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REPORT ON DEP INVESTIGATION WORK AT WELLS 9B LANDFILL

Wells, Maine

(March 2002-February 2003)

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REPORT ON DEP INVESTIGATION WORK AT WELLS 9B LANDFILL

1.0 Introduction

1.1 <u>Site Location and Description</u>

The Old Wells Route 9-B Dump (a.k.a. Indian Trail Landfill) is located on the northern side of Route 9B in Wells, Maine (Figure 1.1). It is located in a residential area, with residential lots and houses and other structures built upon the dump itself. The Webhannet River, the closest surface water body, is located approximately 750 feet north of the site. Interstate 95, a divided highway, is located about 500 feet west of the site.

1.2 Site History.

The so-called Indian Trail Landfill was operated between the 1920's and 1971. After a new dump was established elsewhere in Town, the property changed hands and a residential subdivision was developed on and around the old landfill. Some limited investigation work occurred at the location during the mid-1990's. Due to continuing concerns from residents, the Maine Department of Environmental Protection (DEP) successfully urged the Town to voluntarily contract for professional services to better determine risks posed by the site. Stratex, Inc. completed two rounds of water sampling analysis and a gas assessment survey in homes located on the landfill. Twelve water sample locations showed clear impacts from the former landfill. No landfill gases were detected in the residential structures.

By January 2001, the State had completed its final year of closure activities under *the Landfill Closure and Remediation Program*. Not every landfill in the state was closed under this program. Under law that existed until only recently, the Department of Environmental Protection (DEP) did not have jurisdiction over many of the old, improperly closed and abandoned landfills throughout the State. These landfills, having ceased operations prior to February 1976, were exempt from the program. The Wells 9B Dump (a.k.a. Indian Trail Landfill) is one such site. A new Law that authorizes DEP action at this and other older, abandoned landfill sites was approved by the Legislature in 2001. This law allows the DEP to conduct investigations and to take actions to eliminate health threats.

As a follow-up to several town meetings, the voters approved a waterline extension to the area of the landfill. The Kennebunk, Kennebunkport and Wells Water District and a private contractor installed the trunk line for the public water during 2001. The water was subsequently offered to all residents on or in the immediate vicinity of the landfill whose water supply wells were considered to be affected or at risk from the landfill. Forty service location hookups were completed the same year. An additional service connection was made during 2002. Partial funding for this project was provided by the DEP.

The United Sates Environmental Protection Agency (USEPA) requested that the DEP examine this site for any evidence of possible hazardous substance disposal. Based upon this request, State DEP staff involved in the *Federal Site Discovery Program* conducted a limited assessment program. That work was completed, and a report was issued on September 19, 2001. The investigation consisted of a site inspection, and obtaining soil and groundwater samples. The results continued to indicate that while no high risks to public health have been found, groundwater in the area has been impacted by the landfill. Specifically, o- and p-dichlorobenzene were detected in overburden groundwater wells, although at levels below their respective health standards. Vinyl Chloride was detected in one overburden well at a level above the *State Drinking Water Guidelines* recommended level. Arsenic was also detected in groundwater samples above the *State Guidelines* level. The soil and groundwater on one vacant lot appeared to be impacted by petroleum above the current Maine standard for petroleum contamination. At that time, there appeared to be no surficial soil risks, and little or no impact to the Webhannet River. A public informational meeting was held to discuss the findings and future investigation and remediation plans.

Based upon the preliminary findings, DEP determined that it would proceed with additional investigations around the landfill. These investigations were completed throughout 2002, and finalized during February 2003.

1.3 Summary of Work Completed by DEP 2002-2003.

All of the following tasks were completed by DEP and are reported on in this document:

1. Sampling of twelve (12) area residential wells that were still in use at the time;

2. Surface geophysics with magnetometer completed to more accurately determine the location of the landfill solid waste boundary.

3. Assessment and borehole geophysics completed on six (6) previously used domestic wells, which were then converted into eight (8) permanent monitoring well locations. Groundwater sampling and analyses completed in these locations.

4. Partial investigation of soils and groundwater completed on Town-owned lot to assess possible petroleum spill location.

5. Global Positioning Survey (GPS) equipment used to locate residential wells, boring locations, surface geo-physical work, etc.

6. Soil gas survey investigation on and in immediate vicinity of landfill waste areas.

7. Scan of air quality in basements of six homes located on or in immediate vicinity of solid wastes.

8. Identification of physical hazards that may be posed by any existing wastes at the surface on lots.

DEP completed a draft report on this recent work and met with the Town in early March 2003. Copies of the narrative sections of the final report were then sent to all interested parties in the community. Another informational meeting with the public is planned for April 2003 at a time and place to be determined. An updated Area Map is attached as **Figure 1.2**.

2.0 Domestic Well Sampling

Methodology

Based on the DEP's initial landfill investigation and the extensive residential well sampling conducted by Stratex on behalf of the town, the town extended the public water line and provided service connections to affected and other nearby residential water supplies. After completing the water line extension in 2001, the town of Wells authorized

Stratex to perform additional residential water supply sampling. The fall 2001 sampling effort concentrated on domestic wells located 0.25 to 0.5 miles east of the landfill. Analysis of those test results did not indicate that additional homes should be connected to the public water supply because of landfill related contamination.

In an effort to further evaluate groundwater quality since the water line extension, the DEP sampled a subset of the wells previously sampled by Stratex in the fall of 2001. During the summer of 2002 the DEP sampled twelve active domestic wells. Ten of the domestic wells are located east of the landfill, one within the limits of the landfill, and one west of the interstate and the landfill. **Figure 2** depicts the location of the twelve domestic wells sampled by DEP.

The DEP sampled the domestic water supplies in June and July 2002. All samples were collected before home water treatment systems, if present. The water was run for at least 15 minutes before collecting the samples. Each sample was analyzed for a variety of indicator parameters, metals and volatile organics compounds.

Results and Discussion

Table 1 contains the analytical results for the residential sampling conducted during 2002. With the exception of the Reed water supply, none of the domestic water supplies appear to be affected by the landfill contaminants. The Reed well is located adjacent to the eastern boundary of the landfill. In addition to low concentrations of benzene, chlorobenzene and dichlorobenzenes, this water supply also contains arsenic in excess of the 10 μg/L standard and several elevated indicator parameters. The Reeds subsequently decided to abandon their bedrock well and have connected to the public water supply in 2002.

While not impacted by the landfill, the water quality results for several water supplies indicate they may be affected by nearby septic systems. Elevated concentration of nitrate in both overburden and bedrock wells and to a lesser extent the presence of total coliform bacteria (overburden only), strongly suggest groundwater quality is affected by individual septic systems. For example, the Ryan and Perkin’s water supplies, shallow overburden wells, contained more than 4 mg/L Nitrate-N and total coliform bacteria. Because the dug wells are supplied by saturated surficial deposits, they are extremely unlikely to be influenced by contaminants migrating from the landfill. In fact, overburden well water quality is more likely influenced by activities within the immediate vicinity of the well, including, but not limited to the relatively numerous individual septic systems. Previous sampling conducted by Stratex on behalf of the town identified similar water quality trends attributable to septic systems. Four home water supplies also contained MTBE, albeit below the applicable drinking water standard. There is no evidence suggesting the landfill is the source of MTBE.

In summary, the current domestic well sampling data does not indicate additional connections to the public water supply are necessary due to landfill contamination.

3.0 Groundwater Characterization and Monitoring Requirements

3.1 Groundwater Characterization

Although all domestic well owners impacted by landfill related contaminants have had the opportunity to connect to the public water supply, the DEP wanted to further characterize groundwater quality in the immediate vicinity of the landfill. The installation and sampling of monitoring wells will now enable the DEP to assess groundwater quality since discontinuing nearly all water withdrawal from the fractured bedrock. In addition to learning more about current bedrock groundwater quality, future groundwater monitoring data will yield information about the magnitude and extent of the landfill's impact on groundwater and the potential risks to public health. Despite the relatively flat topography and inherent difficulty in assessing groundwater flow in fractured bedrock, we were also hopeful groundwater elevations obtained from the new monitoring wells would yield information about groundwater flow directions.

Methodology

Rather than expend additional funds to drill new bedrock monitoring wells to provide this information, the DEP decided to convert some of the abandoned domestic wells into conventional monitoring wells. Nearly all of the domestic water supplies in the immediate vicinity of the landfill were abandoned when the public water line was extended to provide potable water. In general, the town abandoned each discontinued well by cutting off the 6 inch steel casing about 3-4 feet below grade/ground surface. In most cases, the town removed the submersible pump and piping before welding a steel plate to the top of each well. Apparently no wells were grouted.

Previous sampling conducted by Statex found each of the six domestic wells chosen for conversion to monitoring wells contained landfill contaminants, including chlorobenzenes. The six selected wells are located adjacent to or within the landfill. The domestic bedrock wells ranged in depth from 60 to 200 ft. Depending on the number and location of water bearing fractures within each borehole, we planned to install one or two 2 PVC monitoring wells. A variety of borehole geophysical tools were used to locate the water-bearing zone(s) within each borehole. The borehole geophysical tools included: caliper, temperature, single point resistance, spontaneous potential, heat-pulse flow meter and acoustic televiewer. **Appendix A** contains the results of the borehole geophysical logging conducted by Northeast Geophysical Services. The caliper and single point resistance logs in conjunction with the heat pulse flow meter data helped identify the most appropriate screened intervals for groundwater monitoring.

Following the borehole geophysics, in early June the DEP installed nine two inch PVC monitoring wells within the six open bedrock wells. **Table 2** identifies each well and the respective screened interval. **Appendix B** contains the well installation diagrams. The six monitoring well locations are shown on **Figure 3**.

Two sampling rounds were conducted in 2002: the first in June and the second in October. During the June sampling round we selected seven of the nine monitoring wells and selected eight of the nine wells for the October sampling event. We collected all samples using standard low-flow sampling procedures. In addition to the field parameters, we collected samples for a variety of indicator parameters, metals and volatile organic compounds.

Results and Discussion

Table 3 contains all of the field and laboratory data for the two sampling rounds. **Table 2** contains the groundwater elevations obtained during the two sampling rounds.

The groundwater elevations obtained during the two sampling rounds provided consistent water level data. In general water levels dropped about 1 to 2 feet between July and October. Unfortunately, the water level data does not allow for the development of a straightforward shallow bedrock water table map. However, both rounds of groundwater elevation data indicate a west to southwesterly groundwater flow direction.

The water quality data obtained during both sampling rounds indicate some level of contamination generally associated with landfill leachate. For example, the specific conductance exceeded 550 μmhos/cm in all wells with the exception of the June 2002 Perry Community-A well and exceeded 1000 μmhos/cm in four wells. Most of the affected wells contained elevated sodium and chloride. Total organic carbon was found in all wells at detectable concentrations during one or both sampling rounds. This is also a significant indication of landfill related contamination. Dissolved oxygen concentrations are depressed (i.e., < 1.0 mg/L) in all wells, a likely consequence of the organic carbon leached from landfill waste. Several wells also contained elevated iron and manganese concentrations most likely a direct consequence of the reducing conditions produced from leaching biodegradable organic wastes. Although elevated arsenic often coincides with elevated iron and/or manganese, arsenic concentrations did not exceed 50 μg/L in either sampling round.

Although all monitoring wells contained some landfill related contaminants, chlorobenzene was only found at the following three locations: McIsaac-A, Perry-Community-B and Bean-A **(Figure 3)**. The chlorobenzene concentrations did not exceed 2 μg/L in the three wells. No samples exceeded the applicable Maximum Exposure Guidelines or Maximum Contaminant Levels for the detected chlorobenzenes with drinking water standards. The chlorobenzene concentrations are similar to the concentrations observed in the former domestic wells. The chlorobenzene concentrations observed in groundwater do not suggest the presence of source areas containing residual chlorobenzene (i.e., free phase product).

To further illustrate groundwater quality in the vicinity of the landfill, we created Stiff Diagrams for selected monitoring and domestic well data **(Figure 4)**. The Stiff Diagrams graphically display cation concentrations on the left side of the figure (i.e., sodium, potassium, calcium and magnesium) and the primary anions on the right hand side (i.e., chloride, bicarbonate and sulfate). The overall shape and size of each Stiff Diagram is determined by the concentrations of the dominant cation(s) and anion(s). At the Wells 9B Landfill, the majority of contaminated wells can be placed in one of two categories: 1) groundwater dominated by sodium/chloride (Breton Bike Shop-A, Bacherlor-A and Bean-B); and 2) groundwater dominated by calcium/bicarbonate (Reed, Perry Community-B and Spainhour-A). The Perry Community-A and McIsaac-A wells are hybrids as they are characterized by sodium/bicarbonate. The monitoring wells dominated by sodium/chloride may result from leachate generated primarily from burned wastes within the landfill. The application of road salt along Interstate 95 is an unlikely source for several reasons. Perhaps the most important reason is the contaminated wells are within or adjacent to a known source of sodium and chloride: the landfill. Further, groundwater within the fractured bedrock appears to flow toward the Maine Turnpike. Contaminated wells dominated by the bicarbonate anion suggest influence from leachate derived from unburned organic rich waste material.

The Stiff Diagrams for the remaining domestic water supplies are best characterized by their relatively low concentrations. None of the domestic wells contain more than 2.5 meq/L of any one cation or anion. This is good news as the relatively low total dissolved solids along with the absence of chlorobenzene suggest landfill related contaminants are not affecting the surrounding residential water supplies.

3.2 Long-Term Monitoring Requirements

Groundwater quality data in the immediate vicinity of the landfill along with data from the selected domestic wells provides information about how the landfill continues to affect the surrounding bedrock groundwater quality. This is particularly important because of the existence of private water supplies beyond the solid waste boundary.

Up until extension of the public water line, many of the homes within and beyond the limits of the landfill obtained groundwater from the underlying fractured bedrock. All of the homes affected by the landfill have been connected to the public water line. It is possible that previous groundwater withdrawal for domestic use may have controlled, to some extent, the migration of landfill contaminants. However, it is difficult to predict future areas affected by landfill related contamination under non-pumping conditions.
Therefore, a long-term monitoring program for private water supply wells beyond the solid waste boundary is necessary to reduce the likelihood of future exposure to landfill related contamination.

The long-term groundwater monitoring program outlined below will yield information about contaminant concentrations in the immediate vicinity of the landfill and a considerable distance beyond the landfill boundary. There are two components to the required long-term groundwater monitoring program at the Wells 9B Landfill. First, some of the abandoned domestic wells the DEP converted to monitoring wells will be routinely sampled. Second, some of the remaining residential wells along Littlefield and Pine Ledge Roads must also be routinely sampled. **Figure 5** denotes both the monitoring wells and the domestic wells that must be included in the long term monitoring program. The program will consist of six domestic wells: one located west of the Maine Turnpike and five located east of the landfill along Pine Ledge Road and Littlefield Road. Only five of the nine monitoring wells are included in the long-term monitoring program. The program will consist of the following wells:

Monitoring Wells	Domestic Wells
Breton Bike Shop-A (Shallow Zone)	Smith
Spainhour	Cain
Bean-B (Deep Zone)	Fraser
McIsaac	Robinson
Perry Community-B (Deep Zone)	Lagasse
	Byrne

All wells must be sampled biannually for two years. All samples must be analyzed for the Chapter 405 Column 1 parameters and volatile organic compounds. After completing two years of monitoring, the DEP will evaluate the data to determine what modifications are necessary to continue to protect public health and the environment.

4.0 Metal Detection Survey

At the request of DEP, Northeast Geophysical Services (NEGS) of Bangor, Maine completed a metal detection survey at the landfill area. This was completed using the EM-61 metal detection instrument and differentially corrected global positioning system (GPS) for locating the survey data. The objective was to better define the landfill solid waste boundary and to locate high metal zones within the wastes.

The results of the survey did indicate the need for some modifications to the area of waste deposition than had been previously estimated. The 2001 and 2002 geoprobing, as well as the recent soils gas survey work and water line installation observations also added to the picture of the type and extent of waste in this overall area. The western portion of the site, which is located along a drive accessing the Breton Bicycle-frame Shop and the Bachelor residence, appears to be an area consisting of mostly burned refuse. There is a considerable area of surface waste located behind the business on Lot 34-6. **(See Figures 1.2 and Appendix C Figure)** Material burned in this area consists mainly of ash and non-combustible items such as metals and glass. The second area is located beneath Abenaki Trail Drive, and between the intersection of Route 9B and the southeast side of Indian Trail Extension. This area appears to consist mostly of buried refuse. Evidence of typical municipal solid wastes were evident in borings and trenches cut for the water line. The fact that methane gas was detected in the area of Anenaki Drive and not in the western section supports this observation.

A full report on this survey is included as **Appendix C** of this Report, which includes a Figure of the revised solid waste boundary of the landfill waste areas. Report **Figures 7 through 15** also delineate the extent of the EM-61 survey work relative to the soils vapor monitoring site investigation work. It is important to remember that the revised solid waste boundary area is still only an estimate of the area containing solid wastes.

5.0 Petroleum Contamination Investigation

The 2001 Site Discovery Report identified Lot 34-6.A as requiring follow up investigative work for potential petroleum contamination. Soil borings from DP-1 (2001 data exhibited a petroleum type odor, and had elevated readings on the field Photo Ionization Device (PID). The highest PID level from this location was from the 12-16 foot interval, with 170 ppm. A soil sample obtained from the 12-16 foot interval had Diesel range Organic Compounds (DRO's) detected at 506 mg/kg; groundwater from this location had DRO
detected at 308 μg/l. It was decided to conduct additional work to determine whether the results from samples in the soil boring were localized to that particular area, or indicative of a larger volume of petroleum contaminated soil.

Methodology for 2002 Petroleum Investigation

Soil borings were advanced in five locations on Lot 34-6.A. **(See Figure 6, and Field Boring Logs in Appendix D).** Soil corings were logged and screened with a Foxboro organic vapor analyzer equipped with a dual PID/FID detector. The PID aspect of the instrument indicates total VOC compounds detected; the Flame Ionization Device (FID) aspect determines whether flammable organic gases such as methane are present. The accepted *Headspace Technique* was utilized with this instrument. Temporary PVC overburden wells were then constructed in the boring orifice for the collection of groundwater samples.

Sample location DP-21, -22, -23, -24, and DP-25 were collected from lot 34-6A. In addition to the five borings advanced in Lot 34-6A, two additional borings were installed on different lots. Boring DP-26 was installed directly south of the Sayer residence, east of Lot 34-6.A. Boring location DP-27 was installed near the Breton Bicycle/ Frame Shop, west of Lot 34-6.A.

Sampling Results

As can be seen in the soil boring logs **(Appendix D),** no PID readings were found as high as the PID reading from the

2001 boring location DP-1. The highest reading was from location DP-21, 16-20 ft interval with 25 ppm. Most PID levels ranged between 0 to 20 ppm. Elevated FID readings were observed at several points, the highest at location DP-25 with a level of 320 ppm. High FID readings occurred at boring locations with greater amounts of refuse. The elevated FID readings
are most likely due to the methane present from refuse decomposition, as methane is a result of this decomposition, and is not detectable with a PID. Subsequent soils gas results taken during the November 2002 survey indicate that this area had elevated levels of methane.

A soil sample was obtained from boring location DP-21 and submitted for DRO, VOC, and pesticides. Groundwater samples were obtained from locations DP-21, -22, -23, and DP-27, and submitted for Volatile Organic Compounds (VOCs), diesel range organics (DRO), and Test F (landfill leachate/ metals). Results can be seen on **Table 4**.

No VOC compounds were detected in the groundwater sample obtained from DP-21. Several VOCs, including carbon disulfide, benzene, xylenes, trimethylbenzenes, and 1,4 dichlorobenzene were detected at low levels from location DP-22. Carbon disulfide, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were detected at low levels from location DP-23. DRO's were detected at 130 μg/l at DP-21, 201 μg/l at location DP-22, and 136 μg/l at location DP-23. DRO's were not detected at location DP-27. None of the organic concentrations exceeded its respective State Recommended Maximum Exposure Guideline (MEG).

Although not relevant for the issue of petroleum contamination, it should be noted that arsenic exceeded its MEG and Federal Maximum Contamination Level (MCL) at DP-23, and chromium and manganese exceeded its MEG only at DP-23. DDD and DDE were detected at low levels from the soil sample obtained from DP-21 (6 and 4 μg/kg, respectively).

Discussion

Results from the geoprobing indicate that the petroleum contamination found at location DP-1 during the 2001 investigation was localized to the immediate area surrounding DP-1. Field headspace analysis did not identify high levels of petroleum contamination. Groundwater and soil samples did reveal some level of petroleum contaminants present, but levels found are most likely levels that would normally be found in most municipal waste landfills. No evidence of wide-scale petroleum contamination at levels requiring additional investigative or remedial actions was found in any of the soil borings in 2002.

6.0 Soil Gas Survey Investigation

Methodology

A soil gas survey was conducted throughout the refuse disposal area to determine whether any vapor health issues may be present from the refuse buried in the landfill. Sampling locations were chosen based on the results of the May 2002 EM-61 metal detection survey. Soil gas sample points were to be located in refuse burial areas. Locations of the site area with high levels of metal were assumed to be areas in which refuse was buried. Therefore, soil gas sample points were located in areas which appeared to have great amounts of buried metal.

Soil gas samples were collected utilizing a direct push drilling rig. A soil gas collection probe was advanced into the ground from 5-8 feet in depth, and a sample of soil gas extracted utilizing a peristaltic pump. After allowing the pump to purge for 90 seconds, a sample was collected for VOC analysis (USEPA Method SW846 Method 8021B, modified for vapor) with a tedlar bag. After collection of the tedlar bag, the exit pipe from the pump was then connected directly to a Landtech GA-94 Landfill Gas Monitor for methane
analysis. The GA-94 was set up to run three 30 second cycles; maximum level for methane, carbon dioxide, and oxygen observed during each cycle was then recorded.

Results

Results can be seen on **Table 5** for VOC analysis, and **Table 6** for methane analysis.

From the results of the 2001 geoprobing, 2002 geoprobing, 2002 soil gas survey, and general observations made during the trenching for water line installation, there appear to be two distinct areas of refuse disposal. The western portion of the site, which is located along a drive accessing the Breton Bicycle/ Frame Shop and the Bachelor house, appears to be an area consisting of mostly burned refuse. Material buried in this area consists primarily of ash and unburnable material, (metal, glass, etc.). The second area is located underneath Abnaki Trail Drive , between the intersection of Route 9B and the Indian Trail Extension. This area consists more of what could be considered household refuse. Corings taken in this area found items such as plastic bags, newspaper, and other similar materials.

A number of VOCs were detected in samples of soil gas collected from throughout the landfill area. All of the compounds detected, with the exception of tetrachloroethene (PCE) and trichloroethene (TCE) have been detected in overburden and bedrock wells located in the landfill area.

Although PCE and TCE have not been detected in groundwater samples, vinyl chloride (VC), a breakdown product of these two compounds, was detected in overburden groundwater samples taken in 2001. Additionally, VC was detected in a location near the where PCE and TCE were detected in the soil gas. Individual **Figures # 7 through 15** denote concentrations of various VOC compounds detected during this work.

In general terms, only methane, PCE, and TCE where detected in discrete areas of the landfill area. All other compounds, (chlorobenzenes, trimethylbenzenes, and BTEX) where detected throughout the known refuse area. Methane was detected along Abenaki Trail Drive in areas known to have the thickest buried municipal refuse (eastern section). Methane was not detected in areas believed to have been the location of refuse burning (the area in and around the Breton Bicycle/ Frame Shop). This corresponds with the source of methane in landfills, that being the decomposing refuse. PCE and TCE were also detected in only the eastern portion of the landfill, indicating that the source of these compounds is lost likely material buried within the
household refuse. The one exception to this is the detection of TCE at SG-24, located behind the Breton house in the western side of the landfill.

1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were detected in the most locations, as were chlorobenzene and BTEX compounds. Although BTEX compounds were detected at almost all locations as well, its, highest levels were also detected from locations along the northwestern edge. Whereas 1,2-dichlorobenzene was detected at locations throughout the 9B Site, chlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene were detected in samples from the eastern portion (municipal refuge) of the site. Although 1,2-dichlorobenzene was found at most locations; highest levels were detected in the northwestern corner. This may indicate that a possible source of the 1,2- dichlorobenzene exists specifically in that area of the site, whereas the chlorobenzene, 1,3- and 1,4- dichlorobenzene, and 1,2,3- and 1,3,5-trimethylbenzene may be ubiquitous throughout the waste. As no soil or groundwater samples have been obtained from this portion of the Site, it is difficult to determine whether this area of the site (the northwest corner) has levels of these compounds greater than what could be considered as ubiquitous for the general refuse of the landfill.

Few of the soil gas locations correspond directly with overburden groundwater samples. The closest soil gas locations and overburden groundwater locations are DP-1 and SG-1 and SG-2, and DP-4 and SG-29. DP-1 and SG-1 and SG-2 are both located in the municipal refuse on the northeastern side of the Abnaki Trail intersection. DP-4 and SG-29 are located on the northern edge of the municipal refuse area.

Water samples from DP-1 had detectable levels of 1,2- and 1,4-dichlorobenzene and benzene. Gas samples from SG-2, which is located approximately 25 feet north of DP-1, had detectable levels of chlorobenzene, 1,2- 1,3- and 1,4-dichlorobenzene, ethylbenzene, napthalene, tetrachlroethene, toluene, trichloroethene, and 1,2,4- and 1,3,5- trimethylbenzene, and xylene. SG-4, located approximately 25 feet south, had only 1,2-dichlorobenzene, napththalene, and xylene.

Water samples from DP-4 had detectable levels of 1,2 dichlorobenzene, isopropyl benzene, n-propylbenzene, the trimethylbenzenes, napthalene, and xylene. Soil gas from SG-29 had detectable levels of 1,2-dichlrobenzene, the trimethylbenzenes, and xylene. From these results, it is difficult to make a direct comparison of soil gas results to groundwater results. This is more likely due to the location of the sampling points.

Discussion

Levels of VOCs detected as compared to USEPA guidance levels for soil gas can be seen on **Table 5.** USEPA Target Shallow Gas Guidelines are not health standards. They are considered as guidance for follow-up residential testing in homes. In other words, exceeding the soil gas standards in soil gas samples indicate that residential homes in the area should then be tested for the presence of such compounds.

USEPA target shallow soil gas was exceeded for the following compounds; benzene, 1,2-dichlorobenzene, ethylbenzene, naphthalene, tetrachloroethene, toluene, trichloroethene, 1,2,4- and 1,3,5-trimethylbenzene.

Methane has no health standards or target soil guidance guidelines, as the toxicity of methane is due to its asphyxiant property (it displaces oxygen) and its potential for explosiveness. Methane was detected in levels greater than its lower explosion limit (the level at which it will ignite, when an ignition source is provided, which is 5.53%)
at five locations. The highest methane level detected was at location SG-18 with a level of 32.30%. The presence of methane at these levels requires immediate followup investigation work. See **Table 6** for Methane results and **Figure 16** for sampling locations.

As a result of the soil gas survey, several homes in the area of the landfill with basements were screened with a Foxboro organic vapor analyzer with a dual PID/FID detector. **(See Section 7 below and Appendix J for results).** Given the sensitivity of the instrument, this should be considered as only an immediate screen to determine any possible immediate health risks. No basements indicated the presence of vapors that indicated an immediate health risk. However, this screen should in no way be considered as an evaluation for the possible presence of vapors from the landfill for long term health effects.

7.0 Air Quality Scan of Six Residential Homes

On February 12, 2003, DEP staff conducted a screening of several residential dwellings for the presence of vapors in their respective basement. The purpose of this screening was

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to determine whether an immediate health risk condition was present in any of the houses basements, due to the levels of vapors recently detected in a soil gas survey conducted over the landfill area of the site.

The screening was conducted with a Foxboro TVA 1000B organic vapor analyzer with a dual PID/FID detector. Only two houses had any response levels on the meter and then only slightly above background levels; the Bachelor and Hafford houses. The Bachelor residence, which had a background level ranging from 3.0 - 3.1 PPM on the FID, had readings in the basement ranging from 3.4 to 3.8. The Hafford residence (which had a background of 3.0 - 3.1 PPM on the FID, had levels range from 3.2 - 3.6 in the basement; a reading directly from the sump located in the south east corner, had levels range from 3.5 - 3.6.

A similar scan of basement air was completed in the Dillow home on 1/8/03. A Trip Summary Report for the basement screening work is attached as **Appendix I**.

No basements indicated the presence of vapors that pose an immediate health risk. However, this screen should in no way be considered as an evaluation for the possible presence of vapors from the landfill for long term health effects.

8.0 CONCLUSIONS. RECOMMENDATIONS AND REQUIREMENTS FOR LANDFILL AREA.

8.1 Conclusions and recommendations: groundwater/landfill gases.

DEP investigations have concluded that the petroleum contamination was a localized issue. No additional action is required for this location on Lot 34.6-A.

Groundwater continues to show adverse effects from the landfill on and in the immediate vicinity of the wastes. The installation of the water line eliminated this risk to all who were affected or deemed at risk from the landfill. Based upon recent sampling, these contaminants do not appear to be currently adversely affecting water quality in homes that retain groundwater wells, located at distance from the landfill.

The hookup of 40 locations to the water line could possibly affect groundwater and contaminant flow. This means that it will be necessary to periodically sample some intact residential groundwater wells and some residential wells converted to monitoring wells to detect any changes in area groundwater quality and flow direction.

The Town is responsible for completion of this long-term monitoring program as discussed in Report Section 3.2, above. Long-term water and air monitoring expenses are not eligible for State cost-sharing.

The outside soils gas findings indicate that a work plan needs to be developed and implemented as soon as possible to address concerns for in-basement and outside soils gas levels. Additional in-depth residential canister air monitoring should be completed at all homes and businesses located on lots 34-6.10., 34-6.A.1., 34-6., 34-6.5., 34-6.4. Permanent gas monitoring wells should be installed around the several homes and areas of concern. Additional soils borings and gas assessment work in the immediate vicinity of landfill wastes should also be conducted to assess risks from VOC's and methane. EPA guidance and State of Maine Solid Waste Management Regulations relating to VOC and methane levels should be considered in the development of a work plan by the Town. The State is committing to 90% cost sharing of these remedial investigation expenses. Subsequent reporting on these follow-up Town investigations will be included as an Addendum to this report.

It will be necessary for the Town to assume some long-term gas monitoring tasks. The specific requirements will be dependent upon the outcome and recommendations from the pending additional landfill gas investigation work. Gas monitoring will become part of the future Town long-term obligations.

8.2 Disposition of Buried wastes in landfill area proper.

Throughout the history of this project, there have been questions concerning what should be the final disposition of the wastes in the old landfill area. **(See Figure 1.2)** A number of interested parties have wondered whether the wastes should be capped in place or removed altogether. Most recently, questions have arisen due to DEP's finding of landfill soils gases above and immediately around the waste area. The consideration of what to do if anything with the waste area is greatly complicated by the fact that the location is made up of a number of privately owned lots, with a road, homes and other structures located throughout. Regardless of the complications, DEP continues to consider these questions and the need for possible solutions. The need for any direct action with the buried wastes is related to a consideration of risks posed to public health.

The recent geophysical survey work provided a better definition of the solid waste boundary of the landfill. The wastes are predominantly located under and adjacent to the Abenaki Trail Road area.

None of the findings to date seem to suggest that there would be any need for the wholesale removal of wastes located under several residential lots and the road. Such activity would likely be very disruptive and expensive, and would only be considered if risks to public health were determined from the continued location of wastes in the ground near residents.

Also, due to the presence of structures and the limited risks determined during this and previous investigation work, there would not appear to be any major benefit from capping the buried wastes in place. Such an effort would be difficult, and limited in value due to the presence of homes, roads, utility poles, and other structures that would penetrate a cover system. Such penetration would defeat the basic purpose of a cover system. Providing a tight cover system would also most likely result in a situation where
landfill gases would be more readily moved toward the residential structures, which is contrary to our goal of

dissipating such risks. The current soils covering the wastes are sandy in nature, which appear to provide for desirable transmission of landfill gases to the atmosphere, where they should be quickly mixed with and diluted by ambient air.

Some wastes are located at the surface on limited portions of Lot 34-6, between Highway 95 and Abenaki Drive. These surficial wastes, consisting mainly of old broken bottles and rusted metals, may pose a limited physical hazard to individuals not aware of their presence. It is not believed that these wastes pose any chemical hazard. It is recommended that the Town, property owner and DEP staff meet to discuss the options to cover or remove these surficial wastes, so as to reduce or eliminate the physical hazards. Any wastes removed will need to be properly disposed.

Some metallic wastes also protrude from the surface soils on the Town Lot # 34-6A Extension. These several locations may pose a physical hazard and should also be covered or removed and properly disposed by the Town.

8.3 Paving of Abenaki Trail Road.

None of the investigation results to date suggest that wastes buried under portions of the existing road pose a physical or chemical risk to public health and the environment, provided that they are not disturbed. This means that the Town may proceed to complete paving of the road. Should preliminary grading, filling or drainage activities encounter solid wastes, these limited, disturbed portions of wastes will need to be removed and properly disposed. The Town should be aware that the road may require more than the usual amount of maintenance due to possible settlement over the wastes.

8.4 Proper abandonment of residential wells.

The Town previously abandoned most of the residential wells in the area when the water line was connected to individual homes. Proper abandonment is important for several reasons, primarily to assure that contaminated groundwater is not used by future property owners located on or in the immediate vicinity of the landfill. There are still a number of lots with one or more old water wells that have not yet been abandoned. These locations will need to be properly abandoned by a qualified contractor in a manner prescribed by DEP.

The following Lots have wells that are recommended for abandonment: Lots 34-6.10 (one dug well and one drilled well), Lot 34-7 (one dug well and one drilled well), Lot 34-6.4 (2 drilled wells), Lots 34-6.1, 6.2, and 6.3 (these three lots owned by a single party together have one drilled, undersized pipe well).

Permission has or will be sought from all property owners prior to abandonment of their individual wells. Owners of lots that received public water signed a release letter that authorized the proper abandonment of their individual water supply wells. Permission to abandon wells will be requested of those few lot owners with existing wells on undeveloped properties located within or adjacent to the footprint of the area that has been supplied with public water.

8.5 Limitations on future development on and in the immediate vicinity of landfill wastes.

State Solid Waste Management Regulations prohibit new construction on or within 100 feet of the solid waste boundary of a landfill. The stated exceptions are for allowance of roads and drainage structures in the area less than 100 feet from the solid waste boundary. Based upon our current understanding of risks, we are not recommending removal of any existing structures or roads. These structures were in place prior to the recent applicability of Solid Waste Laws and Regulations to the site.

Construction concerns in this area of buried wastes are for landfill gas migration to enclosed structures, for physical hazards from metals, glass and other wastes, and for structural settlement. Construction development may also entail digging into or near wastes, thus requiring the proper health monitoring of personnel, and the proper disposal of any wastes encountered. The obvious other major concern here-use of contaminated groundwater-has already been addressed through availability of the public water supply line. There are a number of existing lots on or in close proximity to the landfill solid waste boundary which are currently undeveloped, or large enough to accommodate possible subdivision and additional development in the future. The Department will not approve of new construction on top of or within 100 feet of the areas identified in **Figure 1.2** as still containing landfill wastes.

While new construction on these lots with or near wastes may very well be possible, it should be done in locations at least 100 feet from the solid waste boundary of the landfill. Based upon current information, the following Lots either contain landfill wastes, or have portions of their property located within 100 feet of wastes. The one hundred foot setback from waste limitations for new, permanent and enclosed structures apply to the following locations: Lots 34-6., 34-6.A.Extension, 34-6.A.1., 34-7., 34-6.10., 34-6.5., 34-6.4., 34-6.3., 34-6.2, 34-6.1, 34-6.B.

Anyone wishing to pursue local building permits for permanent, enclosed construction in the area beyond 100 feet from the solid waste boundary may do so if they otherwise meet Town requirements. No permits are required from DEP for placement of enclosed, permanent structures that are locally permitted in the area beyond 100 feet from the solid waste boundary. Road or driveway construction in the area less than 100 feet from the solid waste boundary is permitted without the need for a State permit. It is important to keep in mind that the Department cannot guarantee that there are no risks posed to public health and safety in areas located even beyond 100 feet from the landfill solid waste boundary. While new construction on these lots is possible, it should be done in locations at least 100 feet from the solid waste boundary of the landfill.susseptible to health or safety risks from landfill gases. It is strongly advised that anyone constructing in this area hook up to the public water supply line.

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None of the above requirements should be construed to supercede Town authority to adopt additional and even more stringent building ordinances dealing with construction in the areas on and around the solid waste boundary of the landfill.

All owners of property lots that actually appear based upon current information to contain landfill solid wastes will be required by DEP to file a Property Deed Amendment that meets the terms of disclosure as noted in Solid Waste Management Law, 38MRSA, Section 1310-H-1, entitled *Notice to subsequent owners*. This will assure that future prospective owners are aware of the presence of landfill wastes on the property. Properties that have been identified as actually containing some portions of landfill solid wastes are Lots 34-6, 34-6.A.Extension, 34-6.A.1., 34-7., 34-6.10., 34-6.5., 34-6.4., 34-6.3.

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REPORT ON DEP INVESTIGATION WORK AT WELLS 9B LANDFILL

Wells, Maine

(March 2002-February 2003)

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