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228 Salem Street
WOBURN

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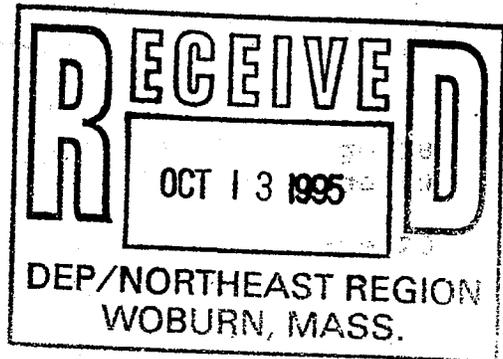
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FINAL REPORT
ENVIRONMENTAL SITE ASSESSMENT

228 SALEM STREET
WOBURN, MA

PREPARED FOR:
JOHN J. RILEY, JR.

SOILS AND HYDROGEOLOGY
ANALYSIS OF SOIL SAMPLES



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1. INTRODUCTION

21E Inc. was contracted on May 14th, 1990 by Mr. John J. Riley for Wedel Corporation to conduct a Phase I - Limited Site Investigation at the property located at 228 Salem Street in Woburn, MA. 21E Inc. has attempted to provide an accurate description of site conditions within the scope of this project.

A review of previously prepared reports for the Site and the surrounding area was conducted to minimize duplication of information gathered on the Site. The scope of this project included an update of municipal and state records pertaining to the subject property and the surrounding area. A site inspection was completed during this study. Soil borings and monitoring wells were installed on the property. Soil samples were field screened with an HNu photoionization meter. Selected soil and groundwater samples were analyzed for various analytes to better assess the subsurface environment. The monitoring wells installed on the property were surveyed and groundwater contour elevations and groundwater flow direction were calculated for the property. Conclusions drawn from the data collected are presented in the text of this report.



2. BACKGROUND

As part of this project, previously prepared reports on the property located at 228 Salem Street in Woburn, MA were reviewed. The following section summarizes the materials presented in the YE²ARS report entitled "Hydrogeologic Investigation of the John J. Riley Tanning Company" (hereafter referred to as YE²ARS) and the GEI report entitled "21E Assessment of J. J. Riley Property dated April 19, 1985 (hereafter referred to as GEI). Other documents have also been reviewed and pertinent data from those sources has also been presented in this section.

J.J. Riley Tanning Company has been in operation on the Site since approximately 1915. Currently, the property is vacant of any business. Previously, the operation existed on 15.8 acres of land. Since the previous reports, the back (northwest) area of the property has been subdivided and no longer is part of the Riley site. The current assessment was completed on approximately 10 acres of land. Formerly the tanning operations took place in Buildings 1 and 2. To the north of Building 1 is the former location of the bag house and lagoon. To the east of the lagoon is the former location of three underground fuel oil tanks and the power plant. To the north of the lagoon and power plant was the former hide storage area, which comprised about 51,000 square feet. On the northwestern portion of the current property, the lot is bounded by the drainage ditch. A sewer easement runs through the property between Building 1 and 2. A currently unused production well (PW#1) is located in the northeast portion of the property.

The property is bordered to the south by Salem Street, to the west by Wildwood Avenue, to the northwest by land formerly utilized by the Riley Company and by land to the northeast formerly occupied by Bio Assay Inc. The abutting lot to the northwest is currently occupied by the BASF Co. and the lot formerly occupied by Bio Assay Inc. is occupied by Toxikon Laboratories. To the east, the property is bordered by land owned by B&M Railroad. Across the B&M Railroad land located to the northeast of the Site is land currently owned by Wildwood Conservation Trust. This land was formerly owned by the Beatrice Food Company and a production well (PW#2) exists on this land which was formerly utilized by the Riley Company. Across Salem Street to the south is currently an office building. This lot, 215 Salem Street, is the former location of a leather tannery, Murray Leather Co. Also across Salem Street to the south is a concrete form operation and a business which sells banding saws and knives. A florist is located across Wildwood Avenue to the west of the Site.



Tanning operations on-site were primarily in the preparation of hides into leather for shoes. The facility was considered a medium sized operation. The process at the Riley site used the chrome tanning method.

The Riley facility used hexavalent chromium, in the chrome tanning method, however prior to introduction into the tanning process the chromium (hexavalent) was converted to trivalent chromium. Trivalent chromium is NOT a hazardous substance according to the EPA. Chemicals formerly used on the Site which are hazardous substances were benzidine based dyes, phenolic based detergents (for soaking of hides), ortho-dichlorobenzene (for disinfecting), butyl acetate (as a solvent for lacquers and finishing products), and 1,1,1-trichloroethane (for cleaning one embossing plate prior to 1979). Several other chemicals not classified as hazardous substances were also used at the Site. Butoxyethanol, diisobutyl ketone, and methoxyethanol are volatile compounds which were used as solvents in carrying lacquers and finishing products. Fuel oil was used for the power plant.

The tanning process at the Riley site produced several waste products. One of these products was the sludge collected in the lagoon in the northwest portion of the site. These solids were dredged periodically from the lagoon and from the catch basin and landfilled on-site. EP toxicity tests have been done on the material landfilled on-site and all levels including hexavalent chromium and total chromium are within acceptable levels. Buffing dust was also produced during the process. This dust was disposed of in a lagoon on-site. Buffing dust, which is primarily composed of leather particles, is not considered a hazardous waste according to the EPA and DEP. According to information obtained from Mr. Riley, the buffing dust has been removed from the Site.

Between November of 1980 and March of 1981, Ecology and Environment under contract to the EPA, sampled groundwater from PW#1 and PW#2. The results revealed levels of volatile organic compounds in both samples. Levels in PW#2, 28 to 1372 ppb (parts per billion) were significantly higher than from PW#1, 10 to 53 ppb. The source of contamination was not determined. According to the YE²ARS report "some of the contaminants present in PW#1 and PW#2 are also present in the City of Woburn's Municipal Production Wells G and H, which are located approximately 2000 feet northeast of Riley Production Well #2, and east of the Aberjona River (EPA, 1981)." Groundwater samples obtained from PW#1 were additionally analyzed for Priority Pollutants, no levels of benzidine were reported as detected.



As part of the investigation conducted by YE²ARS, nine (9) test pits were excavated on the 15.8 acre site. Three of the test pits (TP-7, TP-8, and TP-9) were located on the front (southern) 10 acres. TP-7 was excavated to a depth of 9'4", TP-8 to 6.5', and TP-9 to 7'. Six (6) monitoring wells were installed on the property by YE²ARS in 1983. Four of the six wells (B-1, B-2, B-3c, and B-6b) were installed in the front 10 acres. Refer to Figure 1 for former test pit and monitoring well locations. With the exception of B-6b, the wells were installed to bedrock. Groundwater levels in the four wells ranged from about 4 feet below grade in B-6b, to 37 feet in B-3c. Wells were surveyed and the groundwater flow direction was calculated to be west to east across the site. This flow direction was calculated while PW#2 was pumping under normal conditions.

Groundwater samples collected by YE²ARS in 1983 from wells B-1, B-2 and PW#1 were analyzed for chlorinated volatile organic compounds by EPA method 601. The results revealed no levels of chlorinated solvents in B-1 above the detection limit of 0.1 ppb. Groundwater from PW#1 was found to contain 0.4 ppb of trans-1,2-dichloroethene and 0.4 ppb of trichloroethene (TCE). 0.7 ppb trans-1,2-dichloroethene and 2.3 ppb of chlorobenzene were detected in the groundwater from B-2. This is a substantial decrease from the number and quantity of volatile organic compounds reported in 1980/1981 by Ecology & Environment.

Both reports concluded that the Riley tannery is not a probable source of contamination of Production Well #2. It was also concluded that the Riley site is not a probable source of the contamination detected in the City of Woburn's Municipal Wells G & H.

The previously mentioned underground tanks were removed in November of 1989 by Clean Harbors. According to a 1982 DEQE (now DEP) Division of Air Quality Control material storage sheet, the former tanks were all 15,000 gallons in capacity and 2 years old. Two of the tanks were used for the storage of #6 fuel oil and the other tank was used to store #2 fuel oil. A Woburn Fire Department Report stated that the three tanks were removed in November of 1989 and the excavation was free of product. Also stated in the report was that no penetrations were noted in any of the tanks. The excavation was backfilled with the existing fill, according to the report. One soil sample from the tank removal was analyzed by Clean Harbors laboratory. The sample was found to contain 110 ppm (parts per million) of petroleum hydrocarbon/oil & grease by IR.



Upon inspection of the property by 21E Inc., it was observed that the wells installed by YE²ARS were no longer existing on-site. However, 21E Inc. did note that three additional wells were located on the site. Information provided by Mr. Riley indicates that these wells were installed under authorization of Beatrice Foods through instruction by their council, Hale & Dorr. These wells were reportedly installed in July 1989. No logs or drilling information was available at this time for these wells.

Based upon the above information 21E Inc. proposed to install four additional wells on the property, screen soil samples in the field and again at 21E Inc. facilities under controlled conditions, and analyze selected soil samples in the laboratory.

21E Inc. proposed to analyze selected groundwater samples obtained from seven wells (three existing and four proposed) for concentrations of the eight RCRA metals, volatile organic compounds, petroleum hydrocarbons and semivolatile (acid/base/neutral) compounds. These analyses were chosen based upon the chemicals formerly used or detected at the property. For example, semivolatile analysis will detect benzidine and phenols, whereas, volatile organic analysis will detect the chlorinated and aromatic solvents.

The following sections summarize the updated review of municipal and state records, methods of field work, and results of field work. Conclusions are presented in the final text section of this report. Selected site plans, including groundwater flow and contours, as well as logs and field data collected during the study are included as Figures and Appendices.



3. SITE INVESTIGATION

3.1 SITE OWNERSHIP AND LOCATION

According to Mr. John J. Riley the property is owned by the Wedel Corporation and is located at 228 Salem Street in Woburn, MA. As shown on the north central portion of the Boston North, MA 7.5 X 15 minute topographic quadrangle map, the site is located approximately 2100 feet east of the WoodBrook Cemetery and 8000 feet and 10,000 feet southwest of Woburn Municipal Wells G and H, respectively (see Figure 2). The boundaries of the site are shown on maps 16 and 21, X coordinate 698264 and Y coordinate 542743 of the City of Woburn Assessors plans (see Figure 3).

The Site is comprised of approximately 10 acres. The Site lies between the 50 and 90 foot contours on the USGS Boston North, MA quadrangle. The topography of the Site generally slopes to the northeast and east. The former operations buildings occupy the central portion of the Site. Vegetation exists on-site and appears to be healthy.

3.2 MUNICIPAL FILE REVIEW

Information was reviewed at the Woburn Health Department regarding site investigations on the subject site and properties in the vicinity of the Site. These properties included, but are not limited to, Whitney Barrel Co. at 256 Salem Street, Murphy Waste Oil Co. at 252 Salem Street, the property at 225 Wildwood Avenue, and Woburn Municipal Wells G and H. Conversations with Mr. Jack Fralick, Director of the Board of Health, indicated he knew of no releases of petroleum or hazardous materials at the Site since the completion of the 1985 GEI report.

Records available at the Woburn Fire Department concerned the removal of three 15,000 gallon underground fuel oil storage tanks (USTs). The records indicated these USTs were installed in 1981, and that two of the USTs contained #6 oil and the third UST contained #2 oil. Chief Doherty of the Woburn Fire Department indicated he knew of no problems at the Site concerning any releases of petroleum or hazardous materials since the completion of the 1985 GEI report.

Conversations with representatives of the Woburn Conservation Commission indicated the Conservation Commission is unaware of any specific on-site problems, and that wetlands existed to the east of the site along the B&M railroad property.



5. RESULTS

5.1 GEOLOGY AND HYDROGEOLOGY

The following is a description of the geologic and hydrogeologic characteristics of the subject property, which lies within the tributary basin of the Aberjona River. The topography of the subject site slopes to the northeast and east. Surface water is expected to follow the natural topography of the Site and flow to the east and northeast.

The geology of the Site consists of bedrock overlain by surficial deposits. The local bedrock in the area of the Site has been mapped by the USGS as a Proterozoic Period complex of diorite and gabbro, with subordinate metavolcanic rocks and intrusive granite and granodiorite. Local surficial deposits have been mapped by hydrological surveys (HA-589) as stratified and sorted deposits of sand, gravel, boulders, silt and clay. The Site is located within three differing areas of water well yield rates and transmissivity rates. Water well yields range from less than 100 gallons/minute (gpm) to greater than 300 gpm, and transmissivity values typically range from less than 1,400 to greater than 4,000 ft²/day. According to Hydrologic-Data Report No. 21, Production Well #1 for the John J. Riley Co. was installed in 1945 to a depth of 35 feet, and has a well yield rate of 500 gpm.

Subsurface investigations completed for this study included the advancement of four soil test borings, by hollow stem auger methods, and the installation of four monitoring wells. Monitoring well MW1 was drilled in the front portion of the Site to assess local conditions. MW2 was located in the vicinity of the front of Building #2. MW3 was sited near the former hide storage area and former lagoon. MW4 was sited in the vicinity of the former underground fuel oil storage tanks. Three monitoring wells had been previously placed on the Site and for the purposes of this report were arbitrarily named RR-1, RR-2, and RR-3. No soil boring data was available for these wells. Refer to Figure 5 for locations of these monitoring wells.



Based upon the information gathered during the advancement of the four hollow stem auger borings, the local on-site soil sequence consists of asphalt or loam overlying stratified deposits, in concurrence with previously reported USGS information. The loam typically consisted of dark brown, fine grained sands, and silts interlayered with root matter and traces of gravel. Below the asphalt or loam layer, a sand and gravel layer was encountered which typically consisted of fine to coarse grained sands and gravel, silts, cobbles and boulders. Below the sand and gravel layer, a fine to very fine grained sand layer was generally encountered, although in boring MW3 a very fine sand lens was found within the sand and gravel layer at a depth of 7 to 12 feet below existing grade. Also at this boring location, a layer of black sand was encountered at a depth of 34 to 35.5 feet, just prior to encountering the till stratum. In borings MW1, MW3, and MW4 till was encountered below the sand layer, prior to encountering refusal. The till layer typically consisted of dense, fine grained sands and silts interbedded with gravel.

During the course of this investigation, the monitoring wells were surveyed and additional depth to groundwater measurements were collected. The depth to groundwater measurements were converted to elevations to define the local potentiometric surface (i.e. the water table). The elevation of the potentiometric surface in each well was then computer contoured and hand smoothed. Three point problems were used as a check. The completed groundwater contour map is included as Figure 6. Inferred groundwater flow direction was determined to be easterly across the subject site.

5.2 HNU SCREENING OF SOIL SAMPLES

Soil samples obtained during the subsurface investigations were field screened with an HNu photoionization meter model PI101. Additionally, samples were screened under controlled conditions. The utilized analysis method is described both in Section 4.3 and Appendix B of this report. In general, the HNu photoionization meter is used to screen for a wide variety of organic and inorganic compounds. The results of the HNu screening are presented in Appendix A of this report as a component of the Soil Boring Logs.

No levels of volatiles were detected, by HNu screening, in any of the soil samples obtained from the soil borings.



5.3 CHEMICAL ANALYSIS

5.3.1 SOIL SAMPLES

As previously described, soil samples were collected for selected laboratory analysis. Specific samples chosen for analyses were based upon the boring location and the depth of the soil sample. Refer to Table 1 and Appendix D for results.

RCRA METALS

Three soil samples from the borings were analyzed for RCRA metals. The RCRA metals include arsenic (As), barium (Ba), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), selenium (Se), and silver (Ag). This method uses an acid digestion of the sample followed by analysis on a graphite furnace, or an atomic absorption unit, or an inductively coupled argon plasma instrument; with the exception of mercury which utilizes a cold vapor extraction procedure.

The results of the analysis reveal levels of arsenic in all three samples (3.1 - 6.8 ppm) within the commonly expected range found in soils (0.1 - 40 ppm). Barium was found in all three samples ranging from 15 to 58 ppm. The commonly found levels of Ba in soils range from 100 to 3500 ppm. Cd was found in the soils from 0.1 to 0.2 ppm. Levels found in soils commonly range from 0.1 to 0.7 ppm. Levels of chromium were found in the samples between 17 and 24.3 ppm which are well within the commonly expected levels of 5 - 3000 ppm. Lead was detected between 3.8 and 6.7 ppm. Commonly expected levels are 2 - 2000 ppm of lead in soil. No levels of mercury or selenium were detected in the soil samples. The detection limit for mercury and selenium are 0.1 and 0.5 ppm, respectively. The common range for silver in soils is 0.1 - 5 ppm. Silver was detected in the soils analyzed at 0.1 ppm.

5.3.2 GROUNDWATER ANALYSIS

As previously described, groundwater samples were collected for selected laboratory analysis. The specific analysis chosen for each well was dependent on the location of the well. For a summary of results refer to Table 2 and Appendix D.



VOLATILE ORGANIC COMPOUND ANALYSIS (EPA method 624)

Seven groundwater samples were analyzed for volatile organic compounds by EPA method 624 at New England ChromaChem of Salem, MA. VOA (volatile organic analysis) was performed due to the past solvent usage on the property and the previous analytical data generated from on- and off-site sources. This analytical method uses a purge and trap unit attached to a gas chromatograph with a mass spectrometer detector (GC/MS). Groundwater samples from all wells (MW1, MW2, MW3, MW4, RR-1, RR-2, and RR-3) were submitted for analysis of volatile organic compounds. The results reveal no levels of volatile organic compounds above the detection limit in any of the samples. The detection limit was 1 part per billion (ppb).

PETROLEUM HYDROCARBON ANALYSIS

Five groundwater samples were submitted for petroleum hydrocarbon (PHC) analysis at Environmental Consulting Laboratory, Inc. of Billerica, MA. PHC analysis was chosen due to the past petroleum storage and releases in the area and on the subject property. This method uses a solvent extraction of the sample, followed by concentration of the extract then injection into a gas chromatograph with a flame ionization detector (GC/FID). The results of the five groundwater samples analyzed, MW1, MW2, MW3, MW4, and RR-2, reveal no levels of petroleum hydrocarbons above the detection limit of 0.1 ppm.

RCRA METALS

Three groundwater samples (MW1, MW3, and RR-2) were analyzed for RCRA metals. RCRA metals include arsenic (As), barium (Ba), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), selenium (Se), and silver (Ag). This method uses an acid digestion of the sample followed by analysis on a graphite furnace, or an atomic absorption unit, or an inductively coupled argon plasma instrument; with the exception of mercury which utilizes a cold vapor extraction procedure.

The groundwater sample obtained from MW1 was found to contain As at 9 ppb, barium at 120 ppb, cadmium at 7 ppb, chromium at 50 ppb, lead at 21 ppb, and Ag at 1 ppb. No levels of mercury or selenium were detected in the sample. The following metals were detected in MW3, As at 8 ppb, Ba at 70 ppb, Cr at 30 ppb, and lead at 4 ppb. Cadmium, mercury, selenium and silver were not detected. RR-2 was found to contain Ba at 20 ppb, and Cr at 10 ppb. No levels of arsenic, cadmium, lead,



mercury, selenium or silver were detected in the groundwater from RR-2. All levels detected are at or below Massachusetts Ground Water Standards. The standards have been set at 50 ppb for arsenic, 1,000 ppb for barium, 10 ppb for cadmium, 50 ppb of chromium, lead at 50 ppb, 2 ppb of mercury, selenium at 10 ppb, and silver at 50 ppb.

SEMIVOLATILE ORGANIC ANALYSIS (EPA method 625)

Two groundwater samples were chosen for semivolatile organic analysis (acid/base/neutral, ABN) at Water Control Laboratories. ABN analysis was performed due to the past usage of benzidine and phenols in the manufacturing process on-site. This method uses a solvent extraction at an alkaline pH followed by a solvent extraction at an acidic pH. The extracts are concentrated then injected into a gas chromatograph with a mass spectrometer detector. The results revealed no semivolatile compounds, including pesticides and PCBs, in the groundwater samples analyzed.

TABLE 2
ANALYTICAL TABLE
GROUNDWATER

SAMPLE LOCATION	ANALYTE										
	As	Ba	Cd	Cr	Pb	Hg	Se	Ag	VOA	PHC	ABN
MW1	9	120	7	50	21	ND	ND	1	ND	ND	NA
MW2	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	NA
MW3	8	70	ND	30	4	ND	ND	ND	ND	ND	NA
MW4	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND
RR-1	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA
RR-2	ND	20	ND	10	ND	ND	ND	ND	ND	ND	NA
RR-3	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND
Mass GW Standards (1)	50	1000	10	50	50	2	10	50			

ND: Not Detected
NA: Not Analyzed

NOTE: All Values are in parts per billion

(1) From "Guidance For Disposal Site Risk Characterization And Related Phase II Activities, DEP ORS (1989)





6. SUMMARY AND CONCLUSION

The purpose of this investigation was to determine if a release or threat of release of oil or hazardous materials exists on the property located at 228 Salem Street in Woburn, MA. All pertinent information gathered has been presented herein. 21E Inc. has attempted to provide an accurate description of Site conditions within the scope of this project.

The property is the former location of the Riley tanning company which began operations at the Site in approximately 1915. Currently the Site is vacant. The Riley tanning company was a medium sized chrome tanning operation. The principle product was leather for shoes. As part of the process several chemicals were used on the site. Some of these are benzidine, phenols, 1,1,1-trichloroethane, butyl acetate, ortho-dichlorobenzene, and fuel oil (used as a heating fuel).

Previous investigations at the Site revealed that low levels of chlorinated solvents were present in the groundwater at the Site. The sludge which was produced from the former plant operations and which was collected in an on-site catch basin and lagoon, was analyzed for EP toxicity. All levels of chemicals detected in the EP extract were within acceptable ranges, therefore, the materials are classified as not hazardous. 21E Inc. is of the opinion that the waste material would, if anything, become less hazardous over time, therefore testing the material for this scope was not deemed to be necessary.

An update, since 1985, of municipal and state (DEP) files was completed as part of this investigation. Municipal records reveal several site investigations have been conducted in the immediate area since 1985. These properties include Whitney Barrel Company at 256 Salem Street, Murphy Waste Oil Company at 252 Salem Street, the property at 225 Wildwood Avenue, and Woburn Municipal Wells G and H. Fire Department records included documentation of the removal of three 15,000 gallon underground fuel oil storage tanks from the Riley property.

DEP records included reports on a subsurface investigation at Murphy Waste Oil Company property. This investigation found soils and groundwater contaminated with volatile organic compounds, petroleum, and PCBs. A study at 225 Wildwood Avenue revealed volatile organic contamination in both soil and groundwater on-site. An NOR was issued to Whitney Barrel at 256 Salem Street. The NOR required subsurface investigation at the property. The subsurface investigation revealed contamination of both soil and groundwater with volatile organic compounds,



semivolatile organic compounds, PCBs, and metals. Further investigations are ongoing at the property.

The geology of the Site was gathered from available reports and the current subsurface investigation of the property. The subsurface investigation consisted of the drilling of four soil borings and the installation of four monitoring wells. The information gathered from the subsurface investigation is consistent with the available reports. The Site is underlain by surficial deposits consisting of stratified and sorted deposits of sand, gravel, boulders, silt and clay. These surficial deposits are underlain by bedrock which has been mapped to be a complex of diorite and gabbro of the Proterozoic Period. The monitoring wells on the property were surveyed and depth to groundwater measurements were collected and converted to elevations to define the potentiometric surface or water table. The measurements were used to calculate the inferred groundwater flow direction, which was determined to be east.

Soil borings were drilled on the property and undisturbed soil samples were collected. All soil samples were screened with an HNu photoionization meter and selected soil samples were submitted for laboratory analysis. Monitoring wells were installed in all four of the soil boring locations. Groundwater samples were collected and analyzed from the four installed wells (MW1, MW2, MW3, and MW4) and three previously installed wells (RR-1, RR-2, and RR-3).

The results of the analysis reveal no volatile organic compounds in the groundwater collected from MW1, MW2, MW3, MW4, RR-1, RR-2 or RR-3. Groundwater samples analyzed for petroleum hydrocarbons (MW1, MW2, MW3, MW4, and RR-2) revealed no petroleum products. Semivolatile analysis of groundwater collected from MW4 and RR-3 revealed no semivolatile compounds, including pesticides and PCBs, present in the samples. Total RCRA metals analysis of groundwater from MW1, MW3, and RR-2 revealed no levels above the Drinking Water Standards as set forth by the Massachusetts Department of Environmental Protection. Soil samples (MW1, MW3 and MW4 at about 35') analyzed for total RCRA metals do not indicate levels above the commonly expected ranges.

Based on the data collected during the course of this investigation, it is the opinion of 21E Inc. that there is no evidence of a release or threat of release of oil or hazardous materials on the property located at 228 Salem Street in Woburn, MA. In addition, based on data obtained from this investigation, it appears that previous operations at the property have not adversely affected the integrity of the Site.