aquifer north of Plain Street. Therefore, the major sources of recharge to the aquifer at the Hendrick Street Wellfield, where semi-confined conditions have been observed, include:

    a. percolation through surficial sediments where the aquifer is unconfined south of Plain Street, and

    b. infiltration from surface water, mainly Broad Brook, where the aquifer is unconfined south of Plain Street.

11. A zone of contribution and secondary recharge zone have been delineated based on Motts (1990) and available hydrogeological information. The zone of contribution extends south of the wellfield, into Southampton and Holyoke.

12. TCE has also been detected in Holyoke's Pequot water supply wells, located approximately 3 miles south and upgradient of the Hendrick Street Wellfield. The Pequot wells were taken off-line in 1987 because of TCE contamination.

13. Several sites where land use warrants additional investigation regarding TCE generation and disposal have been identified based on a preliminary survey. These include:

    Bob's Auto Salvage
    Current Site of Southampton Sanitary Engineering
    Former Site of Southamtpon Sanitary Engineering
    Harvest Valley
    Rock Valley Patterns
    Tautznik Excavation

Conclusions

1. Based on the levels of TCE detected in groundwater underlying the subject property, this location can be classified as a "disposal site" pursuant to 310 CMR 40.020.

2. No on-site source of contamination was identified and therefore an off-site source is inferred.

3. The source of TCE contamination is expected to be located within the Zone of Contribution or Secondary Recharge Zone mapped for the Hendrick Street Wellfield, which extends into Holyoke and Southampton. However, given the limited hydrogeological information currently available, potential sources of TCE which lie outside these zones, but could still impact the Barnes Aquifer via another transport mechanism (i.e. Broad Brook), warrant further investigation.

Recommendations

1. Sample existing monitoring wells installed by Motts for the West Holyoke aquifer study at two sites. One of these sites is a shallow/deep cluster.

2. Analyze water samples from these existing wells for volatile organic compounds using the EPA 500 series.

3. Install monitoring wells initially at seven (7) sites to confirm or eliminate potential contaminant sources. These new wells should be located down gradient of potential contamination sources. Proposed well locations are shown on Figure 4.5 and described in Table 4.3.

4. Two of the initial seven locations are upgradient of the Motts cluster well located north of Keys Road. Depending on the results of analyses from the Motts cluster well, these two locations could be equipped with shallow wells, deep wells, or cluster wells. They have been initally designated as shallow well sites, and if neither the shallow nor the deep horizon of the Motts cluster shows TCE they should remain as shallow wells.

5. Analyze water samples from the new monitoring wells for volatile organic compounds using the EPA 500 series.

6. Following review of chemical analysis results, install additional wells to help focus on the principal source(s) of contamination. Some of these wells may be deep wells intended to convert shallow well locations into cluster well locations.

7. The new drilling locations are planned to be truck accessible in so far as possible. They should be convenient locations for long-term monitoring of the aquifer.

8. During the drilling phase of the work, an S E A project engineer or geologist will be on-site full-time to locate the wells, monitor the drilling operations of the Contractor, classify subsurface material and identify strata changes, monitor installation of the monitoring wells, prepare soil boring and well installation logs, and perform on-site screening of soil samples. The boring logs will include annotation of odor and visual observations. Static water levels will be noted for each water-bearing zone pentrated.

9. Appropriate precautions will be taken to reduce the potential that aquifer cross-contamination will occur, and that the monitoring wells will be contaminated by the drilling operations. Procedures outlined in the Quality Assurance/Quality Control plan should be followed, or modified as necessary (with appropriate approvals) if field conditions differ from those anticipated.

10. At least one soil sample will be collected from each boring and submitted to a DEP certified laboratory to validate the field screening results. If no soil contamination is

detected, a single soil sample in the vicinity of the well screen location will be submitted for VOC analysis by EPA method 8240 and for TPH by IR. If contamination of soil samples is detected by field screening, up to five soil samples will be collected from the boring and submitted for laboratory analysis of VOCs. One sample will be submitted for TPH.

11. An intensive windshield survey followed by on-site inspections of selected sites identified as potential contaminant sites should be conducted for portions of Easthampton, Southampton, and Holyoke. The DEP and Town of Easthampton will help pinpoint the potential contaminant sources which will be investigated by S E A.

12. Based on information gathered in the non-drilling and drilling tasks, establish critical water quality trends in the well field area and project the chemicals and their respective concentrations that may be encountered at the Pines and Hendrick Well heads in the next 3 to 8 years. The updated computer model of the Barnes aquifer should be used to make the projections. Based on the field data and projected trends, the maps and cross-sections developed for this study should be updated. Particular attention will be given to chemicals that could interfere with the granular activated carbon process or that cannot be successfully treated by air stripping.

REFERENCES

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IEP, Inc., 1988, Aquifer Land Acquisition Study, Final Report, Town of Easthampton. Prepared for the Town of Easthampton Board of Public Works, Easthampton, Massachusetts.

Larsen, F.D., 1972, Surficial Geology of the Mt. Tom Quadrangle, Massachusetts. Dissertation, University of Massachusetts, Amherst.

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APPENDIX A
ANALYSIS RESULTS
WATER SUPPLY WELLS WITHIN THE CITY OF HOLYOKE

The Commonwealth of Massachusetts

Department Of Environmental Quality Engineering

Lawrence Experiment Station

GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS

OF PURGEABLE ORGANICS

SAMPLE NUMBER 019401
COLLECTOR Prendergast
RECEIVED 4/29/86

CITY/TOWN HOLYOKE
COLLECTED 4/24/86
ANALYZED 5/7/86

SOURCE Coronet - Route 202 Wells - pump line from pressure tank

APPROVED BY AH 6/2/86
JUN 2 1986

☐ No purgeable organic compounds detected.

	ug/l		ug/l
Methylene chloride	1.2		
Trichloroethylene	1.1		

The sample was analyzed according to the EPA procedure, "Method 624-Organics by Purge and Trap". Only those organic compounds which have a significant vapor pressure in aqueous solution at room temperature and thus are amenable to partition by purging are detected by this procedure.

L1 = less than 1.0 ug/l L5 = less than 5.0 ug/l L10 = less than 10 ug/l

*No standard available for quantitation. The mass spectrum obtained was compared to a mass spectral index and a mass spectral data base for identification.

REMARKS:

JUL 1 4 1980

Environmental Quality Engineering
University of Mass.

The Commonwealth of Massachusetts

Department Of Environmental Quality Engineering

Lawrence Experiment Station

37 Shattuck Street, Lawrence, Massachusetts 01843

SOURCE A. – Pequot Water Co.

SOURCE B –

SOURCE C –

SOURCE D –

SOURCE E –

HOLYOKE

COLLECTOR Moynihan

DATE COLLECTED July 3, 1980

DATE RECEIVED July 3, 1980

SPOT PROGRAM

	A	B	C	D	E
SAMPLE NO.	001797				
DATE ANALYZED	7/9/80				
Methylene Chloride	nd				
1,1 Dichloroethylene	nd				
1,2 Transdichloroethylene	nd				
Chloroform	nd				
1,2 Dichloroethane	nd				
1,1,1 Trichloroethane	nd				
Carbon tetrachloride	nd				
Bromodichloromethane	nd				
Trichloroethylene	12.1				
Dibromochloromethane	nd				
Bromoform	nd				
Tetrachloroethylene	nd				

Concentrations reported as micrograms per liter – nd: none detected

The Commonwealth of Massachusetts

Department Of Environmental Quality Engineering

Lawrence Experiment Station

37 Shattuck Street, Lawrence, Massachusetts 01843

SOURCE A - Pt. 202 Wally - 130-010 Lamar Hamel

SOURCE B -

SOURCE C -

SOURCE D -

SOURCE E -

HOLYOKE

COLLECTOR: Holova

DATE COLLECTED: May 2, 1980

DATE RECEIVED: May 7, 1980

	A	B	C	D	E
SAMPLE NO.	001095				
DATE ANALYZED	5/12/80				
Methylene Chloride	nd				
1,1 Dichloroethylene	nd				
1,2 Transdichloroethylene	nd				
Chloroform	nd				
1,2 Dichloroethane	nd				
1,1,1 Trichloroethane	nd				
Carbon tetrachloride	nd				
Bromodichloromethane	nd				
Trichloroethylene	nd				
Dibromochloromethane	nd				
Bromoform	nd				
Tetrachloroethylene	nd				

RECEIVED
MAY 12 1980
Environmental Quality Engineering
University of Mass.

Concentrations reported as micrograms per liter - nd: none detected

Tighe & Bond / SGI
CONSULTING ENGINEERS

Tighe & Bond
Environmental Laboratory
Easthampton, Massachusetts 01027
Massachusetts Certificate of Approval # C 8212
Pequot Water System

Job No. 40019-00
Assoc. No. H-52
Report No. 01679

Sample Source
Sample Description C 38772 - Water from System
Sample Description C
Sample Description C
Sample Description C

Concentrations reported as parts per billion unless listed otherwise.

Lab Number		C 38772	C	C	C
Collector		Creaser			
Date Received		12-17-82			
Date Analyzed		12-20-82			
GC/MS FRACTION-VOLATILE COMPOUNDS					
1V. Acrolein		N.D.			
2V. Acrylonitrile		N.D.			
3V. Benzene		N.D.			
4V. Bis (Chloromethyl) Ether		N.D.			
5V. Bromoform		N.D.			
6V. Carbon Tetrachloride		N.D.			
7V. Chlorobenzene		N.D.			
8V. Chlorodibromomethane		N.D.			
9V. Chloroethane		N.D.			
10V. 2-Chloroethylvinyl Ether		N.D.			
11V. Chloroform		N.D.			
12V. Dichlorobromomethane		N.D.			
13V. Dichlorodifluoromethane		N.D.			
14V. 1,1-Dichloroethane		N.D.			
15V. 1,2-Dichloroethane		N.D.			
16V. 1,1-Dichloroethylene		N.D.			
17V. 1,2-Dichloropropane		N.D.			
18V. 1,2-Dichloropropylene		N.D.			
19V. Ethylbenzene		N.D.			
20V. Methyl Bromide		N.D.			
21V. Methyl Chloride		N.D.			
22V. Methylene Chloride		N.D.			
23V. 1,1,2,2-Tetrachloroethane		N.D.			
24V. Tetrachloroethylene		N.D.			
25V. Toluene		N.D.			
26V. 1,2-Trans-Dichloroethylene		N.D.			

N.D. = Parameter not detected at sensitivity level of instrument which is <1 µg/L (ppb)

TIGHE & BOND / SCI
ONSULTING ENGINEERS

Tighe & Bond
Environmental Laboratory
Easthampton, Massachusetts 01027
Massachusetts Certificate of Approval # C 8212

Job No. 40019-00
Assoc. No. H-52
Report No. 01679

Pequot Water System

Sample Source
Sample Description C 38772 - Water from System
Sample Description C
Sample Description C
Sample Description C

Concentrations reported as parts per billion unless listed otherwise.

		C38772	C	C	C
Lab Number		Creaser			
Collector		12-17-82			
Date Received		12-20-82			
Date Analyzed					
GC/MS FRACTION-VOLATILE COMPOUNDS					
CONTINUED					
27V. 1,1,1-Trichloroethane		N.D.			
28V. 1,1,2-Trichloroethane		N.D.			
29V. Trichloroethylene		4.4			
V. Trichlorofluoromethane		N.D.			
31V. Vinyl Chloride		N.D.			

N.D. = Parameter not detected at sensitivity level of instrument which is <1 mg/l. (ppb)

VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS

Lab Name Tighe & Bond MA. Certification# MA014 Lab Sample ID C68899

ctor Name Client City/Town Holyoke, Mass

Sar e Collected 3-2-88 PWS Name Holyoke Water Works

Sample Received by Lab 3-2-88 PWS ID# 1137001

Analyzed 3-14-88 No. Of Sources entering the distribution system at this point One

e: Ground X Surface

e Treated: Yes No X

Source Name(s) Pequot Wells ID#

Of Treatment:

posite sample: Yes No X

Source Status:

s: List all source ID# , , , , ,

Active Inactive Seasonal

Backup use Emergency Use Only X

Other Disconnected from system soon

rtical Method: 502.1 1, 502.2 2, 503.1 3, (504) 4X, (524.1) 5X, 524.2 5

AMINANTS	ANALYTICAL METHOD	**RESULT ug/L	MCL ug/L	Detection Limits (ug/L)
ene		ND	5	0.5
ontetrachloride		ND	5	0.5
Dichloroethylene		ND	7	0.5
Dichloroethane		ND	5	0.5
Dichlorobenzene		ND	75	0.5
hloroethlyene		9.13	5	0.5
1, Trichloroethane		ND	200	0.5
l Chloride		ND	2	0.5
obenzene		ND		0.5
odichloromethane		ND		0.5
oform		ND		0.5
ane		ND		0.5
robenzene		ND		0.5
rodibromomethane		ND		0.5
roethane		ND		0.5
roform		ND		0.5
romethane		ND		0.5
lorotoluene		ND		0.5
lorotoluene		ND		0.5
omomethane		ND		0.5
chlorobenzene		ND		0.5
chlorobenzene		ND		0.5
s-1,2 Dichloroethylene		ND		0.5
-1,2, Dichloroethylene		ND		0.5
loromethane		ND		0.5
Dichloroethane		ND		0.5
Dichloropropene		ND		0.5
Dichloropropene		ND		0.5
Dichloropropane		ND		0.5
Dichloropropane		ND		0.5
Dichloropropane		ND		0.5
ylbenzene		ND		0.5
rene		ND		0.5
,2 Trichloroethane		ND		0.5
,1,2 Tetrachloroethane		ND		0.5
,2,2 Tetrachloroethane		ND		0.5
loroethylene		ND		0.5
,3 Trichloropropane		ND		0.5
uene		ND		0.5
ylene		ND		0.5
ylene		ND		0.5
ylene		ND		0.5

MINANTS	ANALYTICAL METHOD	RESULTS** ug/L	MCL ug/L	DETECTION LIMITS ug/L
ene ibromide (EDB)		ND		0.02
)ibromo-3-chloropropane (DBCP)		N/A		
ochloromethane		ND		0.5
tylbenzene		ND		0.5
lorodifluoromethane		ND		0.5
rotrichloromethane		ND		0.5
chlorobutadiene		ND		0.5
ropylbenzene		ND		0.5
sopropyltoluene		ND		0.5
nthalene		ND		0.5
ropylbenzene		ND		0.5
-butylbenzene		ND		0.5
t-butylbenzene		ND		0.5
2,3 Trichlorobenzene		ND		0.5
2,4 Trichlorobenzene		ND		0.5
2,4 Trimethylbenzene		ND		0.5
3,5 Trimethylbenzene		ND		0.5

her VOCs detected:

NOTES:

- For clarity all MCLs detection limits and results must be written in micrograms/liter (ug/L).
- *Composite sample preparation can only be done by a certified laboratory.
- **Result must be filled in for each contaminant, N/A = not applicable, ND = not-detected.

Pegasus wells

VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS

Lab Name Tighe & Bond MA. Certification# MA014 Lab Sample ID C68897

Collector Name Client

Date Sample Collected 3-2-88

Date Sample Received by Lab 3-2-88

Date Analyzed 3-14-88

Sample: Ground X Surface

Sample Treated: Yes X No

Type Of Treatment: Chlorination with NaOCl

Composite sample: Yes No X

If Yes: List all source ID# _____, _____, _____, _____, _____

City/Town Holyoke, Mass.

PWS Name Holyoke Water Works

PWS ID# 1137005

No. Of Sources entering the distribution system at this point One

Source Name(s) Coronet Homes ID# 13701G

Source Status:

Active _____ Inactive _____ Seasonal _____

Backup use _____ Emergency Use Only X

Other Disconnected from system soon

Analytical Method: 502.1 1, 502.2 2, 503.1 3, (504) 4 X, (524.1) 5 X, 524.2 6

CONTAMINANTS	ANALYTICAL METHOD	**RESULT ug/L	MCL ug/L	Detection Limits (ug/L)
Benzene		ND	5	0.5
Carbontetrachloride		ND	5	0.5
1,1-Dichloroethylene		ND	7	0.5
1,2-Dichloroethane		ND	5	0.5
Para Dichlorobenzene		ND	75	0.5
Trichloroethlyene		ND	5	0.5
1,1,1 Trichloroethane		ND	200	0.5
Vinyl Chloride		ND	2	0.5
Bromobenzene		ND		0.5
Bromodichloromethane		ND		0.5
Bromoform		ND		0.5
Bromomethane		ND		0.5
Chlorobenzene		ND		0.5
Chlorodibromomethane		ND		0.5
Chloroethane		ND		0.5
Chloroform		ND		0.5
Chloromethane		ND		0.5
2-Chlorotoluene		ND		0.5
4-Chlorotoluene		ND		0.5
Dibromomethane		ND		0.5
1,2-Dichlorobenzene		ND		0.5
1,3-Dichlorobenzene		ND		0.5
trans-1,2 Dichloroethylene		ND		0.5
cis-1,2, Dichloroethylene		ND		0.5
Dichloromethane		ND		0.5
1,2 Dichloroethane		ND		0.5
1,1 Dichloropropene		ND		0.5
cis-1,3 Dichloropropene		ND		0.5
trans-1,3 Dichloropropene		ND		0.5
1,2 Dichloropropane		ND		0.5
1,3 Dichloropropane		ND		0.5
2,2 Dichloropropane		ND		0.5
Ethylbenzene		ND		0.5
Styrene		ND		0.5
1,1,2 Trichloroethane		ND		0.5
1,1,1,2 Tetrachloroethane		ND		0.5
1,1,2,2 Tetrachloroethane		ND		0.5
Tetrachloroethylene		ND		0.5
1,2,3 Trichloropropane		ND		0.5
Toluene		ND		0.5
o-Xylene		ND		0.5
m-Xylene		ND		0.5
p-Xylene		ND		0.5

ANALYTICAL METHOD	RESULTS** ug/L	MCL ug/L	DETECTION LIMITS ug/L
lene Dibromide (EDB)	ND		0.02
Dibromo-3-chloropropane (DBCP)	N/A		
ochloromethane	ND		0.5
tylbenzene	ND		0.5
lor ifluoromethane	ND		0.5
rotrichloromethane	ND		0.5
chlorobutadiene	ND		0.5
ropylbenzene	ND		0.5
opropyltoluene	ND		0.5
thalene	ND		0.5
opylbenzene	ND		0.5
butylbenzene	ND		0.5
-butylbenzene	ND		0.5
3 Trichlorobenzene	ND		0.5
4 Trichlorobenzene	ND		0.5
4 Trimethylbenzene	ND		0.5
5 Trimethylbenzene	ND		0.5

r VOCs detected:

S:

For clarity all MCLs detection limits and results must be written in micrograms/liter (ug/L).
Composite sample preparation can only be done by a certified laboratory.
Result must be filled in for each contaminant, N/A = not applicable, ND = not-detected.

Coroner · Hom

Sept. 30, 1986

Pequot Wells: General Information

1) Size of main: leaves station 8" and continues through out system (6000' of iron and the rest AC cement)

2) Well depth: #1 well is 92' deep and #2 well is 83' deep

3) Screen information: #1 well has 73' of 8" casing, 10' of 8" screen(50 slot), and 2'9" extension piece

#2 well has 83' of 8" casing, 10' of 8" screen(40 and 50 slot), and 2'5" extension piece

4) Yields: 280 to 300 gpm per pump, operating at a station pressure of 75 psi

approximately 500 gpm with both pumps operating against station pressure of 75 psi

5) Safe yields: a third pump was recently proposed at Pequot and would be able to deliver 1000gpm (12" casing)

6) Flows: (1985 stats) Maximum flow of 155,000 gpd

minimum flow of 23,000 gpd

average flow of 38,764 gpd or 14,149,000 gollons per year

7) Tanks: station contains 6 expansion tanks (approximately 80 gal.) with a maximum working pressure of 75 psi

8) Back up diesel power: 54 horse power Ford diesel motor

APPENDIX B
ANALYSIS RESULTS
HENDRICK STREET AND PINE WELLS, 1989-1990

TOWN OF EASTHAMPTON

DEPARTMENT OF PUBLIC WORKS
MEMORIAL HALL
EASTHAMPTON, MASSCHUSETTS 01027

July 25, 1990

Office Manager
Jeanne D. O'Connor

ndent of Public Works
eph I. Pipczynski
el. 413-527-0793

RECEIVED

JUL 27 1990

S E A CONSULTANTS INC.

Erin Healy
SEA Consultants
485 Massachusetts Ave.
Cambridge, MA 02139-4018

Dear Erin,

Enclosed please find all the T.C.E. sample results for the Hendrick Street Wellfield and #5 Pines Well for 1989 and 1990. I hope they prove to be of value to you.

I will send all future results directly to you. Any questions, please call.

Very truly yours,

Joseph I. Pipczynski
Superintendent of Public Works

JIP/mmf
Enclosure

con-test
WATER AND AIR ENGINEERING

P O BOX 591 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

October 20, 1989

Easthampton Water Department
1 Northampton Street
Easthampton, MA 01027

Invoice #1174
Date Sampled:
Date Received: 10/10/89
Date Analyzed: 10/18/89

Sample Matrix: Water

The result of analysis requested is listed below:

Lab # / Sample #	Pines well Trichloroethlyene ug/L
89B06694 (1)	4.6

Analytical Method(s): GC Purge & Trap

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson Chm
Laboratory Director

on-test®
P O BOX 591, EAST LONGMEADOW MASSACHUSETTS 01028 (413) 525-1198

December 21, 1989

ast Hampton Water Department
Northampton Street
asthampton, MA 06424

Invoice #1288
Date Sampled: 11/27/89
Date Received: 11/27/89
Date Analyzed: 12/01/89

ef: Hendrick Street

Sample Matrix: Water

The results of analyses requested are listed below:

Lab # Sample # Location#	Trichloroethlyene ug/l	LOD ug/l
89B07769 (#5) [illegible]es well	4.9	0.5
89B07770 (#4) Pumping Station	8.1	0.5

Analytical Methods: EPA 502.2

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test
WATER AND AIR ENGINEERING
P.O. BOX 591 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

September 26, 1989

PWS ID. #1087000

Easthampton Water Department
. Northampton Street
Easthampton, MA 01027
Attn: Mr. Ted Bischoff

Invoice #1109
Date Sampled: 09/25/89
Date Received: 09/25/89
Date Analyzed: 09/26/89

Sample Matrix: Water

Ref: Hendrick Street

Dear Mr. Bischoff,

The results of analyses requested are listed below:

Micrograms/liter

Lab # / Sample # / Location	89B06258 (#4) Well Field	89B06259 (#5) The Pines Well
Trichloroethylene	11	4.6

Analytical Method(s): GC Purge & Trap

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test®
WATER AND AIR ENGINEERING
P O BOX 591 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

November 16, 1989

PWS ID. #1087000
MA Certification #MA100

Invoice #1223
Date Sampled: 11/06/89
Date Received: 11/06/89
Date Analyzed: 11/07/89

Sample Matrix: Water

Easthampton Water Department
1 Northampton Street
Easthampton, MA 06424
Attn: Mr. Ted Bischoff

Ref: Hendrick Street

Dear Mr. Bischoff,

The results of analyses requested are listed below:

Lab # / Sample # / Location	Trichloroethylene ug/l
89B07228 (#4) Well Field	4.5
89B07229 (#5) Pines Well	3.0

Analytical Method(s): GC Purge & Trap, EPA 502.2

Sincerely,

CON-TEST. Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test
WATER AND AIR ENGINEERING
P.O. BOX 591 • EAST LONGMEADOW MASSACHUSETTS 01028 • (413) 525-1198

September 07, 1989

PWS ID #1087000

Easthampton Water Department
1 Northampton Street
Easthampton, MA 01027
Attn: Mr. Ted Bischoff

Ref: Hendrick Street

Invoice #1048
Date Sampled: 09/05/89
Date Received: 09/05/89
Date Analyzed: 09/06/89

Sample Matrix: Water

Dear Mr. Bischoff,

The results of analyses requested are listed below:

Micrograms/liter

Lab # / Sample # / Location	LOD	89B05774 (#4) Well Field	89B05775 (#5) Pines Well
Trichloroethylene	0.5	8.5	4.6

Analytical Method(s): GC Purge & Trap, EPA 502.2

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test®
WATER AND AIR ENGINEERING

P O BOX 591 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

August 22, 1989
PWS ID #1087000

MA. Certification #MA100

Easthampton Water Department
1 Northampton Street
Easthampton, MA 06424
Attn: Mr. Ted Bischoff

Invoice #1004
Date Sampled: 08/16/89
Date Received: 08/16/89
Date Analyzed: 08/18/89

Ref: Hendrick Street

Sample Matrix: Water

Dear Mr. Bischoff,

The results of analysis requested is listed below:

		Micrograms/liter	
Lab #		89B05228	89B05229
Sample #		(#4)	(#5)
Location	LOD	Well Field	Pines Well
Trichloroethlyene	0.5	8.2	5.4

Analytical Method(s): GC-Purge & Trap, EPA 502.2
LOD = Limit of Detection

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test®
WATER AND AIR ENGINEERING
P O BOX 591 • EAST LONGMEADOW MASSACHUSETTS 01028 • (413) 525-1198

August 22, 1989
PWS ID #1087000

MA. Certification #MA100

Easthampton Water Department
1 Northampton Street
Easthampton, MA 06424
Attn: Mr. Ted Bischoff

Ref: Hendrick Street

Invoice #1013
Date Sampled: 08/18/89
Date Received: 08/18/89
Date Analyzed: 08/18/89

Sample Matrix: Water

Dear Mr. Bischoff,

The results of analysis requested is listed below:

		Micrograms/liter	
Sample #		89B05278 (#4)	89B05279 (#5)
Location	LOD	Well Field	Pines Well
Trichloroethlyene	0.5	8.3	4.9

Analytical Method(s): GC-Purge & Trap, EPA 502.2
LOD = Limit of Detection

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

4th quarter

con-test®
P O BOX 591, EAST LONGMEADOW, MASSACHUSETTS 01028 (413) 525-1198

January 11, 1990

MA. Certification #MA100
PWS ID #108700

Easthampton Water Department
1 Northampton Street
Easthampton, MA 06424
Attn: Mr. Ted Bischoff

Ref: Hendrick Street
"Pines Well"

Invoice #1376
Date Sampled: 12/29/89
Date Received: 12/29/89
Date Analyzed: 01/04/90

Sample Matrix: Water

Dear Mr. Bischoff,

The results of analysis requested are listed below:

Micrograms/liter

Lab # Sample #	LOD	89B08496 (#5)
Benzene	0.5	ND
Carbontetrachloride	0.5	ND
1,1-Dichloroethylene	0.5	ND
1,2-Dichloroethane	0.5	ND
para Dichlorobenzene	0.5	ND
Trichloroethylene	0.5	5.5
1,1,1-Trichloroethane	0.5	ND
Vinyl Chloride	0.5	ND
Bromobenzene	0.5	ND
Bromodichloromethane	0.5	ND
Bromoform	0.5	ND
Bromomethane	0.5	ND
Chlorobenzene	0.5	ND
Chlrodibromomethane	0.5	ND
Chloroethane	0.5	ND
Chloroform	0.5	ND
Chloromethane	0.5	ND
o-Chlorotoluene	0.5	ND
p-Chlorotoluene	0.5	ND
Dibromomethane	0.5	ND
m-Dichlorobenzene	0.5	ND
o-Dichlorobenzene	0.5	ND
Trans 1,2-Dichloroethylene	0.5	ND
cis 1,2-Dichloroethylene	0.5	ND
Dichloromethane	0.5	ND
1,1-Dichloroethane	0.5	ND
1,1-Dichloropropene	0.5	ND
1,3-Dichloropropene	0.5	ND
1,2-Dichloropropane	0.5	ND
1,3-Dichloropropane	0.5	ND

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P O BOX 591, EAST LONGMEADOW MASSACHUSETTS 01028 (413) 525-1198

January 11, 1990

MA. Certification #MA100
PWS ID #108700

Easthampton Water Department
1 Northampton Street
Easthampton, MA 06424
Attn: Mr. Ted Bischoff

Ref: Hendrick Street
"Pines Well"

Invoice #1376
Date Sampled: 12/29/89
Date Received: 12/29/89
Date Analyzed: 01/04/90

Sample Matrix: Water

Dear Mr. Bischoff,

The results of analysis requested are listed below:

Micrograms/liter

Lab # / Sample #	LOD	89B08496 (#5)
Benzene	0.5	ND
Carbontetrachloride	0.5	ND
1,1-Dichloroethylene	0.5	ND
1,2-Dichloroethane	0.5	ND
para Dichlorobenzene	0.5	5.5
Trichloroethylene	0.5	ND
1,1,1-Trichloroethane	0.5	ND
Vinyl Chloride	0.5	ND
Bromobenzene	0.5	ND
Bromodichloromethane	0.5	ND
Bromoform	0.5	ND
Bromomethane	0.5	ND
Chlorobenzene	0.5	ND
Chlrodibromomethane	0.5	ND
Chloroethane	0.5	ND
Chloroform	0.5	ND
Chloromethane	0.5	ND
o-Chlorotoluene	0.5	ND
p-Chlorotoluene	0.5	ND
Dibromomethane	0.5	ND
m-Dichlorobenzene	0.5	ND
o-Dichlorobenzene	0.5	ND
Trans 1,2-Dichloroethylene	0.5	ND
cis 1,2-Dichloroethylene	0.5	ND
Dichloromethane	0.5	ND
1,1-Dichloroethane	0.5	ND
1,1-Dichloropropene	0.5	ND
1,3-Dichloropropene	0.5	ND
1,2-Dichloropropane	0.5	ND
1,3-Dichloropropane		

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PO BOX 591, EAST LONGMEADOW MASSACHUSETTS 01028 (413) 525-1198

MA. Certification #MA100
PWS ID #108700

sthampton Water Department

f: Hendrick Street
"Wellfield"

Invoice #1376
Date Sampled: 12/29/89
Date Received: 12/29/89
Date Analyzed: 01/03/90

Sample Matrix: Water

he results of analysis requested are listed below:

		Micrograms/liter
ab # / ample #	LOD	89B08495 (#4)
r loroethylene	0.05	11

LOD = Limit of Detection

Analytical Method(s): GC Purge & Trap

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test®
WATER AND AIR ENGINEERING
P.O. BOX 59 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

August 22, 1989

MA. Certification #MA100

Easthampton Water Department
1 Northampton Street
Easthampton, MA 01024
Attn: Mr. Ted Bischoff

Ref: Hencrick Street

Invoice #13358 13357
Date Sampled: 08/14/89
Date Received: 08/14/89
Date Analyzed: 08/18/89

Sample Matrix: Water

Dear Mr. Bischoff,

The results of analysis requested is listed below:

Micrograms/liter

Lab # / Sample # / Location	LOD	89B05185 (4003) Well Field	89B05186 (4004) Pines	89B05187 (4005) MA
Trichloroethylene	0.5	11	5.0	<1.5
Tetrachloroethylene	0.5	-	-	

Northampton St bladder

Analytical Method(s): GC-Purge & Trap, EPA 502.2
LOD = Limit of Detection

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

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WATER AND AIR ENGINEERING
P O BOX 591 • EAST LONGMEADOW MASSACHUSETTS 01028 • (413) 525-1198

November 16, 1989

PWS ID. #1087000
MA Certification #MA100

sthampton Water Department
Northampton Street
sthampton, MA 06424
tn: Mr. Ted Bischoff

f: Hendrick Street

Invoice #1223
Date Sampled: 11/06/89
Date Received: 11/06/89
Date Analyzed: 11/07/89

Sample Matrix: Water

ear Mr. Bischoff,

he results of analyses requested are listed below:

Lab Sample # Location	Trichloroethylene ug/l
89B07228 (#4) Well Field	4.5
89B07229 (#5) Pines Well	3.0

Analytical Method(s): GC Purge & Trap, EPA 502.2

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

Sar e ID

Analyte	Result µg/l	MCL µg/l	Detection Limit µg/l	Analytical Method	Date Analyzed
			0.5	EPA 502.2	7/26/90
1,2-Trichloroethane	ND		0.5		
1,1,2-Tetrachloroethane	ND		0.5		
1,2,2-Tetrachloroethane	ND		0.5		
Tetrachloroethylene	ND		0.5		
1,2,3-Trichloropropane	ND		0.5		
Toluene	ND		0.5		
o-Xylene	ND		0.5		
m-Xylene	ND		0.5		
p-Xylene	ND		0.5		
Bromochloromethane	ND		0.5		
n-Butylbenzene	ND		0.5		
Dichlorodifluoromethane	ND		0.5		
Fluorotrichloromethane	ND		0.5		
Hexachlorobutadiene	ND		0.5		
Isopropylbenzene	ND		0.5		
p-Isopropyltoluene	ND		0.5		
Naphthalene	ND		0.5		
n-Propylbenzene	ND		0.5		
Sec-butylbenzene	ND		0.5		
tert-butylbenzene	ND		0.5		
1,2,3-Trichlorobenzene	ND		0.5		
1,2,4-Trichlorobenzene	ND		0.5		
1,2,4-Trimethylbenzene	ND		0.5		
1,3,5-Trimethylbenzene	ND		0.5		
Ethylene Dibromide (EDB)	ND		0.02	504	7/27/90
1,2-Dibromo-3-chloropropane (DBCP)	ND		0.02	504	7/27/90

NA = Not Applicable; ND = Not Detected
* The MCL for para-Dichlorobenzene will be 5.0 µg/l in July 1990.

Surrogate Recoveries :

Compound	% Recovered	QC Limits
4-bromofluorobenzene	*	80-120
1,2- dichlorobenzene-d_4	*	80-120

NOT Applicable to Method 502.2

Edward Demon 9/6/90
Laboratory Director Signature

Water suppliers should mail TWO copies of this report to their REGIONAL DEP office within 30 days of receipt of results and no later than 10 days after the end of the reporting period.

MASSACHUSETTS DEP DIVISION OF WATER SUPPLY
INORGANICS REPORT

PWS ID 1087000 PWS Name EASTHAMPTON WATER DEPT Town EASTHAMPTON, MA.

Sample Location HENDRICK #4
Lab Sample ID 90B08209
Date Collected 7-23-90
Collected By
Month/Year 7/90

Routine ☐
Special ☑ explain below

Lab Name CON-TEST Lab Cert. # MA 100
Sample: Ground ✓ Surface Active Inactive
Notes BACK-UP, EMERGENCY USE ONLY

	Result MG/L	MCL MG/L	Detection Limit	Analytical Method	Date Analyzed
Arsenic	ND	0.05	0.0053	EPA 206.2	7/24/90
Barium	0.28	1.0	0.02	EPA 200.7	7/27/90
Cadmium	ND	0.010	0.00044	EPA 213.2	7/24/90
Chromium	ND	0.05	0.0017	EPA 218.2	7/27/90
Copper*		--			
Fluoride	ND	4.0	0.1	EPA 340.2	7/25/90
Lead	0.0018	0.05	0.001	EPA 239.2	7/27/90
Mercury	ND	0.002	0.0003	EPA 245.1	7/26/90
Nitrate-N	1.7	10.00	0.1	93MM-79	7/24/90
Nitrite-N*	0.014	--	0.005	EPA 354.1	7/24/90
Selenium	ND	0.01	0.003	EPA 270.2	7/27/90
Silver	ND	0.05	0.02	EPA 200.7	7/26/90
Sodium	7.4	20.00	1.0	EPA 273.1	7/25/90

*not required but recommended **NA = Not Applicable; ND = Not Detected

Laboratory Director Signature and Date Edward Demon 8/6/90

Water suppliers should mail TWO copies of this report to their regional DEP office within 30 days of receipt of results and no later than 10 days after the end of the reporting period.

V

MASSACHUSETTS DEP DIVISION OF WATER SUPPLY
VOLATILE ORGANIC COMPOUND REPORT

PWS ID 1087000 PWS Name EASTHAMPTON WATER DEPT Town EASTHAMPTON, MA.

Sample Location HENDRICK #4
Lab Sample ID 90B08209
Date Collected 7-23-90
Collected By
Month/Year 7/90

Routine ☐
Special ☑ explain below

Lab Name CON-TEST Lab Cert. # MA-100
Sample: Ground ☐ Surface ✓ Active ☐ Inactive ☐
Notes BACK-UP; EMERGENCY USE ONLY

Analyte	Result µg/l	MCL µg/l	Detection Limit µg/l	Analytical Method	Date Analyzed
				EPA 502.2	7/26/90
Benzene	ND	5.0	0.5		
Carbon Tetrachloride	ND	5.0	0.5		
1,1-Dichloroethylene	ND	7.0	0.5		
1,2-Dichloroethane	ND	5.0	0.5		
para-Dichlorobenzene	ND	*75.0	0.5		
Trichloroethylene	9.1	5.0	0.5		
1,1,1-Trichloroethane	ND	200.0	0.5		
Vinyl Chloride	ND	2.0	0.5		
Bromobenzene	ND		0.5		
Bromodichloromethane	ND		0.5		
Bromoform	ND		0.5		
Bromomethane	ND		0.5		
Chlorobenzene	ND		0.5		
Chlorodibromomethane	ND		0.5		
Chloroethane	ND		0.5		
Chloroform	ND		0.5		
Chloromethane	ND		0.5		
o-Chlorotoluene	ND		0.5		
p-Chlorotoluene	ND		0.5		
Dibromomethane	ND		0.5		
m-Dichlorobenzene	ND		0.5		
o-Dichlorobenzene	ND		0.5		
trans-1,2-Dichloroethylene	ND		0.5		
cis-1,2-Dichloroethylene	ND		0.5		
Dichloromethane	ND		0.5		
1,1-Dichloroethane	ND		0.5		
1,1-Dichloropropene	ND		0.5		
1,3-Dichloropropane	ND		0.5		
1,2-Dichloropropane	ND		0.5		
1,3-Dichloropropane	ND		0.5		
2,2-Dichloropropane	ND		0.5		
Ethylbenzene	ND		0.5		

Styrene

con-test
P O BOX 391, EAST LONGMEADOW MASSACHUSETTS 01028 (413) 525-1190

VOLATILES SURROGATE RECOVERY SUMMARY

DATE 7-26-90

MATRIX: AIR _____ WATER ✓ SOIL _____ OTHER _____

LAB I.D. #	601/8010 1-CHLORO-2 FLUOROBENZENE PPB RANGE (10.5-19.7)*	601/8010 1-CHLORO-2 FLUOROBENZENE PERCENT RANGE (70-131)	602/8020 1-CHLORO-2 FLUOROBENZENE PPB RANGE (12.3-17.5)*	602/8020 1-CHLORO-2 FLUOROBENZENE PERCENT RANGE (82-117)
Method Blank	15.0	100	14.7	98
90808209	14.8	99	15.2	101
QC Spike	15.9	106	13.6	91

* = True Value: 15 ppb

ANALYST: James Hannah
DATE: 7-26-90

Q.C. APPROVAL: JFK
DATE: 7-31-90

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P O BOX 591 EAST LONGMEADOW MASSACHUSETTS 01028 413 525 2332

WET CHEMISTRY QA/QC SUMMARY

PARAMETER	Analyst/ Date	Reference Material	True Value	Range	Value Reported	Samples Run With
Alkalinity						
Ammonia						
Chloride						
Chlorine (Total)						
Chlorine (Free)						
Conductivity						
Cyanide						
Fluoride	DMM 7/25/90	WS 328 #17	1.81	1.65-1.94	1.77	90080209
Hardness						
Nitrate	DMM 7/24/90	WS 378 #17	2.19	2.03-2.34	2.10	90080209
Nitrite						
Phenols						
Phosphorus (Total)						
Phosphate (Ortho)						
Sulfate						

Q.C APPROVAL: [signature] DMM

DATE: 7/25/90

con-test®
P O BOX 591, EAST LONGMEADOW, MASSACHUSETTS 01028 (413) 525-1198

August 01, 1990

Town of Easthampton Water Department
29R Northampton Street
Easthampton, MA 01027
Attn: Mr. Tom Newton

Ref: #4 Hendrick Street

Invoice #2046
Date Sampled: 07/23/90
Date Received: 07/23/90
Date Analyzed: 07/24/90 - 07/27/90

Sample Matrix: Drinking Water

Dear Mr. Newton,

The results of analyses requested are listed below:

Lab # / Sample #	LOD	90B08209 (#4)
Silver (mg/l)	0.02	ND
Arsenic (mg/l)	0.0053	ND
Barium (mg/l)	0.02	0.28
Cadmium (mg/l)	0.00044	ND
Chromium (mg/l)	0.0017	ND
Mercury (mg/l)	0.0003	ND
Sodium (mg/l)	1.0	7.4
Lead (mg/l)	0.0010	0.0018
Selenium (mg/l)	0.0030	ND

ND = Not Detected
LOD = Limit of Detection

Analytical Method(s): Atomic Absorption & ICP

con-test®
WATER AND AIR ENGINEERING
P O BOX 591 • EAST LONGMEADOW MASSACHUSETTS 01028 • (413) 525-1198

June 12, 1990

MA Certification #MA100
PWS ID #108700

Invoice #1873
Date Sampled: 06/06/90
Date Received: 06/06/90
Date Analyzed: 06/07/90

Sample Matrix: Water

Town of Easthampton
Water Department
29R Northampton Street
Easthampton, MA 01027
Attn: Mr. Chet Torrez

Dear Mr. Torrez,

The results of analyses requested are listed below:

Lab # Sample # Location	LOD	90B05610 (#4) Hendrick St.	90B05611 (#5) Pines Well
Benzene	0.5	ND	ND
Carbontetrachloride	0.5	ND	ND
1,1-Dichloroethylene	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
para Dichlorobenzene	0.5	ND	ND
Trichloroethlyene	0.5	4.1	6.4
1,1,1, Trichloroethane	0.5	ND	ND
Vinyl Chloride	0.5	ND	ND

LOD = Limit of Detection
ND = Not Detected

Analytical Method(s): CG Purge & Trap, EPA 502.2

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

MAR 2 2 1990

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

WATER SUPPLY ANALYSIS (mg/ per liter)

5/12
3/22/90

Easthampton

COLLECTOR C. Torrey

RECEIVED
APR 0 3 1990
Western Region
Department of Environmental
PROTECTION

E A #087-02G Hendricks St., Well
E B #087-01G 8' GD
E C #087-04G Nonotuck Rd., Well
E D #087-03G Love Feild Well
E E
E F

	A	B	C	D	E	F
PLE NO.	585375	585376	585377	585378		
E OF COLLECTION						
E OF RECEIPT						
BIDITY	0.1	< 0.1	0.1	< 0.1		
IMENT	0	0	0	0		
OR	0	0	0	0		
OR	0	D1	0	0		
	8.0	8.0	8.2	8.0		
KALINITY-TOTAL(CaCO3)	56	62	48	63		
RDNESS(CaCO3)	56	56	59	61		
LCIUM(Ca)	17	17	18	17		
NESIUM(Mg)	3.4	3.5	3.3	4.7		
IUM(Na)	6.7	5.5	4.1	2.1		
TASSIUM (K)	0.7	0.7	1.5	2.7		
ON(Fe)	< 0.04	< 0.04	< 0.04	< 0.04		
NGANESE(Mn)	< 0.03	< 0.03	< 0.03	0.10		
LFATE(SO4)	15	15	15	29		
LORIDE(Cl)	16	14	18	5.0		
EC. COND.(micromhos/cm)	200	201	204	198		
TROGEN(AMMONIA)	0.03	< 0.02	0.03	< 0.02		
GEN(NITRATE)	1.34	0.88	3.0	< 0.02		
ITROGEN(NITRITE)	< 0.002	< 0.002	< 0.002	< 0.002		
OPPER(Cu)	< 0.03	< 0.03	< 0.03	< 0.03		

on-test®
P.O. BOX 591, EAST LONGMEADOW, MASSACHUSETTS 01028, (413) 525-1196

March 28, 1990

MA. Certification #MA100
PWS ID #108700

Invoice #1576
Date Sampled: 03/13/90
Date Received: 03/13/90
Date Analyzed: 03/27/90

Sample Matrix: Water

sthampton Water Department
Northampton Street
sthampton, MA 01027
tn: Mr. Joseph Pipczynski

lear Mr. Pipczynski,

The results of analyses requested are listed below:

Micrograms/liter

Lab #		90B02069	90B02070
Sample #		(#4)	(#5)
Location	LOD	Hendrick St.	Hendrick St. Pines
Benzene	0.5	ND	ND
Carbontetrachloride	0.5	ND	ND
1,1-Dichloroethylene	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
para Dichlorobenzene	0.5	6.3	3.8
Trichloroethylene	0.5	ND	ND
1,1,1-Trichloroethane	0.5	ND	ND
Vinyl Chloride	0.5	ND	ND
Bromobenzene	0.5	ND	ND
Bromodichloromethane	0.5	ND	ND
Bromoform	0.5	ND	ND
Bromomethane	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Chlrodibromomethane	0.5	ND	ND
Chloroethane	0.5	ND	ND
Chloroform	0.5	ND	ND
Chloromethane	0.5	ND	ND
o-Chlorotoluene	0.5	ND	ND
p-Chlorotoluene	0.5	ND	ND
Dibromomethane	0.5	ND	ND
m-Dichlorobenzene	0.5	ND	ND
o-Dichlorobenzene	0.5	ND	ND
Trans 1,2-Dichloroethylene	0.5	ND	ND
cis 1,2-Dichloroethylene	0.5	ND	ND
Dichloromethane	0.5	ND	ND
1,1-Dichloroethane	0.5	ND	
1,1-Dichloropropene			

con-test®
P.O. BOX 591, EAST LONGMEADOW, MASSACHUSETTS 01028 (413) 525-1198

December 21, 1989

East Hampton Water Department
Northampton Street
Easthampton, MA 06424

Invoice #1288
Date Sampled: 11/27/89
Date Received: 11/27/89
Date Analyzed: 12/01/89

Ref: Hendrick Street

Sample Matrix: Water

The results of analyses requested are listed below:

Lab # Sample # Location#	Trichloroethlyene ug/l	LOD ug/l
89B07769 (#5) Pines well	4.9	0.5
89B07770 (#4) Pumping Station	8.1	0.5

Analytical Methods: EPA 502.2

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

Con-test®
P.O. BOX 591, EAST LONGMEADOW, MASSACHUSETTS 01028 (413) 525-1198

June 23, 1989

Job #12999

Easthampton Water Department
1 Northampton Street
Easthampton, MA 06424
Attn: Mr. Ted Bischoff

Dear Mr. Bischoff,

The results of the Water samples received on June 05, 1989 are listed below.

Micrograms/liter

Lab # / Sample # / Location	Detection Limits ug/l	89B03783 (#5) Hendrick St. Pumping Station
Benzene	0.5	ND
Carbontetrachloride	0.5	ND
1, 1, - Dichloroethylene	0.5	ND
1, 2, - Dichloroethane	0.5	ND
para Dichlorobenzene	0.5	6.1
Trichloroethlyene	0.5	ND
1, 1, 1, Trichloroethane	0.5	ND
Vinyl Chloride	0.5	ND
Bromobenzene	0.5	ND
Bromodichloromethane	0.5	ND
Bromoform	0.5	ND
Bromomethane	0.5	ND
Chlorobenzene	0.5	ND
Chlorodibromomethane	0.5	ND
Chloroethane	0.5	ND
Chloroform	0.5	ND
Chloromethane	0.5	ND
o-Chlorotoluene	0.5	ND
p-Chlorotoluene	0.5	ND
Dibromomethane	0.5	ND
m-Dichlorobenzene	0.5	ND
o-Dichlorobenzene	0.5	ND
Trans - 1, 2, Dichloroethylene	0.5	ND
cis - 1, 2, Dichloroethylene	0.5	ND
Dichloromethane	0.5	ND
1, 1 Dichloroethane	0.5	ND
1, 1 Dichloropropene	0.5	ND
1, 3 Dichloropropene	0.5	ND
1, 2 Dichloropropene	0.5	ND
1, 3 Dichloropropane	0.5	ND
2, 2 Dichloropropane	0.5	ND

con-test®
WATER AND AIR ENGINEERING
P O BOX 591 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

June 19, 1990

MA Certification #MA100
PWS ID #108700

Invoice #1923
Date Sampled: 06/18/90
Date Received: 06/18/90
Date Analyzed: 06/18/90

Sample Matrix: Water

n of Easthampton
er Department
Northampton Street
sthampton, MA 01027
tn: Mr. Tom Newton

ear Mr. Newton,

he results of analyses requested are listed below:

Lab # / Sample # / Location	LOD	90B06259 (#4) Hendrick St.	90B06260 (#5) Pines Well
Trichloroethylene	0.5	7.1	3.3

LOD = Limit of Detection
ND = Not Detected

Analytical Method(s): GC Purge & Trap, EPA 502.2

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

con-test®
WATER AND AIR ENGINEERING
P.O. BOX 591 • EAST LONGMEADOW, MASSACHUSETTS 01028 • (413) 525-1198

n of Easthampton Water Department

: #4 Hendrick Street

Invoice #2046
Date Sampled: 07/23/90
Date Received: 07/23/90
Date Analyzed: SEE BELOW

Sample Matrix: Drinking Water

e results of analyses requested are listed below:

p # mple # te Analyzed	LOD	90B08209 (#4)
trite (mg/l) /24/90	0.005	0.014
te (mg/l) /24/90	0.1	1.7
luoride (mg/l) 7/25/90	0.1	ND

D = Not Detected
OD = Limit of Detection

nalytical Method(s): Nitrite: EPA 354.1
Nitrate: Orion Research Method #93MM-79
Fluoride: EPA 340.2

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own of Easthampton Water Department

ef: #4 Hendrick Street

Invoice #2046
Date Sampled: 07/23/90
Date Received: 07/23/90
Date Analyzed 07/26/90

Sample Matrix: Drinking Water

The results of analyses requested are listed below:

Micrograms/liter

Lab # / Sample #	LOD	90B08209 (#4)
Benzene	0.5	ND
Carbon Tetrachloride	0.5	ND
1,1-Dichloroethylene	0.5	ND
1,2-Dichloroethane	0.5	ND
para Dichlorobenzene	0.5	9.1
Trichloroethlyene	0.5	ND
,1 Trichloroethane	0.5	ND
Vinyl Chloride	0.5	ND
Bromobenzene	0.5	ND
Bromodichloromethane	0.5	ND
Bromoform	0.5	ND
Bromomethane	0.5	ND
Chlorobenzene	0.5	ND
Chlorodibromomethane	0.5	ND
Chloroethane	0.5	ND
Chloroform	0.5	ND
Chloromethane	0.5	ND
o-Chlorotoluene	0.5	ND
p-Chlorotoluene	0.5	ND
Dibromomethane	0.5	ND
m-Dichlorobenzene	0.5	ND
O-Dichlorobenzene	0.5	ND
Trans-1,2 Dichloroethylene	0.5	ND
cis-1,2, Dichloroethylene	0.5	ND
Dichloromethane	0.5	ND
1,1 Dichloroethane	0.5	ND
1,1 Dichloropropene	0.5	ND
1,3 Dichloropropene	0.5	ND
1,2 Dichloropropane	0.5	ND
1,3 Dichloropropane	0.5	ND
2,2 Dichloropropane	0.5	ND
Ethylbenzene	0.5	ND
Styrene	0.5	ND
1,1,2 Trichloroethane	0.5	ND
1,1,1,2 Tetrachloroethane	0.5	ND
1,1,2,2 Tetrachloroethane		

con-test®
P O BOX 591, EAST LONGMEADOW, MASSACHUSETTS 01028 (413) 525-1198

'own of Easthampton Water Department

Ref: #4 Hendrick Street

Invoice #2046
Date Sampled: 07/23/90
Date Received: 07/23/90
Date Analyzed 07/26/90

Sample Matrix: Drinking Water

The results of analyses requested are listed below:

Micrograms/liter

Lab # / Sample #	LOD	90B08209 (#4)
Tetrachloroethylene	0.5	ND
1,2,3 Trichloropropane	0.5	ND
Toluene	0.5	ND
p-Xylene	0.5	ND
ylene	0.5	ND
m-Xylene	0.02	ND
Ethylene Dibromide (EDB)	0.02	ND
1,2 Dibromo-3-chloropropane (DBCP)	0.5	ND
Bromochloromethane	0.5	ND
n-Butylbenzene	0.5	ND
Dichlorodifluoromethane	0.5	ND
Fluorotrichloromethane	0.5	ND
Hexachlorobutadiene	0.5	ND
Isopropylbenzene	0.5	ND
p-Isopropyltoluene	0.5	ND
Naphthalene	0.5	ND
n-Propylbenzene	0.5	ND
Sec-butylbenzene	0.5	ND
Tert-butylbenzene	0.5	ND
1,2,3 Trichlorobenzene	0.5	ND
1,2,4 Trichlorobenzene	0.5	ND
1,2,4 Trimethylbenzene	0.5	ND
1,3,5 Trimethylbenzene		

ND = Not Detected
LOD = Limit of Detection

Analytical Method(s): GC Purge & Trap, EPA 502.2, 504

Sincerely,

CON-TEST, Inc.

Edward Denson

Edward Denson
Laboratory Director

APPENDIX C
ESTIMATED HABITATS
NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

NHESP File: 90-369

23 July 1990

Erin Healy
SEA Consultants, inc.
485 Massachusetts Avenue
Cambridge, MA 02139 - 4018

Re: Pumping Station
Hendricks Street
Easthampton, MA

Dear Ms. Healy:

Thank you for contacting the Natural Heritage and Endangered Species Program regarding rare species and ecologically significant natural communities in the vicinity of the above-referenced site as described in your letter of 29 June 1990.

The estimated habitat area you are interested includes recorded sightings of the Marbled Salamander (Ambystoma opacum) and the Wood Turtle (Clemmys insculpta). The Massachusetts Division of Fisheries and Wildlife classifies the Marbled Salamander as a Threatened species; the Wood Turtle is listed as a Special Concern species. Information detailing the habitat and biology of these species may found on the enclosed fact sheets.

Please note that this determination is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should new rare species information become available, this determination may be reconsidered.

Please contact Jay Copeland, Environmental Reviewer, if you have any questions.

Sincerely,

Celina Harshman
Environmental Review Assistant

CH/ch

Massachusetts Natural Heritage Program

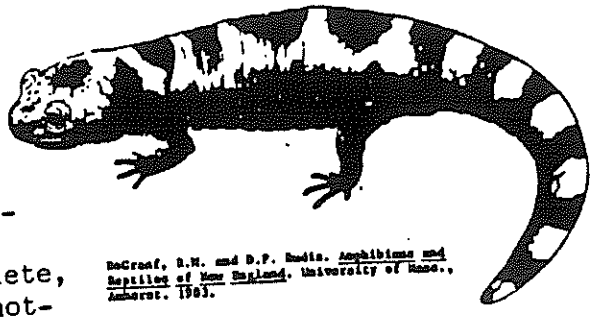
Natural Heritage Program
MA Division of Fisheries and Wildlife
100 Cambridge Street, Boston, MA 02202
(617) 727-9194

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

MARBLED SALAMANDER

Ambystoma opacum

DESCRIPTION



DeGraaf, R.M. and D.F. Rudis. Amphibians and Reptiles of New England. University of Mass., Amherst. 1983.

The Marbled Salamander is a small, stocky salamander with a short tail and short limbs reaching an overall length of 9-11 cm (3.5-4 in.). The background dorsal coloration is dark gray to black. The ventral coloration is uniform dark gray. Bold silver or white markings converge laterally to enclose black spots midway down the back; sometimes, the cross banding is incomplete, forming stripes on the back and sides. Markings are notably brighter and more distinct in males than in females. Recently transformed juveniles average about 4 cm (1.5 in.) in total length and have a dark gray to brown coloration with tiny silver flecks scattered over the dorsal area. As the animal matures these flecks expand to form the characteristic adult pattern.

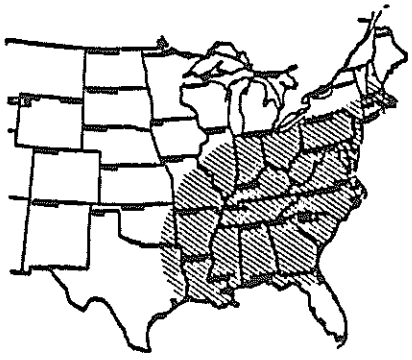
SIMILAR SPECIES IN MASSACHUSETTS

Mature adult Marbled Salamanders are very distinct. Young "Marbled" adults are similar to young adult Spotted and Blue-spotted Salamanders, but are distinguished by their silver rather than gold dorsal flecking.

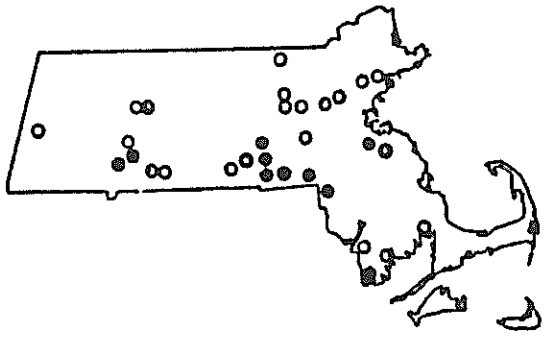
HABITAT IN MASSACHUSETTS

The Marbled Salamander is largely terrestrial, living in woodlands under stones, logs, or other surface debris. They generally occur in deciduous to mixed woods of the southern hardwood type, dominated by oak and hickory species with White Pine. They are known to occur in a variety of habitats including both moist, sandy areas and dry hillsides. They can be found beneath surface materials such as logs, bark, boards, stones and drift piled up along the margins of streams and ponds. Wooded vernal ponds are required for breeding.

(continued overleaf)



Distribution of Ambystoma opacum



● Verified since 1978
○ Reported prior to 1978

Breeding Distribution in Massachusetts by Town

1985

LIFE HISTORY AND ECOLOGY

Unlike most of the other species of Ambystoma which deposit their eggs early in the spring in water; Marbled Salamanders breed and deposit their eggs in the fall on land. During the late summer, adults move during moist nights toward dry vernal ponds and congregate under the leaf litter. Males generally preceed females by a few days.

The eggs are deposited in situations which will insure their being submerged by fall and winter rains, in the beds or near the margins of ponds and streams. Courtship involves circular "dancing" and snout to vent nuzzling. This induces the male to deposit a gelatinous spermatophore on the pond floor which is then picked up by the female, with fertilization occurring internally.

Eggs are spherical and opaque, between 2 and 5 mm in diameter. Numbering between 50 and 230, they are laid in shallow depressions or under leaf litter in dry pond beds, often taking the shape of the cavity they occupy. The female remains nearby guarding the eggs until rains fill the pond.

Time to hatching is variable and dependent on the availability of water. Eggs are capable of withstanding extended desiccation without mortality, and in some cases may overwinter to hatch the following spring. Larvae grow slowly through the winter, but growth accelerates in spring as temperatures increase and food items, such as aquatic invertebrates, become more abundant. The schedule of larval metamorphosis is largely dependent on pond water levels during summer. In years of high water, larvae remain in the pond longer, sometimes until fall, before transforming. In some years, the recently transformed young salamanders are leaving the pond as adults are arriving to breed.

Marbled Salamanders feed on adult and larval insects and crustaceans, earthworms, snails, slugs, beetles, and ants. They are nocturnal and generally less active than other salamander species.

RANGE

The Marbled Salamander ranges from New Hampshire and central Massachusetts south to northern Florida, west through southeastern New York to the region of Lake Michigan and southward through the Mississippi basin to eastern Oklahoma and eastern Texas.

POPULATION STATUS

In Massachusetts, the Marbled Salamander is classified as "Threatened". Since 1978 the species has been reported from 9 sites in the state; records from 24 additional locations were reported prior to 1978. The fact that the Marbled Salamander is near the northern limit of its range in Massachusetts is a contributing factor to its rarity in the state. It has also been impacted by loss of habitat through development and urbanization. Furthermore, the species is difficult to locate and census accurately.

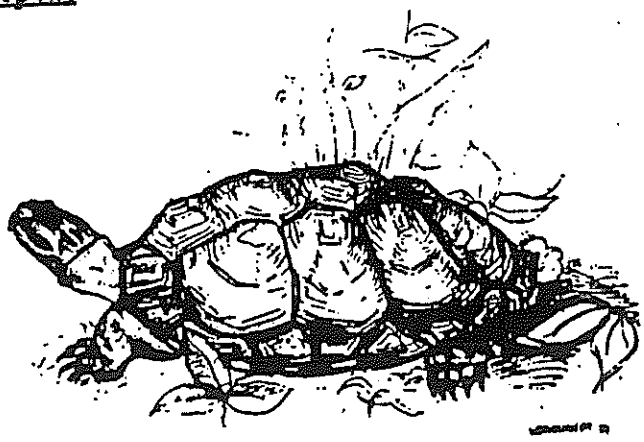
Although the Marbled Salamander is widespread throughout Massachusetts lowlands, populations are very small and localized surrounding breeding pools. For unknown reasons, many vernal ponds do not support them. Acid precipitation and pesticide spraying have also been implicated in the decline of this species. In addition, high mortality can occur in situations where heavily traveled roads pass in close proximity to breeding ponds.

Natural Heritage & Endangered Species Program

Commonwealth of Massachusetts
Division of Fisheries & Wildlife
100 Cambridge Street
Boston, MA 02202
(617) 727-9194

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

Wood Turtle
(Clemmys insculpta)



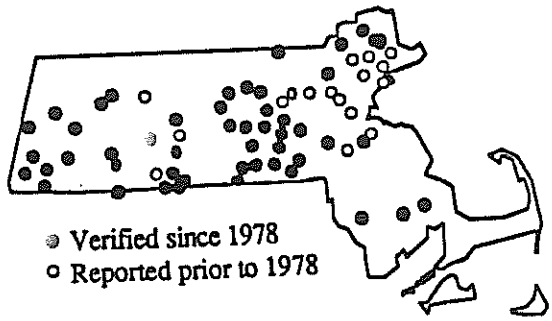
D. Wesselhoeft, 1989

DESCRIPTION: The Wood Turtle is the largest member of its genus, ranging from 14.0 to 22.9 cm (5.8 to 9.0 inches) in length. Each segment of its brown upper shell rises into an irregular pyramidal shape, and is marked with a pattern of concentric ridges and radiating grooves resembling a spider web or growth rings on a tree stump. The turtle's lower shell is yellowish, with black splotches along the sides, one on each segment. The lower shell of a male turtle is concave for mating purposes. The head of a Wood Turtle is black, and the tail and legs are black or brown on the upper surface. The throat and lower surface of the tail and legs may be red, orange, or yellow. Male Wood Turtles are usually larger than the females, and have longer, thicker tails.

SIMILAR SPECIES: The habitat of Eastern Box Turtles and Blanding's Turtles may overlap that of the Wood Turtle, but neither has pyramidal shell segments like the Wood Turtle. The Northern Diamondback Terrapin has a shell similar to that of the Wood Turtle, but it only lives near saltwater, which the Wood Turtle avoids.

(continued overleaf)

Range of Wood Turtle



Massachusetts Distribution by Town

1990

RANGE: The Wood Turtle can be found throughout New England, north to Nova Scotia, west to eastern Minnesota, and south to northern Virginia.

HABITAT IN MASSACHUSETTS: Wood Turtles prefer forested areas next to unpolluted, meandering streams; they can also be found near rivers, bogs, and swamps. In the summer, they may leave their water source and wander long distances into woods, fields, farmland, and roadsides.

BEHAVIOR/ECOLOGY: Wood Turtles are most active by day; they can often be seen basking on a log or muddy streambank. A Wood Turtle basking on land can be very difficult to spot, since it often partially buries itself, concealing its body outline. When leaving water, Wood Turtles almost always throw dirt or sand over their shells with their front feet; hatchlings display this behavior immediately after leaving the nest. They are omnivorous, eating a variety of foods such as clams, carrion, insects, fish, frogs, grass, moss, dandelions, and berries. Wood Turtles sometimes exhibit "stomping behavior": they stomp on the ground with their front feet, creating vibrations in the ground which cause earthworms to rise to the surface; the earthworms are then eaten.

Wood Turtles mate in both spring (late March to May) and autumn (October). Mating usually occurs in the water. From 4 to 12 smooth white eggs, about 3.4 cm (1.4 in.) in length and 2.4 cm (.95 in.) in width, are laid in a nest in May or June. The nest is a depression dug by the female in gravel or sandy soil, which is frequently but not always near water. The eggs usually hatch in August or September, sometimes as late as October.

Adult Wood Turtles often leave their water source during the summer, but always return in autumn, where they mate and then hibernate in communal groups from late autumn to March or April. Muddy banks, stream bottoms, deep pools, decaying forest vegetation, and abandoned muskrat burrows can all serve as hibernation sites. Wood Turtles have long life spans, sometimes exceeding 50 years.

POPULATION STATUS: Wood Turtles are listed as a species of Special Concern in Massachusetts. Population decline of Wood Turtles has been caused by pollution of streams, development of wooded streambanks and extensive commercial collection of specimens. Highway deaths take a heavy toll on adult Wood Turtles; coyotes are also known to prey on adults. Predation of eggs and young by raccoons, skunks, cats, and dogs is also a serious problem.

APPENDIX D
HENDRICK STREET WELLFIELD
PRELIMINARY ASSESSMENT REPORT

Commonwealth of Massachusetts Department of Environmental Quality Engineering

Potential Oil/Hazardous Material Release Site
PRELIMINARY ASSESSMENT REPORT

For DEQE Use Only
Case No. ____
File Name ____
Date Listed ____
Disposition ____

I. PROPERTY NAME AND LOCATION (See Supplementary Instructions)

Property Name [1]: Hendrick Street Wellfield
Address: Hendrick Street, Easthampton, MA

UTM Coordinates [5]
N 4678125 M
E 0693125 M

Latitude/Longitude
42 14 27 N
72 29 35 W

Municipality [2]	Zip Code	USGS Quad(s) [4]
Easthampton	01027	MT. TOM

II. OWNERS/OPERATORS

	Date Acquired	Specific Property Use/Activity [6]
Present Owner: [8] Town of Easthampton Address: Memorial Hall, Easthampton, MA Contact: Joseph I. Pipczinski Tel. 413 527-0793	Before 1908	SIC # 4941 ☐ Active ☐ Inactive
Present Operator: Same as owner Address: Contact: Tel. - -	Before 1908	SIC # ____ ☐ Active ☐ Inactive
Previous Owner: N/A Address: Tel. - -	From/To Dates	SIC # ____
Previous Operator: N/A Address: Tel. - -	From/To Dates	SIC # ____

Additional Owner/Operator Information is: ____ Attached ____ Unknown X Not Pertinent

Site Locus Map Attached [7] ☐

III. GENERAL PROPERTY/AREA INFORMATION

Property/Area Use [9]	Property Present	Property Past	Surrounding Area
Industrial	____	____	____
Commercial	____	____	X
Residential	____	____	X
Agricultural	____	____	X
Undeveloped	X	X	

Check if property is or ever was a known:
____ Refuse/Waste Disposal Area
____ Gasoline (Service) Station
____ Fuel Storage Depot
____ Industrial Manufacturing Facility
____ Check if Property is Planned for Development

IV. REVIEW OF AVAILABLE RECORDS/INFORMATION

Municipal: Date Reviewed 6/6/90 By Kimberly Noake Of S E A Consultants
Information Source(s): Files at Towns of Easthampton, Holyoke and Southampton Telephone: 497-7800
Contact Person(s): (See attached list)

State: [9] Date Reviewed 6/25/90 By Erin Healy Of S E A Consultants
Information Source(s): General Hazardous Waste Files, Spill Incident Files, UST Files Telephone: 497-7800
Contact Person(s):

Owner/Operator: [10] Date Reviewed 7/5/90 By Erin Healy Of S E A Consultants
Information Source(s): Town of Easthampton (See attached list) Telephone:
Contact Person(s): Joseph Pipczynski, Roland Laramee

Other: [11] Date Reviewed 7/3/90 By Erin Healy Of S E A Consultants List
Information Source(s): IEP, Inc. (1988) Report and W.S. Morrs (1990) Report (see Att'd ~~UST~~) Telephone:
Contact Person(s):

Additional Information/Information Sources are attached: ☒ Yes ☐ No.

VI. PRELIMINARY ASSESSMENT SUMMARY/REPORTING MATRIX

Based upon a review and evaluation of available records, information, and field observations, indicate and summarize applicable property conditions. Abbreviations and table headings are explained at the bottom of the page; additional guidance is contained in direction section. **Please note that responses are mandatory in shaded columns.**

SOURCE	Past/Present Existence [15]			Test Data Available [16]			Evidence of OHM Contamination/Release [17]			COMMENTS [18]
	Yes	No	Information Source (f)	Yes	No	Describe (g)	Rec.	Obs.	Test	None	
On-Site (Non-Liquid) Waste Disposal (a)	☐	☒		☐	☐		☐	☐	☐	☐	
Surficial OHM Discharge or Spillage	☐	☒		☐	☐		☐	☐	☐	☐	
Surficial Wastewater Discharge (b)	☐	☒		☐	☐		☐	☐	☐	☐	
Subsurface OHM Discharge (c)	☐	☒		☐	☐		☐	☐	☐	☐	
Subsurface Wastewater Discharge (d)	☐	☒		☐	☐		☐	☐	☐	☐	
Underground Storage Tank(s) - Oil - (e)	☒	☐	Easthampton Fire Dept. Records	☐	☐		☒	☒	☐	☒	Tanks were removed in 1988.
Underground Storage Tank(s) - Haz. Materials -	☐	☒		☐	☐		☐	☐	☐	☐	
Above-Ground Oil/Haz. Material Storage Tank(s)	☒	☐	Field Observation	☐	☐		☐	☒	☐	☒	
Other:	☐	☒		☐	☐		☐	☐	☐	☐	
Unknown Source but Evidence of Contamination	☒	☐		☐	☐	Groundwater analysis indicates TCE contamination	☐	☐	☒	☐	Recent analytical results attached

FOOTNOTES: (a) includes refuse, demolition wastes, sludges, hazardous wastes; (b) includes domestic or industrial sewage, surface impoundments; (c) via dry wells, leach fields, injection wells, etc.; (d) includes domestic or industrial sewage leach fields/pits; (e) note: waste oil is considered a "hazardous material"; (f) records, field observation, etc.; (g) includes tank testing data, geophysical data, analytical data, etc.

ABBREVIATIONS: Rec = Records; Obs = Observations; OHM = Oil or Hazardous Material

ADDITIONAL COMMENTS: [19]

A Phase I Limited Site Investigation is in progress

Property Access: [20] ☐ Restricted ☐ Unrestricted ☒ Partially Restricted

Property Ownership: ☐ Private ☒ Governmental ☐ Military

SURVEY OF AVAILABLE RECORDS/INFORMATION (Continued.)

Based upon records and available information, have petroleum products or hazardous materials been used, treated, stored, or disposed of, on the property?

[X] Yes [ ] No X Petroleum ___ Hazardous Materials

Underground Storage Tanks: [11] Records/Evidence of Present/Former Use. [X] Yes [ ] No

	Gasoline	Fuel Oil	Waste/Other Oil	Hazardous Materials	Unknown
Indicate Number of Tanks:					
Presently On-site	___	0	___	___	___
Removed	___	2	___	___	___
With Capacity 1100 Gallons	___	2	___	___	___
Over 10 Years Old	___	2	___	___	___
Total Number:	___	2	___	___	___

Wastewater: [12]

	Generated?	Composition	Disposal
Present	[ ] Yes [X] No [ ] Unknown	[ ] Sanitary [ ] Industrial	[ ] Municipal Sewer [ ] On-site [ ] Other
Past	[ ] Yes [X] No [ ] Unknown	[ ] Sanitary [ ] Industrial	[ ] Municipal Sewer [ ] On-site [ ] Other

Comments: ~~The drinking water wellfield is currently being pumped to waste.~~ ← delete

Is there currently an on-site water supply well? [X] Yes [ ] No [ ] Unknown. Active? [X] Yes [ ] No

Other existing means for sampling groundwater? [ ] Yes [X] No

Only under Emergency conditions ~~Temporarily out of service~~

Indicate Present or Past Federal/State Environmental Permits/Regulations at the Property.

[ ] N.P.D.E.S. [ ] Groundwater Discharge [ ] R.C.R.A. Generator [ ] R.C.R.A. TSD [ ] Air Quality [X] Other

Comments: State and Federal regulations regarding drinking water supplies

Is/are there any record(s) of Criminal, Civil, or Administrative Actions, at the property due to (alleged) violations of environmental statute or regulation? [X] Yes [ ] No Comments: The site is listed as No. 1-0639 in the DEP list of confirmed sites and locations to be investigated, 1990.

V. PROPERTY RECONNAISSANCE

Property Reconnaissance by Owner/Operator/Consultant [14] (Circle one.)

Date 7/5/90 By Erin Healy/Kosta Exarhoulakos Of S E A Consultants

Evidence of a Release of Oil or Hazardous Materials? [X] Yes [ ] No [ ] Potential

If Yes/Potential, Based upon: [ ] visual [ ] olfactory [X] analytical/screening

Comments: The most current analytical results (attached) from samples collected on May 24, 1990, indicate an average concentration of TCE of 10 ppb.

FOR DEQE USE ONLY:

___ On-site Reconnaissance ___ Off-site Reconnaissance By EPA/DEQE/Contractor: (Circle one.)

Date ___ By ___ Of ___

Evidence of a Release of Oil or Hazardous Materials? [ ] Yes [ ] No [ ] Potential

Comments:

CONCLUSIONS AND CERTIFICATIONS

Based upon all available information and data, pursuant to MGL Chapter 21E, is there evidence that a release of oil or hazardous materials has or is occurring at the property? ☒ Yes ☐ No ☐ Unknown at this time

Do property conditions constitute a threat of release? ☐ Yes ☒ No ☐ Potential

If either of above is "Yes", are immediate site actions necessary to abate an imminent hazard to public health, safety, welfare, or the environment, due to:

____ Proximity to known potable water supplies?	☒ Yes	☐ No
____ Potential for direct human contact and exposure?	☒ Yes	☐ No
____ Potential for fire or explosion?	☐ Yes	☒ No
____ Proximity to fisheries/critical habitats?	☐ Yes	☒ No
____ Other: _____	☐ Yes	☐ No

If a release has been confirmed, are immediate actions necessary to initiate abatement, containment, or recovery actions, in order to avoid a situation where a delay in remedial actions will substantially decrease the efficiency and/or degree of ultimate cleanup? ☒ Yes ☐ No

Have remedial actions already been taken at the site? ☒ Yes ☐ No

NOTE: If immediate actions are needed, or if remedial actions have already been taken at the site, append complete details on nature of problem and proposed/completed site actions.

(Owner) Operator/Private Party (Circle one.)

Name _____

Title _____

Company Town of Easthampton

Date _____

Property Affiliation _____

Professional Environmental Consultant

Name _____

Title _____

Firm S E A Consultants Inc.

Date _____

☐ Additional information attached to Form

Indicate Name(s) of Environmental Assessment Report(s) prepared for Property: IEP Inc. (1988) Report and W.S. Motts (1990) Report (see attached list) and the Phase I - Limited Site Investigation of the Hendrick Street Wellfield (SEA Consultants Inc., 1990)

If Form completed by Private Party and/or Professional Environmental Consultant, please sign:

I hereby certify that the information furnished in and with this Form, to the best of my knowledge, is true, accurate, and complete.

Signature: _____ (Owner/Operator/Private Party)

Signature: _____ (Consultant)

VIII. DISPOSITION OF CASE

FOR DEQE USE ONLY:

Form completed by: PRP/Consultant/DEQE/DEQE Contractor/Other (Circle one.) Date Received: _____

If not compiled by DEQE, is provided information: ☐ Adequate ☐ Insufficient ☐ Inaccurate

Conclusions: ☐ No Evidence of Release ☐ Release Confirmed ☐ Potential Release - Further Investigation Required

Disposition of Case: ☐ No Action ☐ Re-do P.A. ☐ Perform S.I. ☐ Perform IRM ☐ Other

Enforcement Position: ☐ N.A. ☐ Send N.O.R. ☐ N.O.R. sent _____ ☐ Other

Comments: _____

DEQE STAFF: _____ TITLE: _____

SIGNATURE: _____ DATE: _____

APPENDIX E
POTENTIAL OFF-SITE CONTAMINANT SOURCES

APPENDIX E

POTENTIAL OFF-SITE CONTAMINANT SOURCES

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The following is a summary of potential sources located during our investigation. A discussion of the probability of these sources constituting a threat to groundwater at the subject property is included in the main text.

Windshield Survey and Interviews

Barnes Municipal Airport, Westfield

The airport is located approximately 6 miles southwest of the Hendrick Street Wellfield. Although it lies outside the modelled zone of contribution for the wellfield, it is remotely possible that subsurface contamination emanating from the airport could migrate through the aquifer, into the zone of contribution. However, pending review of groundwater studies currently being done at the airport, this site is not currently being considered as a possible TCE source impacting the Hendrick Street Wellfield. Airports are often sources of substantial amounts of waste solvents from engine maintenance, painting and stripping operations. Also, fire drills which involved dumping fuel into open pits and igniting it were conducted at the airport up until the 1960's .

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168 County Road, Southampton

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commercial and public hazardous waste generators. Wastes are received at the facility in 15, 16, 30 and 55 gallon containers; characterized according to the SSE waste analysis plan and then segregated into compatible groups for storage. Waste oil is received in tanker trucks, and following characterization, is stored in four 8,000 gallon tanks. Oil contaminated soils are received in containers or lined trucks, characterized, and stored in either a covered 5 or 20 cubic yard container.

All wastes which are collected from generators and spill clean-up activities are transported to a permitted treatment, recycling, and/or disposal facility. No treatment, reclamation, or disposal of hazardous wastes occurs at the SSE facility which currently operates as a storage site.

Former Site of Southampton Sanitary Engineering Corporation
former Pequot Road Site, Southampton

SSE has been in operation for approximately 20 to 30 years. Prior to the 1970's, SSE was located on Pequot Road. During the 1970's, SSE moved from the Pequot Road location to the present location on County Road. Until the late 1970's to early 1980's, SSE was operating as a septage hauler. SSE collected septage from residential, commercial and industrial subsurface disposal systems, in Southampton and disposed of it in lagoons and/or pits located at their Pequot Road facility.

Septage is a highly concentrated waste with a variable composition. Some common constituents of septage that are potential groundwater contaminants include pathogenic bacteria and viruses, heavy metals, nitrates, sodium, chloride, and volatile organic compounds such as benzene, toluene, 1,1,1-trichloroethane (TCA), 1,1,2-trichloroethane, and trichloroethylene (TCE). Heavy metals and volatile organic compounds are typically found in the waste streams from a variety of commercial and industrial

facilities. In Southampton, subsurface disposal systems were used to dispose of the sanitary sewage from these types of businesses. The presence of heavy metals and volatile organic compounds in septage can also be attributed to the improper disposal of household hazardous waste, and the use of toilet bowl and septic system cleaners.

Lagoons and pits provided a system for the dewatering of septage. They are usually unlined and sited in well-drained, permeable soils. Lagoons and pits provide minimal treatment of septage and, therefore, pose a serious thareat to groundwater quality. The former Pequot Road site of SSE should be investigated as a potential source of TCE contamination.

Rock Valley Patterns, 111 Southampton Road, Holyoke

Rock Valley Patterns is a former cottage industry which operated out of the basement of a home located at 11 Southampton Road, just beyond the intersection of Route 141 and Southampton Road in Holyoke, Massachusetts. The house is located on the banks of the Broad Brook, approximately 100 feet from the brook. The land surrounding the house is frequently flooded by the brook.

Rock Valley Patterns began manufacturing metal and wood patterns for the machine tool industry in the mid-1940's. The business was closed in the early 1980's. At that time, Rock Valley Patterns employed approximately thirty (30) people. According to Connie Baker, member of the Holyoke Conservation Commission who performed several site inspections of the property, drums containing unidentified materials were stored, unprotected, outside the house. The house was served by a septic system.

Machine shops and metal working operations typically perform many different processes which generate grinding sludges and wastewater. Oil is generally used in the machining or stamping process as a lubricant. Most machine shops use degreasing solvents for routine maintenance on machinery and for cleaning metal parts. Trichloroethylene is a typical solvent used for these purposes. Process wastewaters and spent machinery cleanser from the Rock Valley Patterns operations may have been disposed of via the domestic septic system. The cleanser used by Rock Valley Patterns employees to clean parts and machinery likely contained TCE. The former Rock Valley Patterns site should be investigated as a potential source of TCE contamination.

Massachusetts Department of Environmental Protection

Files regarding incidences of contaminant discharge in the towns of Easthampton, Southampton and Holyoke were reviewed at the office of the Massachusetts Department of Environmental Protection (DEP) in Springfield, Massachusetts on June 25, 1990. Unless otherwise noted, the probability of these releases impacting groundwater is low.

Easthampton

Emergency Response Files

90 Strong Street

An unidentified pile of refuse was reported dumped at this property on September 23, 1988. The material was determined to be composed of groundstone and wood chips.

1 Cottage Street

Incidents of oily discharge from the Easthampton Dye, Inc. facility, located on a canal which runs to Mill Pond, were reported in 1988, 1989 and 1990.

Southampton

Emergency Response Files

5 Cook Road

An area 16' by 100' was discovered on October 17, 1989, to be contaminated with a one inch layer of oil. This was thought to be a residue from light road spraying.

Brickyard Road near the Westfield town line

A 30 gallon drum of oil containing 1,1,2,2 Tetrachlorethane and Chloroform was found in a shed during a brush fire on March 10, 1990. According to DEP files, the substance was supposed to be analyzed for pesticides after initial analysis, but no results were in the file. This site is not located within the Zone of Contribution or Secondary Recharge Zone mapped for the Hendrick Street Wellfield. According to the Southampton Fire Chief, Rheal Labrie, there is no business operating on the site and this appears to be an isolated incident of chemicals being stored on the property.

Pleasant Street and Line Road, Johnson Metal Products

During a DEP site inspection in 1983, spills and improper waste storage and disposal were noted. Also, a complaint was filed with DEP on July 31, 1989 that metal parts were painted in open air behind this facility, resulting in soil contamination. The DEP Initial Inspection Report noted that painting was performed on a concrete slab and no residue was apparent on the ground. This case was closed with no further action reported in the file. Because this site is not located within the Zone of Contribution or Secondary Recharge Zone for the Hendrick Street Wellfield, it is not being considered as a potential source which would impact the Barnes Aquifer at Hendrick Street.

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89 Pomeroy Street

Fuel was spilled during a car accident on September 28, 1987.

Line Street

Approximately one-half gallon of transformer fluid was spilled as a result of a car accident on December 19, 1986.

Line Street

Non-PCB oil was spilled during transformer maintenance on May 12, 1986.

Holyoke

General File

178 Rock Valley Road, Babacus Corporation

7,000 cubic yards of demolition material was dumped on the property. No additional hazardous waste was identified on the site based on examination of test pits dug on the site.

Emergency Response

Corner of Southampton and Mountain Roads

During a truck accident, 40 to 75 gallons of diesel were spilled.

Cherry Street Extension, Holyoke Revolver Club

Lead bullets were reportededly shot into a hillside. During an inspection, it was found that the bullets were shot into tires on the hillside.

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A portion of the airport is a National Guard facility and the other section is a Westfield municipal facility. According to George Gifford, Manager of the municipal section, two studies are in progress to assess groundwater and soil quality at the airport. The National Guard is conducting an Installation/Restoration Program with results of groundwater and soil analyses expected in September or October, 1990. The Municipal Airport is performing a Groundwater Management Study to formulate a sampling program for a preliminary groundwater assessment. The results of these studies will be obtained and reviewed if they become available during subsequent phases of this project.

Bob's Auto Salvage, 113 County Road North, Southampton

This site is located approximately 2 miles southwest of the Hendrick Street Wellfield, within the mapped zone of contribution. A site inspection was not performed at the facility; however, junkyards may use solvents for metal parts cleaning, machinery maintenance and degreasing. Based on the area reconnaissance survey performed by S E A, it appears that a tributary of Broad Brook runs through or along the property line of the salvage yard, which could serve as a conduit for transport of discharge from the site to the aquifer. Hydrogeologic mapping of the area suggests that the aquifer is probably unconfined in this area.

Tautznik Excavation 165 Hendrick Street, Easthampton

Heavy equipment related to this excavation business is stored behind a residence located on Hendrick Street. The storage area is on the western bank of Broad Brook, approximately 1500 feet south of the Hendrick Street Wellfield. Solvents are routinely used in vehicle maintenance and may be expected to be stored on this property. Any spills at this site could be transported via Broad Brook to the Barnes Aquifer at the Hendrick Street Wellfield. This site was identified during the area reconnaissance survey and an on-site inspection was not performed. Further investigation into waste generation and disposal at this business is warranted.

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Line Street at Pleasant Street

A 7-gallon PCB spill was reported on July 16, 1990, when a car hit a pole and knocked off a transformer.

159 East Street

Non-PCB containing oil was reported spilled from an oil switch rupture on a capacitor on June 14, 1987.

Line Street near Phelps Street

A spill of transformer coolant was reported on May 23, 1987.

170 County Road

A 20-gallon spill of #2 Fuel oil was reported spilled onto a concrete floor on February 14, 1987.

County Road

Potentially PCB-containing oil was spilled from a transformer when a car struck a pole on October 18, 1983.

Town of Easthampton
Fire Department

According to records at the Easthampton Fire Department, there are no underground storage tanks located on property adjacent to the subject site. As discussed in this report, two underground diesel storage tanks located on the site were removed in 1988 and no contamination was noted during excavation. According to Armand Lapointe, Fire Prevention Officer for the Town of Easthampton, other underground storage tanks in the vicinity of the site are home heating oil tanks on residential property.

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM
PREPARED FOR
THE TOWN OF EASTHAMPTON
HENDRICK STREET WELL FIELD

AUGUST, 1990

Prepared By:
S E A Consultants Inc.
Cambridge, Massachusetts

APPENDIX F
QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

1.0 INTRODUCTION

This Quality Assurance/Quality Control Program has been developed by S E A Consultants Inc. (S E A) in accordance with the Scope of Work approved by the Massachusetts Department of Environmental Protection (DEP) as Phase I of the Remedial Investigation at the Hendrick Street Wellfield in Easthampton, Massachusetts. This program will outline field procedures to be followed in the course of performing tasks outlined within the Scope of Work.

2.0 SUB-CONTRACTORS QUALIFICATIONS

All subcontractors used during the course of this program will be required to meet appropriate minimum qualifications as established by S E A. At a minimum, laboratories performing sample analysis will be certified by the Commonwealth of Massachusetts, and well drilling contractors will be state licensed.

3.0 MONITORING WELL INSTALLATION

Monitoring wells will be installed at locations specified by S E A and approved by the Town of Easthampton and the DEP. Well depths will be determined based on the well location, site specific hydrogeology and the intent in placing the well.

3.1 Decontamination Procedures

Well casing and screens will be steamcleaned before installation. Rinse water will be collected per Section 12.0 below.

3.2 Well Installation Method

Monitoring wells will be installed in boreholes advanced by the drive-and-wash casing method. The drive-and-wash technique involves advancing a steel casing through the overburden using a 300 pound weight falling approximately 24-inches, with blow counts being recorded. Once the casing has been advanced to the required depth of sampling, the bore hole will be cleaned of sand with a washing bit. Water used during the washing operation will be supplied and brought to the site by the driller as described in Section 3.5, below. Soil samples can then be obtained using the split spoon sampler. Wells will have 2 to 3 feet of PVC riser extending above existing land surface, surrounded by a steel protector pipe. All wells will be capped and the protector pipe secured with a lock.

Given the area hydrogeology, monitoring wells may be installed into either a confined or unconfined aquifer (or both), depending on well location. A confined aquifer system will be determined by the on-site geologist or engineer based on the presence of a clay/silt confining layer identified from split spoon samples. Split spoon samples will be collected at 5 foot intervals, or at changes in stratigraphy where warranted. Sampling procedures will be discussed below.

To prevent cross contamination during well installation into a confined aquifer, a 4-inch casing will be installed and grouted through the upper aquifer and partially into the confining layer. The lower aquifer will then be penetrated with a 3-inch casing, and a 2-inch PVC riser and screen will be installed in the borehole.

If a well is being placed into an unconfined aquifer, a 3 or 4-inch casing will be advanced to the desired depth of the well and a 2-inch PVC riser and screen placed within the borehole.

3.3 Refusal

Refusal is defined as being a rate of advance of the standard split spoon sampler of less than 12 inches per 120 blows or 1 inch per 100 blows, when driven with at least a 140 pound weight free-falling 30 inches. When refusal is encountered, drilling will be halted and the well completed at a depth determined by SEA in the field. A 10-foot core will be obtained using a diamond bit core barrel at the depth of refusal when it is 20 feet or more above the expected bedrock surface.

3.4 Drill Cuttings

Drill cuttings will be screened for VOCs using a Photoionization Detector (PID). If VOCs are detected above background levels, cuttings will be stockpiled on an impervious surface and a composite sample will be collected and submitted for analysis by EPA Method 8240. If the material may be classified as hazardous waste, appropriate disposal in accordance with Federal and State laws and regulations will be evaluated and implemented.

3.5 Source Water

Only water of drinking water quality, preferably from the Maloney Wellfield in Easthampton, can be used for well installation. Source water will be sampled and submitted for laboratory analysis for VOCs by EPA Method 500 series and TPH. A sample will also be collected from the first buffalo tank of water used by the drillers and analyzed for the same parameters with a 24 hour turn-around time. Additionally, source water will be collected and analyzed if the source water is changed, equipment is changed, or, minimally, once per week.

3.6 Well Development

Following well installation, the well will be developed by pumping and surging until groundwater discharge is free of suspended sediment. The pump used will be an air lift pump using filtered air.

3.7 Waste Water Disposal

Wastewater from well drilling, and well development will be disposed of on site. Decontamination wastewater will be disposed according to Section 12.0 below.

4.0 WELL SPECIFICATIONS

Well depths will be determined by S E A based on site specific stratigraphy and hydrogeology.

4.1 Screening

Wells will be screened with 20 feet of 10-slot, pre-slotted, flush joint PVC. The interval to be screened will be determined by S E A based on stratigraphy at the well location.

The annular space between the screen and the borehole wall will be filled with Ottawa Silica Sand extending to at least one foot above and one foot below the screened interval. Five feet of bentonite slurry will be placed in the annular space between the riser and the borehole above the silica sand pack, as an impermeable seal.

Backfill will be placed above the impermeable seal, extending to a height of within 2 feet of the existing ground surface. Natural material excavated during well construction and installation will be used as backfill if screening with the PID does not indicate VOCs. Backfill may not contain debris, pieces of pavement, organic matter, top soil, peat or clay, rock material greater than 1 inch in largest dimensions, rock material extremely angular in texture, or any material which in the opinion of the Engineer, shall be disruptive to the proper operation of the observation well. Backfill material shall be installed by shoveling material into the borehole. If excavated material is deemed unsuitable for use as backfill material, transported

backfill consistent with the stated criteria and approved by S E A will be used.

5.0 WELL LOGS

A well log report form and monitoring well cross section schematic (Attachments A and B) will be completed by S E A for each well installed. The boring logs will include annotations of odor and visual observations.

6.0 SOIL SAMPLING

6.1 Split Spoon Sampling Procedure

At 5-foot intervals during well installation, a soil sample will be taken according to ASTM D-1586 - Standard Penetration using a split spoon sampler of stainless steel construction. Not less than 1- 3/8 inch diameter samples shall be obtained by driving the sampler by means of a 140 pound weight falling 30 inches beginning at a depth which is equal to the bottom of the casing previously advanced. A record will be kept of the number of blows required to drive the sampler into the soil for each six inches of penetration.

6.2 Decontamination Procedures

Between samples, the split spoon will be cleaned by the following procedure:

1. Rinse with distilled water;
2. Rinse with methanol (pesticide grade); and
3. Rinse with distilled water.

Rinse water will be disposed of according to Section 12.0 below.

6.3 Soil Screening Procedure

The on-site engineer/geologist will perform field screening of split-spoon soil samples for volatile organics by jar headspace analysis using a portable Photovac 10S50 gas chromatograph (GC). Jar headspace field screening procedures are outlined in Attachment C. The library memory of the GC will be calibrated for TCE as well as other potential contaminants for direct reading of contaminant concentrations.

At least one soil sample will be collected from each boring and submitted to a DEP certified laboratory to validate the field screening results.

- If no soil contamination is detected during VOC screening of split spoon samples, a single soil sample will be collected at the depth of the well screen. This sample will be submitted for VOC analysis by EPA Method 8240 and for TPH by IR.

- If VOCs are detected during screening of soil samples, up to five samples will be collected from the boring and submitted for laboratory analysis for VOCs (method 8240). Where applicable, the five VOC soil samples will be collected from the following zones, as delineated by GC screening:

  a) where no contamination is detected by GC screening, just above the detected zone of contamination;
  b) at a depth where contamination is first identified;
  c) the zone of maximum contamination (this sample will also be submitted for analysis TPH by IR);
  d) the lower end of contamination; and
  e) outside (below) the zone of contamination;

7.0 GROUNDWATER SAMPLING

7.1 Decontamination Procedures

All equipment will be cleaned before being brought to the field by the following procedure:

1. Rinsed with tap water;
2. Cleaned with alconox soap and distilled water mixture, using a brush when necessary;
3. Rinsed with distilled water;
4. Rinsed with pesticide grade methanol; and
5. Rinsed with distilled water.

Following decontamination, bailers will be wrapped in aluminum foil. Bailers will be dedicated to specific wells and will not be cleaned in the field. Equipment used to measure field parameters should be cleaned between sample points by rinsing with pesticide grade methanol followed by a distilled water rinse. Decontamination rinse water will be disposed of according to Section 12 below.

7.2 Water Level Measurements

Prior to well purging or sampling, the depth to water from the top of the well casing will be measured using an electronic probe. Measurements will be recorded to 0.01 foot. The probe should be rinsed with pesticide grade methanol followed by a rinse with distilled water between sample points.

7.3 Well Purging

Prior to sampling or performing field analyses, all wells will be purged by extracting 3 to 5 well volumes of water. This is done to remove stagnant casing water so that a representative sample is

obtained.

Monitoring Wells

When purging monitoring wells, the volume of water to be removed can be calculated by the following:

1 gallon for each 6.13 feet of water in a 2-inch diameter well

Wells will be purged using a pump or by bailing, and efforts will be made to avoid pumping a well dry. Tubing which comes in contact with formation water will be of teflon or high density polyethylene construction and dedicated to each well.

Flowing Artesian

In the case of a flowing artesian well, 3 well volumes will be allowed to discharge from the well by permitting it to flow for a period of time calculated from the full pipe formula.

Gravel Packed Wells

A gravel packed well will be allowed to free flow from its tap for a period of 5 minutes. After discharging 3 volumes from the line, sample bottles will be filled.

7.4 Field Analyses

1. Temperature, specific conductance and pH will be measured in-situ at all wells after purging. Measurements for specific conductance will be temperature compensated to 25°C.

2. Equipment used for field analyses will be calibrated prior to each day of use, at a minimum. Calibration kits will be brought to the field and used as necessary.

3. Samples will be collected exclusively for field analysis and will not be submitted for laboratory analysis.

4. Probes used to measure field parameters will be rinsed with methanol followed by a distilled water rinse between each sample point.

7.5 Obtaining Groundwater Samples

Monitoring Wells and Non-Flowing Artesian Wells

Groundwater samples will be obtained using bottom draft, teflon bailers attached to a teflon coated wire or cord. A bailer will be dedicated to each well. The bailer will be lowered to the screen depth to obtain the groundwater sample.

Flowing Artesian Wells

To obtain samples from a flowing artesian well, a well cap fitted to accept a dedicated piece of tubing (high density polyethylene or teflon) will be used to fill sample bottles.

Gravel Packed Wells

Sample bottles will be filled directly from the tap of a gravel packed well discharge pipe.

Before collecting a sample, the bottle will be rinsed once with water from the body to be sampled. The sample can then be transferred directly into the pre-preserved container or 40 ml vial.

9.0 SAMPLE CONTAINERS AND PRESERVATION

Water samples will be placed in appropriate containers per Attachment D. Sample containers cleaned according to accepted methods will be obtained from a laboratory.

Samples for Volatile Organic Compound (VOC) analysis should be collected as to avoid entrapment of air in the container. A 40 ml vial with teflon septum is used to collect VOC samples. After filling, the vial should be inverted and tapped to discern whether air bubbles are entrapped within the sample. If air is entrapped, the sample will be discarded and a new sample taken.

Preservatives for samples collected for specific analyses are listed in Attachment D. If preservatives are necessary, they will be put into sample bottles by the laboratory, with the bottles marked accordingly by the laboratory. All samples will be maintained at 40°C until delivery to the laboratory.

10.0 LABELING

Indelible ink pens and waterproof labels will be used to label all sample containers. At a minimum the information listed below shall appear on each label:

1. Project name
2. Sample point designation
3. Date
4. Time

5. Name of person collecting sample
6. Analyses to be performed

11.0 CHAIN OF CUSTODY PROCEDURES

Adherence to Chain of Custody procedures is required for all sampling events. A sample is considered to be under a person's custody if it is in a person's physical possession, in view of the person after taking possession, and secured by that person so that no one can tamper with it, or secured by that person in an area that is restricted to authorized personnel.

11.1 Custody Considerations

1. As few individuals as possible will handle each sample to reduce the possibility of error, confusion and/or damage.

2. Only the number of samples necessary for the study will be collected.

3. Samples will be identified as necessary with waterproof ink to prevent illegibility.

11.2 Chain of Custody Record

To establish documentation necessary to trace sample possession from time of collection, a chain of custody record shall be completed and accompany all samples. An example of the chain of custody record to be used is included in Attachment E.

When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the chain of custody record. This record documents transfer of custody of samples from the sampler to another person, or to the laboratory and shall accompany all samples. Sample transfers shall be refused unless

accompanied by the appropriate Chain of Custody record.

12.0 PROCESS WATER COLLECTION AND DISPOSAL

Waste process water will be generated from casing, screen and sample equipment decontamination. All wastewater will be collected in 55 gallon drums. A composite sample from each drum will be screened for volatiles using a portable Gas Chromatograph.

If less than 5 ppb VOCs are detected, wastewater can be disposed of on-site. If more than 5 ppb VOCs are detected, a sample will be obtained from the drum and submitted for laboratory analysis for disposal purposes. The water will be transported off-site for disposal, the disposal method being determined based on analytical results.

13.0 DOCUMENT CONTROL

13.1 Log (Field) Book

Field notes will be kept in bound log books and written in indelible ink. The log book will be used to record a permanent record of all field activities. Information recorded in the log book includes, but is not limited to, the following:

1. Date
2. Weather
3. Individuals on site during field operations
4. Sample location
5. Field analysis calibrations and results
6. Sampling information and observations
   - sample interval
   - water levels
   - odor
   - visual observations (i.e. sheen, suspended sediment, etc.)

ATTACHMENT 3

JAR HEADSPACE ANALYTICAL SCREENING PROCEDURE

The following are recommend procedures for conducting analytical screening of Volatile Organic Compound (VOC)-contaminated soils utilizing a portable Photoionization Detector (PID) or Flame Ionization Detector (FID):

(1) Half-fill two clean glass jars with the sample to be analyzed. Quickly cover each open top with one or two sheets of clean aluminum foil and subsequently apply screw caps to tightly seal the jars. Sixteen ounce (16 oz.) (approx. 500 ml) soil or "mason" type jars are preferred; jars less than 8 oz. (Approx. 250 ml) total capacity may not be used.

(2) Allow headspace development for at least 10 minutes. Vigorously shake jars for 15 seconds both at the beginning and end of the headspace development period. Where ambient temperatures are below $32^{o}F$ ($0^{o}C$), headspace development should be within a heated vehicle or building.

(3) Subsequent to headspace development, remove screw lid and expose foil seal. Quickly puncture foil seal with instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulates.

As an alternative, syringe withdrawal of a headspace sample with subsequent injection to instrument probe or septum-fitted inlet is acceptable contingent upon verification of methodology accuracy using a test gas standard.

ATTACHMENT 2C

JAR HEADSPACE ANALYTICAL SCREENING PROCEDURE

The following are recommend procedures for conducting analytical screening of gasoline-contaminated soils utilizing a portable Photoionization Detector (PID) or Flame Ionization Detector (FID):

(1) Half-fill two clean glass jars with the sample to be analyzed. Quickly cover each open top with one or two sheets of clean aluminum foil and subsequently apply screw caps to tightly seal the jars. Sixteen ounce (16 oz.) (approx. 500 ml) soil or "mason" type jars are preferred; jars less than 8 oz. (Approx. 250 ml) total capacity may not be used.

(2) Allow headspace development for at least 10 minutes. Vigorously shake jars for 15 seconds both at the beginning and end of the headspace development period. Where ambient temperatures are below $32^{\circ}F$ ($0^{\circ}C$), headspace development should be within a heated vehicle or building.

(3) Subsequent to headspace development, remove screw lid and expose foil seal. Quickly puncture foil seal with instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulates.

As an alternative, syringe withdrawal of a headspace sample with subsequent injection to instrument probe or septum-fitted inlet is acceptable contingent upon verification of methodology accuracy using a test gas standard.

Project _____

Boring No. _____
Sheet _____ of _____
Ref. No. _____

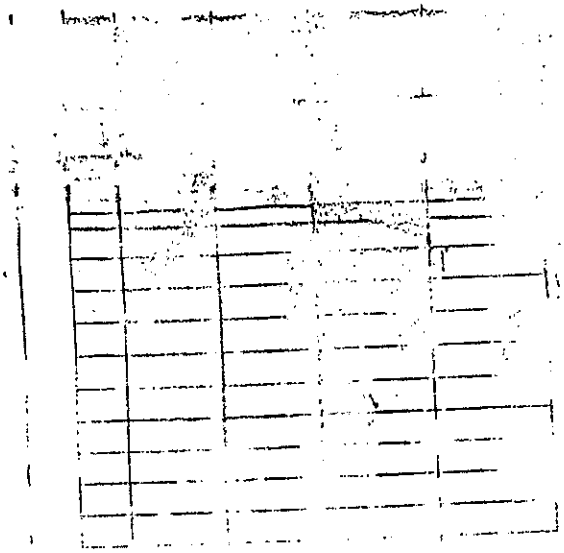
SEA Consultants Inc.
Engineers/Architects

Contractor _____
Engineer/Geologist _____
Casing Size _____
Sampler _____

Boring Location _____
Ground Surface Elevation _____

Water Level _____
Time _____ Casing at _____

Depth (ft)	Casing (B/ft)	Sample No.	Sample Pen. (in.) / Rec.	Sample Depth (ft)	Sample Blows/ 6"	Sample Description	Remarks	Stratum Description



ATTACHMENT B

MONITORING WELL CROSS SECTION SCHEMATIC

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

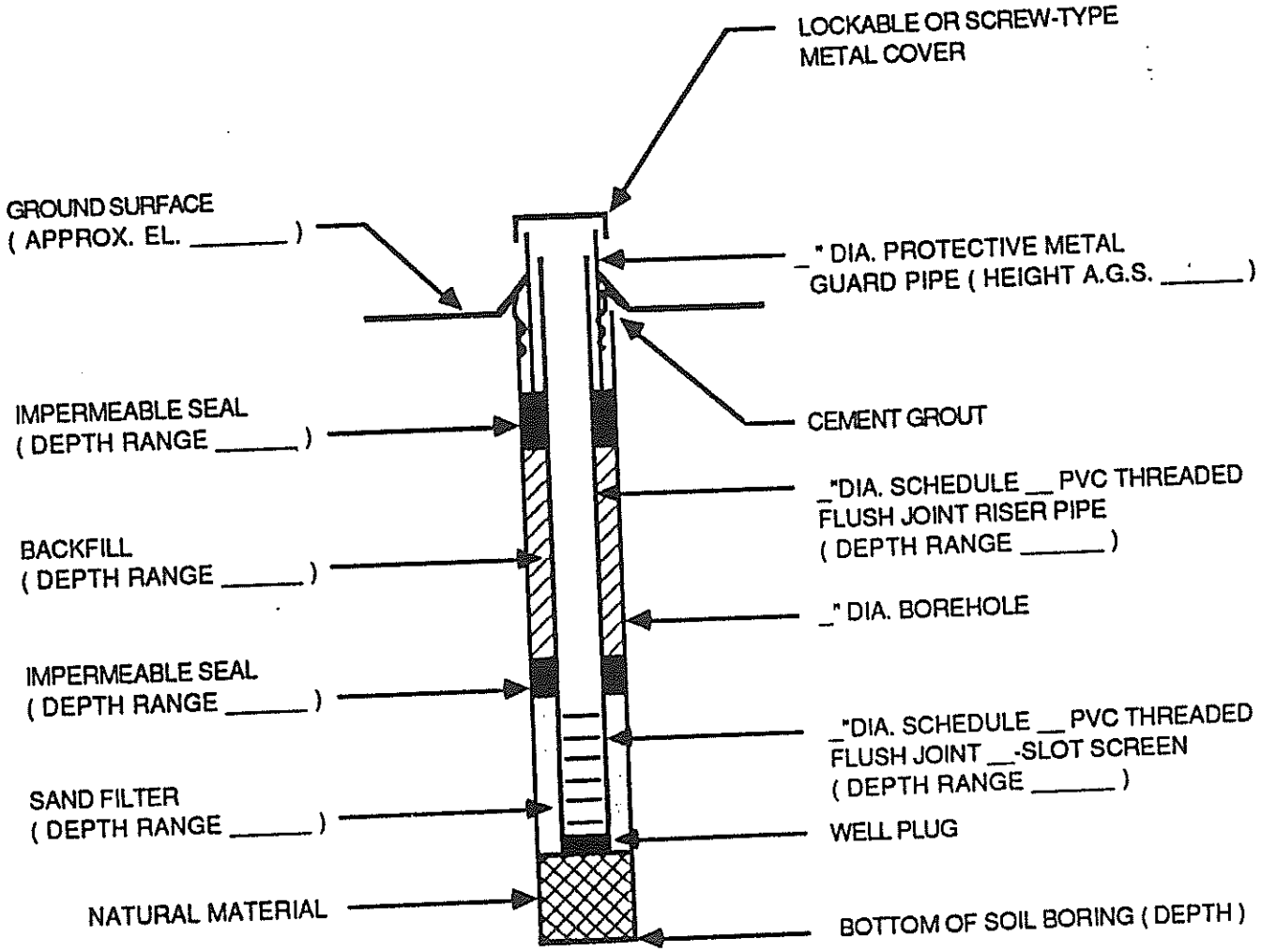
DRILLING CONTRACTOR: _____
FOREMAN: _____
METHOD: _____

SEA GEOLOGIST/ENGINEER: _____

GROUNDWATER LEVEL:
DATE: _____
TIME: _____
FEET: _____
METHOD: _____
DATUM: _____

MONITORING WELL NO. _____
JOB NO: _____ CLIENT: _____
LOCATION: _____
DATE:
START: _____ FINISH: _____

SOIL SAMPLES TAKEN:
YES _____ NO _____
EQUIPMENT CLEANING:
YES _____ NO _____
METHOD: _____
MATERIAL TO FACILITATE DRILLING:
YES _____ NO _____
TYPE: _____



MONITORING WELL CROSS SECTION SCHEMATIC

ATTACHMENT C

JAR HEADSPACE ANALYTICAL SCREENING PROCEDURE

method, maximum [illegible]
seconds. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture in which case headspace data should be discounted.

(5) The headspace screening data from both jar samples should be recorded and compared; generally, replicate values should be consistent to plus or minus 20%.

(6) PID and FID field instruments shall be operated and calibrated to yield "total organic vapors" in ppm (v/v) as benzene. PID instruments must be operated with a 10.0 eV (+/-) lamp source. Operation, maintenance, and calibration shall be performed in accordance with the manufacturer's specifications. For jar headspace analysis, instrument calibration shall be checked/adjusted no less than once every 10 analysis, or daily whichever is greater.

(7) Instrumentation with digital (LED/LCD) displays may not be able to discern maximum headspace response unless equipped with a "maximum hold" feature or strip-chart recorder.

RECOMMENDED SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Parameter or Analysis	Container[a]	Preservation	Maximum Holding Time
Bacterial Tests:			
Coliform, fecal and total	P, G	Cool, 4°C, [b]	6 hours
Fecal streptococci	P, G	Cool, 4°C, [b]	6 hours
Inorganic Tests:			
Acidity	P, G	Cool, 4°C	14 days
Alkalinity	P, G	Cool, 4°C	14 days
Ammonia	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Biochemical oxygen demand	P, G	Cool, 4°C	48 hours
Biochemical oxygen demand, carbonaceous	P, G	Cool, 4°C	48 hours
Bromide	P, G	None required	28 days
Chemical oxygen demand	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Chloride	P, G	None required	28 days
Chloride, total residual	P, G	None required	Analyze immediately
Color	P, G	Cool, 4°C	48 hours
Cyanide, total and amenable to chlorination	P, G	Cool, 4°C, NaOH to pH>12, 0.6 g ascorbic acid	14 days
Fluoride	P	None required	28 days
Hardness	P, G	HNO_3 to pH<2, H_2SO_4 to pH<2	6 months
Hydrogen ion (pH)	P, G	None required	Analyze immediately
Kjeldahl and organic nitrogen	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Metals:			
Chromium VI	P, G	Cool, 4°C	24 hours
Mercury	P, G	HNO_3 to pH<2	28 days
Metals, except chromium VI and mercury	P, G	HNO_3 to pH<2	6 months
Nitrate	P, G	Cool, 4°C	48 hours
Nitrate-nitrite	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Nitrite	P, G	Cool, 4°C	48 hours
Oil and grease	G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Organic carbon	P, G	Cool, 4°C, HCl or H_2SO_4 to pH<2	28 days
Orthophosphate	P, G	Filter immediately, cool, 4°C	48 hours
Oxygen, Dissolved Probe	G Bottle and top	None required	Analyze immediately
Winkler	do	Fix on site and store in dark	8 hours

RECOMMENDED SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES (CONTINUED)

Parameter or Analysis	Container[a]	Preservation	Maximum Holding Time
Phenols	G only	Cool, 4°C, H_2SO_4 to pH<2	28 days
Phosphorus (elemental)	G	Cool, 4°C	48 hours
Phosphorus, total	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Residue, total	P, G	Cool, 4°C	7 days
Residue, Filterable	P, G	Cool, 4°C	7 days
Residue, Nonfilterable (TSS)	P, G	Cool, 4°C	7 days
Residue, Settleable	P, G	Cool, 4°C	48 hours
Residue, Volatile	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days
Specific conductance	P, G	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C, add zinc acetate plus sodium hydroxide to pH>9	7 days
Sulfite	P, G	None required	Analyze immediately
Surfactants	P, G	Cool, 4°C	48 hours
Temperature	P, G	None required	Analyze
Turbidity	P, G	Cool, 4°C	48 hours
Organic Tests:			
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4°C, [b]	14 days
Purgeable aromatic hydrocarbons	G, Teflon-lined septum	Cool, 4°C, [b c]	14 days
Acrolein and acrylonitrile	G, Teflon-lined septum	Cool, 4°C, [b d]	14 days
Phenols	G, Teflon-lined cap	Cool, 4°C [b]	7 days until extraction, 40 days after extraction
Benzidines	G, Teflon-lined cap	Cool, 4°C [b]	7 days until extraction
Phthalate esters	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitrosamines	G, Teflon-lined cap	Cool, 4°C, store in dark[b]	40 days after extraction
PCBs, acrylonitrile	G, Teflon-lined cap	Cool, 4°C	40 days after extraction
Nitroaromatics and isophorone	G, Teflon-lined cap	Cool, 4°C, store in dark[b]	40 days after extraction
Polynuclear aromatic hydrocarbons	G, Teflon-lined cap	Cool, 4°C, store in dark[b]	40 days after extraction
Haloethers	G, Teflon-lined cap	Cool, 4°C [b]	40 days after extraction

RECOMMENDED SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES (CONTINUED)

Parameter or Analysis	Container[a]	Preservation	Maximum Holding Time
Chlorinated hydrocarbons	G, Teflon-lined cap	Cool, 4°C	40 days after extraction
TCDD	G, Teflon-lined cap	Cool, 4°C [b]	40 days after extraction
Total organic halogens	G, Teflon-lined cap	Cool, 4°C, H_2SO_4 to pH<2	7 days
Pesticides Tests:			
Pesticides	G, Teflon-lined cap	Cool, 4°C, pH 5-9	40 days after extraction
Radiological Tests:			
Alpha, beta and radium	P, G	HNO_3 to pH<2	6 months

[a] Polyethylene (P) or Glass (G)

[b] If sample contains chlorine residual, add 0.008% sodium thiosulfate

[c] May necessitate preservation with mercuric chloride

[d] May necessitate pH adjustment of 4 to 5

ATTACHMENT E

CHAIN OF CUSTODY RECORD FORM

CHAIN OF CUSTODY RECORD

SEA Consultants Inc.
Engineers/ Architects
Cambridge, MA S. Portland, ME Wethersfield, CT.

Project: _____ Location: _____
Client: _____ Project No: _____

SAMPLE IDENTIFICATION AND ANALYSIS

SEA Sample I.D. No.	Lab. I.D. No.	No. of Containers	Sample Location	Sample Type	Date	Time	Analysis Required

COMMENTS:

CHAIN OF CUSTODY CHRONICLE :

COLLECTED BY:

1 NAME: _____ COMPANY: _____
SIGNATURE: _____ DATE: _____ TIME: _____

CUSTODY TRANSFERRED TO:

2 NAME: _____ COMPANY: _____
SIGNATURE: _____ DATE: _____ TIME: _____

CUSTODY TRANSFERRED TO:

3 NAME: _____ COMPANY: _____
SIGNATURE: _____ DATE: _____ TIME: _____

RECIEVED IN LABORATORY BY:

4 NAME: _____ COMPANY: _____
SIGNATURE: _____ DATE: _____ TIME: _____

NOTE: Original remains with sample containers

Information Sources

Files Reviewed

Massachusetts DEP Locations to be Investigated
Updated to March 22, 1990

Massachusetts DEP Files at the Springfield office:

Easthampton:

- General Hazardous Waste File
- Emergency Response File
- Underground Storage Tank Files
- Oil Spills File

Southampton:

- General Hazardous Waste File
- Emergency Response File

Holyoke:

- General Hazardous Waste File
- Emergency Response File
- Underground Storage Tank File

Files pertaining to sites listed in the DEP LTBI within the zone of contribution for the Hendrick Street Wellfield.

Easthampton Fire Department
Underground Storage Tank Files

Persons Interviewed

Hazel Young
Southampton Conservation Commission

Ernest J. Mathieu
Director of Health
Holyoke Board of Health

Joe Ciak
Health Inspector
Easthampton

Stuart Beckly
Town Planner
Easthampton

Information Sources (Continued)

Persons Interviewed

Joseph Slattery
Superintendent
Southampton Water Department

Rheal Labrie
Chief
Southampton Fire Department

George Gifford
Manager
Barnes Municipal Airport, Westfield

Leonard Phelan
Superintendent
Westfield Water Department

David Goodwin
Project Manager
Resource Mapping/Land Information System
University of Massachusetts, Amherst

Connie Baker
Holyoke Conservation Commission

Charles J. Kaniecki
Southampton Board of Health

Information Sources

Persons Interviewed

Joseph Pipczynski
Superintendent
Easthampton Department of Public Works

Thomas Newton
Supervisor
Easthampton Utilities, Department of Public Works

Roland Laramee, P.E.
Town Engineer
Town of Easthampton

Robert Plantier
Chief
Easthampton Fire Department

Armand Lapointe
Fire Prevention Officer
Easthampton Fire Department

Butch Seidel
Chemist
Holyoke Water Department

Mr. Raymond Higgins
Inventory Coordinator
Holyoke Water Department

SITE SPECIFIC HEALTH AND SAFETY PLAN
HENDRICK STREET WELLFIELD
TOWN OF EASTHAMPTON, MASSACHUSETTS

MAY 1990

UPDATED AUGUST 1990

S E A CONSULTANTS INC.
Engineers/Architects
Cambridge, Massachusetts
Glastonbury, Connecticut
Londonderry, New Hampshire

APPENDIX G
SITE SPECIFIC HEALTH AND SAFETY PLAN

SITE SPECIFIC HEALTH AND SAFETY PLAN
HENDRICK STREET WELLFIELD
TOWN OF EASTHAMPTON, MASSACHUSETTS

Background

Trichloroethylene (TCE) was initially detected in public drinking water wells on Hendrick Street in Easthampton, Massachusetts, in October 1984. Since that time, the concentration of TCE has gradually increased to a point where in February, 1988, the Massachusetts Department of Environmental Protection (DEP) required periodic sampling and analysis of the water from the wells. The average concentration of TCE for the calendar year 1988 was 8.0 micrograms per liter (ug/L). The average concentration of TCE in 10 groundwater samples collected from the wellfield on May 24, 1990, was 10^0 ug/L. These concentrations are greater than the DEP Maximum Contaminant Level (MCL) of 5.0 ppb allowed in drinking water.

S E A Consultants Inc. (S E A) has been contracted by the Town of Easthampton to perform an investigation of the potential sources and extent of volatile organic compound (VOC) contamination of the Hendrick Street Wellfield and to determine the feasibility of treatment.

Area of Study

Existing Wells

The Hendrick Street Wellfield is a tubular wellfield, comprised of 106 wellheads, over an area of approximately 1-1/2 acres. Adjacent to the Hendrick Street Wellfield is the Pines Well pumping station (off Hendrick Street) which is an 8-inch gravel-packed well providing potable water to residents of Easthampton. Within 1.5 miles of the Hendrick Street and Pines Street wells, a groundwater monitoring

well (designated 1-87) is located on Plain Street. The attached Site Plan shows the relative locations of the existing wells to be sampled.

Proposed Wells

Additional groundwater monitoring wells will be installed in the Easthampton/Holyoke/Southampton area at locations designated by S E A. A total of 16 groundwater monitoring wells are proposed to be installed and sampled to determine the extent and degree of TCE contamination. The locations of these wells will be determined based on area hydrogeology and locations of possible sources of TCE.

Scope of Services

S E A Consultants Inc. has been retained by the Town of Easthampton to investigate the extent of VOC contamination at the Hendrick Street Wellfield. The on-site tasks required by the investigation include:

- groundwater sampling of existing wells for VOCs, total petroleum hydrocarbons (TPH), and radionuclides
- installation and sampling of additional monitoring wells
- soil sampling by split spoon method during well installation
- field screening of soil samples for VOCs using a portable gas chromotograph (GC)
- measurement of piezometric surfaces to establish relative water table elevations

Groundwater Monitoring

Existing Wells

The scope of work includes the collection of water samples from 10 of the 106 wellpoints in the Hendrick Street wellfield (A-3, A-13, A-14, B-9, W-10, C01, C-6, E-6, G-1, and G-6), from the Pines Well, and from the groundwater monitoring well (1-87) at Plain Street. All samples will be analyzed for VOCs by EPA 500 series methdology and TPH by

infrared spectroscopy (IR) methods. In addition, one sample from the Hendrick Street Wellfield and the sample from the Pine Street Well will be analyzed for radon, gross alpha particle, and gross beta particle radionuclides.

The existing wells to be sampled represent three well types: artesian, gravel-packed, and monitoring well. Artesian wells and the gravel-packed well will be allowed to flow freely to waste for a time equivalent to the evacuation of 3 to 5 well volumes, prior to samples being collected. The monitoring well will be bailed or pumped to evacuate 3 to 5 well volumes prior to sampling.

Monitoring Well Installation and Sampling

Proposed Wells

A total of 16 groundwater monitoring wells are proposed to be installed and sampled to determine the extent and degree of TCE contamination. The locations of these wells will be determined based on area hydrogeology and locations of possible sources of TCE.

Wells will be installed by drive-and-wash method to a depth determined by S E A. The groundwater sampling protocol involves bailing or purging 3 to 5 well volumes from the well before obtaining a sample. Methods used to purge and sample wells will be dependent on the well type (artesian, gravel packed or non-artesian monitoring well).

Soil samples will be collected with a split spoon during well installation. Soil will be field screened for VOCs using a portable gas chromatograph (GC). Soil excavated during well installation will be screened for disposal purposes using a photoionization detector (PID).

The Easthampton site has a history of low level TCE groundwater contamination. Although these levels may exceed Massachusetts MCL for drinking water, field personnel activities will be limited to soil sample screening and groundwater sampling. Therefore, only minimal dermal and respiratory contact is anticipated. It is recommended that personal protective measures during the investigation be limited to appropriate clothing for soil and water sampling activities. Due to the artesian nature of several of the wellpoints, rain gear, boots, and gloves are recommended. During the course of the investigations, should new information become available regarding potential exposure and/or health hazards, these recommendations will be amended as necessary to limit exposure of field personnel to chemical hazards and to comply with personal protective measures detailed in 29 CRF 1910.120: Hazardous Waste Operations and Emergency Response. The following pages detail the site specific Heath and Safety Plan and personal protective measures which will be followed by on-site personnel during the site investigation.

SITE HEALTH AND SAFETY PLAN OUTLINE

SECTION I - GENERAL INFORMATION

SITE NAME: Hendrick Street Wellfield & Surrounding residential area

DATE: May 1990, updated August 1990

LOCATION: Easthampton, Massachusetts

INVESTIGATIVE OBJECTIVE(S): Well sampling and well installation

PROPOSED DATE OF INVESTIGATION: beginning May 1990

BACKGROUND REVIEW: Complete X Preliminary _____

DOCUMENTATION/SUMMARY: OVERALL HAZARD: Serious _____ Moderate _____

Low X Unknown _____

PROJECT SAFETY MANAGER: Norma W. Keane PHONE: (617) 497-7800

S E A Corporate Health and Safety Officer

SECTION II - SITE/WASTE CHARACTERISTICS

A. WASTE TYPE(S): Liquid X Solid _____ Sludge _____ Gas _____

B. CHARACTERISTIC(S): Corrosive _____ Ignitable ____ Radioactive _____

Volatile X Toxic ___ React. ____ Unk. ___ Other ____

C. FACILITY DESCRIPTION: Size 15.77 acres Buildings 3

Topography: flat

Principal Disposal Method (type/location): N/A

Unusual Features (dike integrity, power lines, terrain, etc.):

Wellfield within an aquifer protection zone

Status (open, closed, unknown): unknown

History: (Worker or non-worker injury; complaints from public; previous agency action): Trichloroethylene has been detected in the Hendrick Street Wellfield since October, 1984. However, these levels were below the Maximum Contaminant Levels (MCL) of 5 ug/L until October of 1987. The current average level within the wellfield is 10 ug/L.

Note: N/A means "Not Applicable"

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SECTION III - HAZARD EVALUATION

A. KNOWN OR SUSPECTED ON-SITE HAZARDS

Substance(s) Involved	Concentration(s) (If Known)	Primary Hazards
trichloroethylene	5.6 - 12 ug/L	ingestion

The following additional hazards are expected on-site (e.g., slippery ground, uneven terrain, etc.) Uneven terrain wet and muddy ground conditions.

SECTION IV. WORK PLAN INSTRUCTIONS

A. PERIMETER ESTABLISHMENT AND ON-SITE CONTROL

Perimeter Identified: N/A Zone(s) of Contamination Identified: N/A

B. PERSONAL PROTECTIVE EQUIPMENT

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks: Level D for all tasks

Note: N/A means "Not Applicable"

C. Protective clothing mat

Substance/Chemical Name	Material
N/A	N/A

Due to the artesian nature of some wells, it is recommended t
boots, and gloves be worn during sampling to limit potential
with TCE contaminated water.

Note: N/A means "Not Applicable"

1232R

If air-purifying respirators are authorized, N/A (filtering medium) is the appropriate canister for use with the involved substances and concentrations. A competent individual has determined that all criteria for using this type of respiratory protection have been met.

D. MONITORING PROCEDURES

Describe the procedures to be used for monitoring the site: During drilling and installation of monitoring wells. Field screening of soils will be performed using jar headspace analysis with a photoionization detector (PID); ambient air monitoring will be performed using the PID at ground level and face level.

Surveillance Equipment and Materials: Photovac TIP II or Microtip

Action level: 5 ug/L above background levels

Action to be Taken: Evacuate the work area and notify the Health and Safety Officer and Project Manager who will determine if work will continue upgraded to Level C protection or if other action is necessary.

Biomedical monitoring requirements: N/A

E. COMMUNICATIONS (ON-SITE): Oral

Procedures: N/A

Equipment: N/A

If radios are used as a means of communication: Channel N/A has been designated as the radio frequency for personnel in the Exclusion Zone. All other on-site communications will use channel N/A.

Personnel in the Exclusion Zone should remain in constant radio communication with or within sight of the project manager or the project team leader. Any failure of radio communication requires an evaluation of whether personnel should leave the Exclusion Zone.

Note: N/A means "Not Applicable"

If an emergency signal is designated: N/A is the emergency signal to indicate that all personnel should leave the Exclusion Zone. In addition, a loud hailer is available if required.

The following standard hand signals will be utilized:

Hand gripping throat ----------	Out of air, can't breathe
Grip partner's wrist or -------- both hands around waist	Leave area immediately
Hands on top of head ----------	Need assistance
Thumbs up ----------	OK, I am all right, I understand
Thumbs down ----------	No, negative

F. DECONTAMINATION PROCEDURES

Hot Line Location (initial): N/A

Command Post Location (initial): N/A

Personnel: N/A

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The standard level D decontamination protocol shall be used with the following decontamination stations: N/A

Emergency decontamination will include the following stations: N/A

Note: N/A means "Not Applicable"

The following decontamination equipment is required: All disposa
materials will be bagged and disposed using appropriate methods.
Liquinox and distilled water solution, pesticide grade methanol an
deionized water will be used as the decontamination solution for
sampling equipment. Decontamination rinse waters will be collected
and sampled for determination of appropriate disposal as described
the QA/QC program for this project.

G. SITE ENTRY PROCEDURES/ON-SITE ORGANIZATION AND COORDINATION

Team Size: 2

Entry Briefing (date):

Station Designation (name/responsibility):

1. Engineer/geologist
2. Engineer/geologist
3.
4.
5.
6.

Work Schedule/Limitations: Sampling will be performed between dawn and dusk.

Note: N/A means "Not Applicable"

1232R

SECTION V. EMERGENCY MEDICAL CARE/PROCEDURES

A. List of Emergency Phone Numbers

Agency/Facility	Phone Number
Police Easthampton Police Department	527-1212
Fire Easthampton Fire Department (emergency)	527-2424
Hospital Cooley Dickinson Hospital	584-4090
Public Health Advisor Board of Health	527-2129
Other	

B. On-Site First Aid Equipment

Type	Location
First Aid Kit	Engineer's Vehicle

C. Directions to nearest facilities

Hospital: Cooley Dickinson Hospital: Go north on Hendrick Street, to Route 141. Take Route 141 North to Route 10. Take Route 10 to Route 9 in Northampton. Take Route 9 west (left) to 30 Locust St.

Note: N/A means "Not Applicable"

D. Emergency medical information for substances present

Substance	Exposure Symptoms	First-Aid Instructions
N/A		

E. Emergency Procedures

The following standard emergency procedures will be used by on-site personnel. The project safety manager shall be notified of any on-site emergencies and shall be responsible for ensuring that the appropriate procedures are followed.

Personnel Injury in the Exclusion Zone:

N/A

Personnel Injury in the Contaminant Reduction Zone:

N/A

Personnel Injury in the Support Zone:

N/A

Note: N/A means "Not Applicable"

Fire/Explosion: In the event of a fire or explosion on-site, all site personnel shall assemble at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

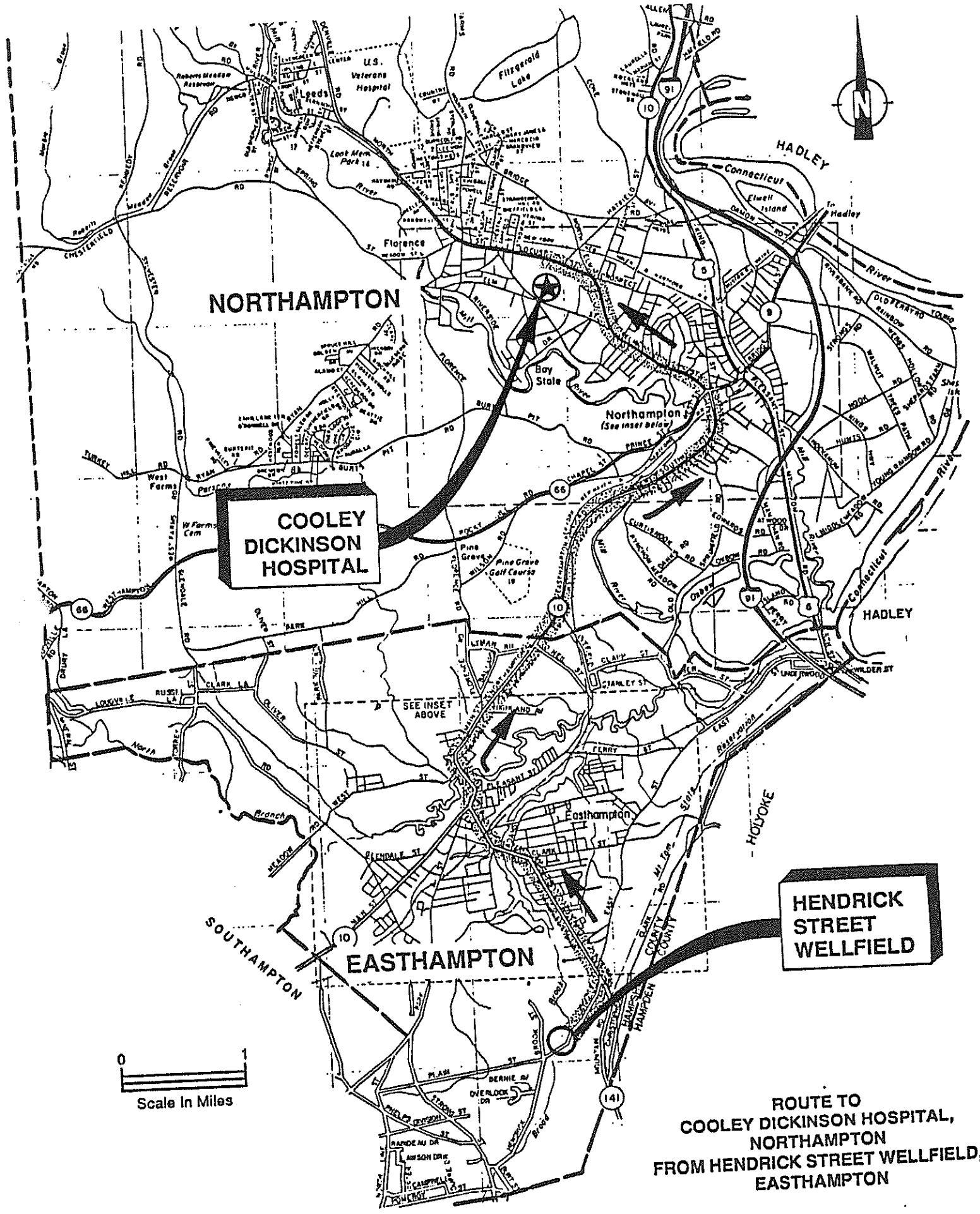
Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the work area. Reentry shall not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure: If any other equipment on-site fails to operate properly, the project manager or the project team leader and project safety manager shall be notified and then shall determine the effect of this failure on continuing operations on-site. If the failure affects the safety of personnel or prevents completion of the work plan tasks, all personnel shall leave the work area until the situation is evaluated and appropriate actions taken.

In all situations, when an on-site emergency results in evacuation of the work area, personnel shall not reenter until:

- The conditions resulting in the emergency have been corrected.
- The hazards have been reassessed.
- The site safety plan has been reviewed.
- Site personnel have been briefed on any changes in the site safety plan.

Note: N/A means "Not Applicable"



ROUTE TO
COOLEY DICKINSON HOSPITAL,
NORTHAMPTON
FROM HENDRICK STREET WELLFIELD,
EASTHAMPTON

All site personnel have read the above plan and are familiar with its provisions.

Project Safety Manager	Norma W. Keane (Name)	(Signature)
Project Manager or Project Team Leader	(Name)	(Signature)
Other Site Personnel		

Note: N/A means "Not Applicable"

Sampling Protocol

for

Easthampton Hendrick Street Well Field Investigation

Easthampton, Massachusetts

The intent of sampling at the Easthampton Hendrick Street Well is to evaluate the level of volatile organic compounds (VOCs) contamination and to determine the direction of contaminant migration. Additionally, testing will also be conducted for the detection of total petroleum hydrocarbons (TPH) and radionuclides.

Ten (10) of the samples will be obtained from artesian well points located within the Hendrick Street Tubular Well Field, one (1) sample will be obtained from the Pines Well, and one (1) sample will be obtained from monitoring wells located on Pine Street. There are a total of twelve (12) sampling locations in this protocol.

The twelve samples will be collected and analyzed following EPA procedures and protocols and will be analyzed for the 8 regulated and 51 unregulated VOCs using the EPA 500 series and total TPH by Infrared (IR).

A sample will be collected from one of the eight peripheral wells in the Hendrick Street wellfield, and a sample from the Pines Well to be submitted for radionuclides testing. These two samples will be tested for Radon, Gross Alpha and Gross Beta.

Four different types of wells requiring varying sampling protocol exist at these locations. The four types of wells are: monitoring wells, flowing artesian wells, non-flowing artesian wells, and a gravel packed well. The following protocols will be followed for each well type.

APPENDIX H
HENDRICK STREET WELLFIELD
SAMPLING PROTOCOL
MAY 24, 1990

Monitoring Wells

Three (3) well volumes shall be removed by bailing or pumping as appropriate to the well. The bailer shall be decontaminated prior to use and between each well using a combination of liquinox and distilled water wash and a minimum of two rinses with distilled water. After removing three well volumes, all sample bottles (supplied by an independent laboratory and inclusive of preservatives as needed) will be filled. Additional care will be taken to ensure that all VOA vials will be filled to the septum with no air within.

Flowing Artesian Wells

Approximately three (3) well volumes shall be allowed to discharge from the well, by permitting it to flow for a calculated period of time (estimated to be 1 to 3 minutes), according to the vertical full pipe formula. The well cap shall be decontaminated prior to use and between each well using a combination of liquinox and distilled water wash and a minimum of two rinses with distilled water. After approximately three well volumes have been discharged, all sample bottles (supplied by an independent laboratory and inclusive of preservatives as needed) will be filled. Additional care will be taken to ensure that all VOA vials will be filled to the septum with no air within.

Non-Flowing Artesian Wells

Approximately three (3) well volumes shall be allowed to discharge from the well using a dedicated high density polyethylene tubing to siphon out the water. After approximately three well volumes have been discharged all sample bottles (supplied by an independent laboratory and inclusive of preservatives as needed) will be filled. Additional

Insert Attachment 5

1232R

APPENDIX I
HENDRICK STREET WELLFIELD
LABORATORY ANALYSIS CERTIFICATES
MAY, 1990

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220

MA 086 NH 198958-A CT PH-0574

CERTIFICATE OF ANALYSIS

Client: SEA Consultants, Inc.

Address: 485 Massachusetts Avenue
Cambridge, MA 02139

Attn: Kosta Exarhoulakos

Client Designation: Project# 90072.1V

Laboratory Job Number: 902659

Invoice Number: 14027

Date Received: 05/24/90

Date Reported: 06/07/90

Delivery Method: Client Delivery

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
902659.1	5/23/90 3:35 pm A-3	N/A
902659.2	5/23/90 A-13	N/A
902659.2D	5/23/90 A-13	N/A
902659.3	5/23/90 4:15 A-14	N/A
902659.3S	5/23/90 4:15 A-14	N/A
902659.4	5/23/90 1:03 pm B-9	N/A
902659.5	5/23/90 2:05 pm E-6	N/A
902659.6	5/23/90 2:25 pm G-1	N/A
902659.7	5/23/90 3:00 G-6	N/A
902659.8	5/23/90 1:44 W-10	N/A
902659.9	5/24/90 12:40 C-2	N/A
902659.10	5/24/90 10:30 C-6	N/A
902659.11	5/24/90 10:30 1-87	N/A
902659.12	5/24/90 1:00 pm Pines	N/A
902659.13	Trip Blank	N/A

Authorized by: Scott McLean - Laboratory Director

cp

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.2 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics*** Trichloroethylene	9.5	ug/L	**	14	524.2	----	06/06/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.2 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	9.5	ug/L	**	14	524.2	----	06/06/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.3 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***				14	524.2	----	06/07/90
Trichloroethylene	10	ug/L	**				
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.3 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	10	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS:
* Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.4 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	10	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.4 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	10	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS:
* Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.6 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***				14	524.2	----	06/07/90
Trichloroethylene	12	ug/L	**				
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.6 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

Analysis Requested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***				14	524.2	----	06/07/90
Trichloroethylene	12	ug/L	**				
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.8 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

AnalysisRequested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	12	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.8 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

AnalysisRequested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	12	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.10 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

AnalysisRequested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	10	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.10 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

AnalysisRequested: Volatile Organics and Total Hydrocarbons

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	10	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.12 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

AnalysisRequested: Volatile Organics and Total Hydrocarbons (Radioactivity to follow)

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	5.6	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS:
* Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.12 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass bottle and two VOA vials

AnalysisRequested: Volatile Organics and Total Hydrocarbons (Radioactivity to follow)

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics***							
Trichloroethylene	5.6	ug/L	**	14	524.2	----	06/07/90
Total Hydrocarbons	ND	mg/L	0.5	2	503BE	05/24/90	05/25/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.13 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/07/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One VOA vial

AnalysisRequested: Volatile Organics

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Volatile Organics ***	ND	ug/L	**	14	524.2	----	06/07/90

COMMENTS: * Complete list of References found in Addendum I
** A list of volatile organics analyzed for and their detection limits accompanies this report.
*** All compounds were below the detection limits except those listed above.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.7 Date Received: 05/24/90

Sample Matrix: Water Date Reported: 06/12/90

Condition of Samples: Satisfactory Field Prep: None

Number & Type of Containers: One glass jug

Analysis Requested: Gross Alpha and Gross Beta

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Gross Alpha	0.3+/-0.6	pCi/L	0.6	17	900.0	----	06/01/90
Gross Beta	1.1+/-0.5	pCi/L	0.5	17	900.0	----	06/01/90

COMMENTS: * Complete list of References found in Addendum I
Radioactivity analysis performed by Reference Lab #2 - see Addendum II.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902659.7 **Date Received:** 05/24/90

Sample Matrix: Water **Date Reported:** 06/12/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One glass jug

Analysis Requested: Gross Alpha and Gross Beta

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Gross Alpha	0.3+/-0.6	pCi/L	0.6	17	900.0	----	06/01/90
Gross Beta	1.1+/-0.5	pCi/L	0.5	17	900.0	----	06/01/90

COMMENTS: * Complete list of References found in Addendum I
Radioactivity analysis performed by Reference Lab #2 - see Addendum II.

15. Interim Methods for the Determination of Asbestiform Minerals in Bulk Insulation Samples, Research Triangle Institute, June 1980. Asbestos Containing Materials in School Buildings: A Guidance Document, March 1979, USEPA Document C00090, parts 1 & 2.

16. Interim Methods for the Determination of Asbestos in Bulk Insulation Samples (EPA-600/M4-82-020).

17. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," Publication EPA-600/4-80-032, U. S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, August 1980.

18. "Clean Harbors Radiological Environmental Analytical Procedures," Clean Harbors Analytical Services, Braintree, MA, October 1985.

19. H. M. Prichard and T. F. Gesell, "Rapid Measurement of RN-222 Concentrations in Water with a Commercial Liquid Scintillation Counter", Health Physics, Volume 33, 1977, pp. 577-581.

20. "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", March 1979, EPA 600/4-79-019.

21. Analysis of PCB's in Transformer Fluid and Waste Oil. EPA 600/4-81-045. 1981.

22. Klute, A. 1986, "Methods of Soil Analysis, Part 1", Methods 15-2.2 and 15-5.1. American Society of Agronomy, Madison, WI.

23. Exhibit No. 1. Petroleum Oils by Gas Chromatography. Alley Young & Baumartner, Inc. Consulting Engineers, PO Box 2036, Brentwood, Tennessee 37024.

15. Interim Methods for the Determination of Asbestiform Minerals in Bulk Insulation Samples, Research Triangle Institute, June 1980. Asbestos Containing Materials in School Buildings: A Guidance Document, March 1979, USEPA Document C00090, parts 1 & 2.

16. Interim Methods for the Determination of Asbestos in Bulk Insulation Samples (EPA-600/M4-82-020).

17. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," Publication EPA-600/4-80-032, U. S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, August 1980.

18. "Clean Harbors Radiological Environmental Analytical Procedures," Clean Harbors Analytical Services, Braintree, MA, October 1985.

19. H. M. Prichard and T. F. Gesell, "Rapid Measurement of RN-222 Concentrations in Water with a Commercial Liquid Scintillation Counter", Health Physics, Volume 33, 1977, pp. 577-581.

20. "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", March 1979, EPA 600/4-79-019.

21. Analysis of PCB's in Transformer Fluid and Waste Oil. EPA 600/4-81-045. 1981.

22. Klute, A. 1986, "Methods of Soil Analysis, Part 1", Methods 15-2.2 and 15-5.1. American Society of Agronomy, Madison, WI.

23. Exhibit No. 1. Petroleum Oils by Gas Chromatography. Alley Young & Baumartner, Inc. Consulting Engineers, PO Box 2036, Brentwood, Tennessee 37024.

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220

MA 086 NH 198958-A CT PH-0574

CERTIFICATE OF ANALYSIS

Client: SEA Consultants

Address: 485 Massachusetts Avenue
Cambridge, MA 02139

Attn: Douglas Aghjayan

Client Designation: Project #90072.1B

Laboratory Job Number: 902772

Invoice Number: 13970

Date Received: 05/31/90

Date Reported: 06/05/90

Delivery Method: Client delivered

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
902772.1	PINESA	N/A
902772.2	PINESB	N/A
902772.3	G-6A	N/A
902772.4	G-6B	N/A

Authorized by: Scott McLean - Laboratory Director

kmg

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220

MA 086 NH 198958-A CT PH-0574

CERTIFICATE OF ANALYSIS

Client: SEA Consultants

Address: 485 Massachusetts Avenue
Cambridge, MA 02139

Attn: Douglas Aghjayan

Client Designation: Project #90072.1B

Laboratory Job Number: 902772

Invoice Number: 13970

Date Received: 05/31/90

Date Reported: 06/05/90

Delivery Method: Client delivered

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
902772.1	PINESA	N/A
902772.2	PINESB	N/A
902772.3	G-6A	N/A
902772.4	G-6B	N/A

Authorized by: Scott McLean - Laboratory Director

kmg

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902772.1 Date Received: 05/31/90

Sample Matrix: Water Date Reported: 06/05/90

Condition of Samples: Satisfactory Field Prep: None

Number & Type of Containers: One VOA vial

Analysis Requested: Radon

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Radon	30+/-12	pCi/L	12	19	----	----	06/01/90

COMMENTS: * Complete list of References found in Addendum I
Radon analysis performed by Reference Lab #2 - see Addendum II.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902772.1 Date Received: 05/31/90

Sample Matrix: Water Date Reported: 06/05/90

Condition of Samples: Satisfactory Field Prep: None

Number & Type of Containers: One VOA vial

Analysis Requested: Radon

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Radon	30+/-12	pCi/L	12	19	----	----	06/01/90

COMMENTS: * Complete list of References found in Addendum I
Radon analysis performed by Reference Lab #2 - see Addendum II.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902772.3

Date Received: 05/31/90

Sample Matrix: Water

Date Reported: 06/05/90

Condition of Samples: Satisfactory

Field Prep: None

Number & Type of Containers: One VOA vial

Analysis Requested: Radon

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Radon	100+/-20	pCi/L	20	19	----	----	06/01/90

COMMENTS: * Complete list of References found in Addendum I
Radon analysis performed by Reference Lab #2 - see Addendum II.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 902772.3 **Date Received:** 05/31/90

Sample Matrix: Water **Date Reported:** 06/05/90

Condition of Samples: Satisfactory **Field Prep:** None

Number & Type of Containers: One VOA vial

Analysis Requested: Radon

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES EXT/PREP	DATES ANALYSIS
Radon	100+/-20	pCi/L	20	19	----	----	06/01/90

COMMENTS: * Complete list of References found in Addendum I.
Radon analysis performed by Reference Lab #2 - see Addendum II.

ALPHA ANALYTICAL LABS
ADDENDUM I
REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. 1986.

2. Standard Methods for Examination of Water and Waste Water. APHA-AWWA-WPCF. 16th Edition. 1985.

3. Standard Methods for Examination of Water and Waste Water. APHA-AWWA-WPCF. 17th Edition. 1989.

4. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-82-055. 1983.

5. Oil Spill Identification System. CG-D-52-77 U. S. Coast Guard. 1977.

6. Methods for Organic Chemical Analysis of Municipal and Industrial Waste Water. EPA 600/4-82-057. 1982.

7. U. S. Department of Health, Education, and Welfare, National Institute of Occupational Safety and Health. D. G. Taylor, [Manual of Analytical Methods, 2nd Ed., DHEW (NIOSH) Pub. No. 77-237A, 1977.]

8. Handbook of Analytical Quality Control in Water and Wastewater Laboratories. EPA 600/4-79-019. March 1979.

9. The United States Pharmacopeia. The National Formulary. USP 20th Edition. Formulary 15th Edition. 1980.

10. Choosing Cost-Effective QA/QC (Quality Assurance/Quality Control) Programs for Chemical Analysis. PB85-241461. U. S. Department of Commerce, National Technical Information Service. August 1985.

11. Manual of Analytical Quality Control for Pesticides in Human and Environmental Media. PB 261 019. EPA 600/1-76-017. February 1975.

12. Annual Book of ASTM Standards. Sections 0, 3, 5, 6, 8, 9, 11, and 14. American Society for Testing and Materials 1986.

13. Code of Federal Regulations, Title 40, Part 268, Appd. I, 1987.

14. Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. Available from USEPA, Cincinnati, 26 West Martin Luther King Drive, Cincinnati, Ohio, 45268.

ALPHA ANALYTICAL LABS
ADDENDUM I
REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. 1986.

2. Standard Methods for Examination of Water and Waste Water. APHA-AWWA-WPCF. 16th Edition. 1985.

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7. U. S. Department of Health, Education, and Welfare, National Institute of Occupational Safety and Health. D. G. Taylor, [Manual of Analytical Methods, 2nd Ed., DHEW (NIOSH) Pub. No. 77-237A, 1977.]

8. Handbook of Analytical Quality Control in Water and Wastewater Laboratories. EPA 600/4-79-019. March 1979.

9. The United States Pharmacopeia. The National Formulary. USP 20th Edition. Formulary 15th Edition. 1980.

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12. Annual Book of ASTM Standards. Sections 0, 3, 5, 6, 8, 9, 11, and 14. American Society for Testing and Materials 1986.

13. Code of Federal Regulations, Title 40, Part 268, Appd. I, 1987.

14. Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. Available from USEPA, Cincinnati, 26 West Martin Luther King Drive, Cincinnati, Ohio, 45268.

ALPHA ANALYTICAL LABS
ADDENDUM II
REFERENCE LABORATORIES

1. CHEMWEST ANALYTICAL LABORATORIES/DIVISION OF COMPUCHEM
600 West NorthMarket Blvd.
Sacramento, CA 95834
MA Certification Number: NC028

2 CLEAN HARBORS ANALYTICAL SERVICES
325 Wood Road
Braintree, MA 02184
(617) 849-1800
MA Certification Number: MA 032

3. E. W. SAYBOLT & CO., INC.
22 Elkins Street
S. Boston, MA 02127
(617) 268-7668

4. FUSS ENVIRONMENTAL LABS.
77 Batson Drive
Manchester, CT 06040
(203) 646-5628
CT Certification Number: PH0441

5. CERTIFIED ENGINEERING AND TESTING
25 Mathewson Drive
Weymouth, MA 02189
(617) 337-7887