Phase I
Remedial Investigation/
Feasibility Study
Work Plan

Fashion Cleaners
641 East Park Avenue
Long Beach, New York 11561

NYSDEC Site Code 130170

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Submitted To:

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Phase I Remedial Investigation/Feasibility Study Work Plan

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TABLE OF CONTENTS

1. INTRODUCTION 1

1.1 PURPOSE 1
1.2 SITE DESCRIPTION AND HISTORY 2
1.2.1 Property Location and Legal Description 2
1.2.2 Topographic/Geologic/Hydrogeologic/Hydrologic Conditions 3
1.2.3 Site and Vicinity Characteristics 5
1.3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS 8
1.3.1 Limited Investigation Conducted by ERM (June 2005) 8
1.3.2 Limited Investigation Conducted by BEI (September 2005) 9
1.3.3 Interim Site Visit (February, 2008) 10
1.3.4 NCDOH Boiler Blow-Down Inspection 11
1.4 SITE CONCEPTUAL MODEL 11
1.5 REMEDIAL INVESTIGATION PROJECT ORGANIZATION 13

2. REMEDIAL INVESTIGATION 14

2.1 UNDERGROUND UTILITY EVALUATION 16
2.2 TIDAL INFLUENCE EVALUATION 16
2.3 SUB-SURFACE EVALUATION 17
2.3.1 Soil Borings 18
2.3.2 Groundwater Monitoring Wells 19
2.4 GROUNDWATER SAMPLING AND ANALYSIS 22
2.5 HYDRAULIC CONDUCTIVITY ESTIMATION 22
2.6 GROUNDWATER FLOW EVALUATION 22
2.7 SOIL VAPOR INTRUSION ASSESSMENT 23
2.8 DECONTAMINATION 24
2.9 HANDLING OF INVESTIGATION DERIVED WASTES 25
2.9.1 Soil 25
2.9.2 Groundwater 26
2.9.3 Decontamination Fluids 26
2.9.4 PPE and Associated Debris 26
2.10 DATA USABILITY REPORT 26
2.11 RI REPORT 27
2.12 PHASE II RI 27
2.12.1 Off-Site Delineation of Contamination 27
2.12.2 Human Health Exposure Assessment 28
2.12.3 Fish and Wildlife Impact Analysis 29

3. FEASIBILITY STUDY 30

3.1 DEVELOPMENT OF REMEDIAL ALTERNATIVES 30
3.2 INTERIM REMEDIAL MEASURE (IRM) 31
3.3 SCREENING AND ANALYSIS OF REMEDIAL ALTERNATIVES 31
3.3.1 Detailed Analysis of Alternatives 32
3.4 FEASIBILITY STUDY REPORT 33

4. PROJECT SCHEDULE 34

5. REFERENCES 35

TABLE OF CONTENTS (Continued)

FIGURES

Figure 1-1 Site Location
Figure 1-2 Site Plan
Figure 1-3 Site Layout
Figure 1-4 Well Radius Search Results
Figure 1-5 June 2005 PCE and TCE Analytical Results
Figure 1-6 September 2005 PCE and TCE Analytical Results
Figure 2-1 Proposed Groundwater Testing Locations
Figure 2-2 Proposed Soil Testing Locations
Figure 2-3 Proposed Soil Vapor Intrusion Assessment Sampling Locations
Figure 4-1 Project Schedule

TABLES

Table 2-1 Phase I RI – Sampling and Analytical Summary

APPENDICES

Appendix A Photographic Documentation - February 20, 2008 Site Visit
Appendix B Key Project Personnel Resumes
Appendix C Community Air Monitoring Plans (Ground Intrusive and Non-Intrusive Activities)
Appendix D Guidance for the Development of Data Usability Summary Report

1. INTRODUCTION

1.1 Purpose

EnviroTrac Ltd. (EnviroTrac) was contracted by Cougar Management & Realty Services, Inc. (Cougar Management), on behalf of Lido Realty Co. (Lido Realty), to prepare a Phase I Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the Fashion Cleaners Site (Site) located at 641 East Park Avenue, Long Beach, New York 11561-2512 (Figure 1-1). The Site is assigned New York State Department of Environmental Conservation (NYSDEC) Class 2 Inactive Hazardous Waste Disposal Site Registry Site Code 130170. Lido Realty entered into a Consent Agreement (Index #AI-0589-0507)[1] with the NYSDEC to develop and implement an inactive hazardous waste disposal site remedial program for the Site that shall include a Remedial Investigation/Feasibility Study (RI/FS).

The RI/FS for the Site will be conducted in a phased approach. The first phase of the RI includes a background data review and initial Site investigation activities. The background review, which included a historical records search and review, was performed to gain a better understanding of the history of the Site. In addition, information pertaining to surrounding properties and potential sensitive receptors was reviewed. Two (2) historical environmental reports, summarizing previous limited subsurface investigations conducted at the Site, were reviewed and utilized as guides during the preparation of the proposed scope of the investigative portion of the initial RI phase. The Phase I investigation activities will concentrate on confirming the results of prior testing of soil and groundwater conducted in 2005 and, through the use of this information as a guide, developing an understanding of current conditions with respect to soil and groundwater quality, assessing the potential for soil vapor intrusion at on-site and near-site locations and further developing the site conceptual model.

Following completion of the on-site soil evaluation that is a component of the first phase of the RI, an IRM Work Plan will be prepared and submitted to the NYSDEC. The IRM will be designed to reduce concentrations of volatile organic compounds (VOCs) identified during the subsurface investigation. The final scope of the second phase of the

RI will be determined following implementation and completion of the Phase I investigation, at which time a Phase II RI Work Plan will be prepared. It is anticipated that the second phase of the RI will focus on additional on-site soil, groundwater and soil vapor investigation as warranted, off-site evaluation of groundwater soil vapor, and other investigative work required to complete the RI and to support the development of a Feasibility Study (FS).

A Health and Safety Plan (HASP), Sampling and Analysis Plan (SAP) and a Citizen's Participation Plan (CPP) have been developed and are provided under separate cover. The HASP is intended to ensure the health and safety of workers and the immediate community during performance of the RI. The SAP contains both a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). It outlines data quality objectives and details the specific sampling procedures and the relevant sampling and analytical protocols to ensure that the data collected during the RI are of sufficient quality to support remedial decisions. The CPP outlines activities to ensure adequate involvement of the community in the remedial process.

1.2 Site Description and History

1.2.1 Property Location and Legal Description

The Site consists of a rectangular-shaped parcel of land measuring approximately 1,600 square feet located at 641 East Park Avenue, City of Long Beach, Nassau County, New York 11561-2512, on the northern side of East Park Avenue between Neptune Boulevard and Roosevelt Boulevard. The Site is occupied by a portion of a one story commercial building with a boiler room and small rear yard area to the north. The Site is designated on the Nassau County Tax Map as Section 59, Block 229, Lot 21. The physical location of the Site is at Latitude 40° 35' 20" North and Longitude 73° 38' 42" West.

1.2.2 Topographic/Geologic/Hydrogeologic/Hydrologic Conditions

Geology

The barrier island on which Long Beach is located lies within the Atlantic Coastal Plain Province, which extends beneath the Atlantic Ocean about 100 miles offshore to the edge of the continental shelf. The southern portion of Long Island is a low glacial outwash plain, which slopes southward towards the ocean. The "physiographic root" is formed by two terminal moraines along the northern side of Long Island. The area is underlain by eight geological units of unconsolidated deposits of sand, gravel, and clay that were laid down in parallel beds on the surface of hard, crystalline bedrock.[2]

The north shore is frequently categorized by a bluff and is indented by bays. From the southernmost moraine, the land surface slopes gently southward toward the Atlantic Ocean. The southern shoreline is poorly defined, merging into salt marshes. Surface formations are composed of unconsolidated sands, gravels, and some clays; therefore, precipitation infiltrates quickly and streams are small with a steady flow from underground sources.[3]

Based on regional knowledge, subsurface geology at the Site is expected to consist predominantly of coarse to fine sands intermixed with silts, clays, and gravels.

Hydrogeology

The City of Long Beach obtains all of its potable water from deep wells screened in the deepest water bearing formation in Nassau County, the Lloyd formation. The formation rests upon bedrock varying between 1,400 and 1,500 feet below sea level. The surface of the bedrock slopes at a rate of 60 to 80 feet per mile or 1½ percent to the southeast. The rock consists primarily of schists and gneisses. The Lloyd sands are a Cretaceous Age deposit and a member of the Raritan formation, believed to be about 100 million years old. Withdrawals from the Lloyd formation, reduced water levels in the overlying source strata, and the presence of the relatively impervious Raritan clay overlying the

Lloyd formation, all contribute to the lower piezometric heads in the formation and the cessation of free flowing wells.

The Raritan clay is a member of the Raritan formation and is composed mostly of silty clays and non-continuous layers of sand beneath Long Beach, it is about 300 feet thick and 900 feet below sea level. The impervious nature of the Raritan clay makes it unusable for water supply. However, it provides protection to the Lloyd sands against saltwater encroachment from above. The Raritan clay is overlain by the Matawan group, referred to as the Magothy formation. The formation is salted beneath Long Beach, therefore, unusable as public water supply. A number of the shallower Magothy wells have experienced deteriorating water quality from nitrate pollution. This indicates that existing and future wells may require deeper screening to remedy nitrate pollution. Extensive deepening may affect the hydraulics within the Lloyd formation beneath Long Beach, which could lead to heavy salting. Such salting would destroy the only source of fresh water supply within the boundaries of the City of Long Beach.[4]

Based on a review of historical environmental reports (refer to Section 1.3), ground water at the Site reportedly occurs at depths ranging from 4 to 10 feet below grade (ft. bg.). The direction of groundwater flow at the Site is undetermined at this time. The Site is located in close proximity to two (2) tidal water bodies and previous environmental activities conducted at the Site did not yield a sufficient quantity of monitoring wells to calculate an accurate local groundwater flow direction.

Surficial Geology and Topography

Most of the major features of the present-day topography of Long Island are a result of the Pleistocene glaciation and are oriented in belts or ridges parallel to the island's length. The most prominent are two east-west trending morainal ridges (Ronkonkoma and Harbor Hill moraines) that traverse the island. Neither of these moraines are located within the borders of the City of Long Beach. Long Beach is considered part of the outwash plain slope that extends southward from the base of the Ronkonkoma Moraine in Nassau County to the southern shore. The outwash plain has an altitude of 100 to 150 feet along its northern border and slopes southward at about 20 feet per mile. It is

overlain by recent deposits of sand, silt, and organic material along the south-shore beaches and along stream channels.[5]

The topography of Long Beach is typical of most barrier beach areas. It is extremely flat, with grades slightly higher near the ocean beaches. Grades vary, generally between eight and 11 feet above mean sea level along the beachfront to grades at Reynolds Channel from five to seven feet above mean sea level.[4] Elevations are generally less than 10 feet above the National Geodetic Vertical Datum (NGVD).[2]

Included as Figure 1-1 is a copy of the current annotated 7.5 minute series United States Geological Survey (USGS) map (Lawrence Quadrangle) showing the Site location, surface topography, drainage patterns, and cultural features. The Site appears relatively flat with an approximate elevation of 3 feet above mean sea level (amsl). The Sarazen Canal is located approximately 260 feet to the northwest of the Site and the Atlantic Ocean is located approximately 2,230 feet to the south of the Site.

1.2.3 Site and Vicinity Characteristics

The Site is located in a retail shopping center building located in a mixed residential and commercial area of Long Beach, New York. The building appears to be of slab on-grade construction and does not contain a basement. Commercial properties adjoin the Site to the east and west and residential properties are located to the north; surrounding properties do not appear to contain basements. An aerial photograph of the Site and surrounding area is presented as Figure 1-2 and a Site layout map is included as Figure 1-3.

According to information obtained from the City of Long Beach through a Freedom of Information Act (FOIA) file review and from Sanborn Fire Insurance Maps (Sanborn Maps) and historical aerial photographs obtained through Environmental Data Resources, Inc. (EDR) of Milford, Connecticut, the shopping center building appears to have been constructed in 1951 and a dry cleaner appears to have operated at the Site since at least 1966. The Site is currently owned by Lido Realty and has been operated as Fashion Cleaners for over ten (10) years by the current tenant, Oceanside Sands

Cleanery. The tenant space consists of a reception area, a dry cleaning equipment room, a steam press and work area, a boiler room, and a small exterior yard area.

1.2.3.1 Environmental Database Review

Standard source information and any other reasonably ascertainable records were obtained from local, state, and federal environmental information databases. This information was reviewed in the form of a Radius Map report prepared by EDR and an Environmental Report prepared by Toxics Targeting, Inc. (TTI) of Ithaca, New York. Based on a review of the referenced reports, the Site was identified on the NYSDEC Inactive Hazardous Waste Disposal Sites database as Site Code 130170. The listings include a summary of historical investigations that have been performed at the Site and include the NYSDEC's conclusion that a remedial investigation is necessary. The Site is currently assigned Classification Code 2, which is assigned to a site at which "the disposal of hazardous waste has been confirmed and the presence of such hazardous waste or its components or breakdown products represents a significant threat to the environment or to health." The Site was also identified on the Hazardous Waste Generators and Transporters database. The Site is assigned facility identification number NYD047660253 as a small quantity generator.

One (1) additional dry cleaner was identified within a one-half mile radius of the Site. Kwik Wash Laundromat, located at 657 East Park Avenue, Long Beach, New York 11561 is located approximately 113 feet to the east of the Site. Based on a review of the Sanborn Maps, the facility appears to have been operated as a dry cleaner since at least 1950. According to a review of the environmental database reports, this facility was identified on the Hazardous Waste Generators and Transporters database as a small quantity generator under facility identification number NYD981141195. No additional listings were identified for this facility.

1.2.3.2 Potential Sensitive Receptors

The Radius Map report prepared by EDR and a Sensitive Receptor Report prepared by TTI were reviewed for potential sensitive receptors in the area of the Site. The reports

included a search of registered wells in the area of the Site. Additionally, the Sensitive Receptor Report included potential sensitive receptors such as public facilities, parks, and beaches. Seven (7) wells were identified within a one-half mile radius of the Site. One (1) well, located approximately 2,118 feet to the west of the Site, appears to be owned by the Nassau County Department of Public Works. The well is reportedly installed to a depth of 30 feet below grade (ft. bg.) and is utilized for monitoring purposes. The six (6) remaining wells appear to comprise two (2) public water supply well fields which are located approximately 1,200 and 1,800 feet to the east of the Site, respectively. The supply wells appear to be owned by the City of Long Beach and are reportedly installed within the Lloyd Aquifer at depths ranging from 1,225 to 1,470 ft. bg.

EnviroTrac conducted a private well survey at the NYSDEC Region I office on July 17, 2008 to confirm and refine the results included in the EDR and TTI reports summarized above. The well survey included a search of all wells that have been registered with the NYSDEC Division of Water. The survey confirmed that two (2) public supply wells, both reportedly owned by the City of Long Beach, exist within a one-half mile radius of the Site. Well N-5308 is located approximately 1,600 feet to the east of the Site at East Park Avenue and Pacific Boulevard and was reportedly completed to a depth of 1,225 ft. bg. in April 1956. Well N-8233 is located approximately 1,800 feet to the east of the Site at East Park Avenue and Maple Avenue and was reportedly completed to a depth of 1,230 ft. bg. in May 1967. Well N-5308 is reportedly screened 1,160 feet below the top of the well casing and N-8233 is reportedly screened 1,176 from the top of the casing. Refer to Figure 1-4 for a depiction of the locations of the public supply wells.

Five (5) day care facilities, one (1) school, two (2) churches, and one (1) hospital were also identified in the EDR and TTI reports within a one-half mile radius of the site. The nearest is the Congregation Beth Sholom located at 315 Roosevelt Boulevard, Long Beach, New York 11561, approximately 277 feet to the southeast of the Site. Additionally, Long Beach Park, located along the shoreline of the Atlantic Ocean, is located approximately 2,095 feet to the south of the Site.

1.3 Previous Environmental Investigations

Two (2) environmental investigations were previously conducted at the Site, the results of which were reviewed and are summarized below. As part of an environmental review of the Site, a limited soil and groundwater investigation was conducted at the Site in June 2005 by Environmental Resources Management – Northeast (ERM) of Melville, New York, on behalf of the property owner, Lido Realty. The results of the investigation are summarized in a letter report prepared by ERM dated July 29, 2005[6]. Based on the results of the June 2005 ERM investigation, an additional limited investigation was subsequently conducted at the Site in September 2005 by Berninger Environmental, Inc. (BEI) of Bohemia, New York, on behalf of the current Fashion Cleaners tenant. The results of this investigation are summarized in a letter report prepared by BEI dated November 27, 2005[7]. The results of these previous investigations will be used to formulate and guide the initial scope of the RI.

1.3.1 Limited Investigation Conducted by ERM (June 2005)

As part of the limited investigation conducted at the Site by ERM in June 2005, two (2) preliminary shallow hand borings and five (5) soil borings were installed at the Site. Four (4) of the soil borings (SB-01 through SB-04) were installed in the rear exterior portion of the Site, located to the north of the building, and one (1) soil boring (SB-05) was installed within the interior portion of the building, located adjacent and to the north of the room containing the dry cleaning equipment. Refer to Figure 1-5 for soil boring locations. Ground water was reportedly encountered at depths ranging from 8 to 10 ft. bg. in the five (5) soil borings. Additionally, following the collection of soil samples, soil borings SB-01 and SB-05 were completed as monitoring wells MW-01 and MW-02, respectively.

Analytical results reportedly revealed the detection of the dry cleaning solvent tetrachloroethylene (PCE) above the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objective (RSCO) of 1,400 micrograms per kilogram (ug/Kg) in soil samples collected at soil borings SB-01, SB-02, and SB-05. Two (2) soil samples, one deep and one shallow, were collected at SB-01, SB-02, and SB-05; PCE concentrations in the six (6) samples ranged from 230 ug/Kg to

440,000 ug/Kg. Contaminant concentrations reportedly decreased with depth at each boring. Trichloroehtylene (TCE), the primary metabolite of PCE, was detected above the RSCO of 700 ug/Kg in the soil samples collected at soil boring SB-05. Concentrations ranged from 3,900 ug/Kg in the deep sample (7.0 to 8.0 ft. bg.) to 71,000 ug/Kg in the shallow sample (4.0 to 4.5 ft. bg.). Refer to Figure 1-5 for a summary of PCE and TCE soil sampling analytical results.

Groundwater at both monitoring well locations was reportedly also impacted by PCE and TCE. PCE was detected at a concentration of 32,000 micrograms per liter (ug/L) at monitoring well MW-01 and TCE was detected at a concentration of 180 ug/L. PCE was detected at a concentration of 88,000 ug/L at MW-02 and TCE at a concentration of 18,000 ug/L. Refer to Figure 1-5 for a summary of PCE and TCE groundwater sampling analytical results.

1.3.2 Limited Investigation Conducted by BEI (September 2005)

As part of the BEI investigation, a total of five (5) additional soil borings were installed at the Site in September 2005 (Figure 1-6). Three (3) of the locations were intended to duplicate boring locations that had previously been installed by ERM (BEI-01, BEI-02, and BEI-05, one (1) boring was installed in the central portion of the building (BEI-06), and one (1) boring was installed to the south of the building (BEI-07). Ground water was reportedly encountered in the borings at depths ranging from 4 to 6.5 ft. bg. Based on field observations, soil samples were collected at four (4) boring locations; a soil sample was not collected at the boring installed to the south of the building as suspect field characteristics (i.e., odor, staining, elevated photo-ionization detector (PID) readings)) were reportedly not observed. Soil borings BEI-02, BEI-06, and BEI-07 were completed as temporary monitoring wells GW-2, GW-6, and GW-7, respectively following the completion of soil sampling activities to allow for the collection of groundwater samples. Additionally, groundwater samples were collected from previously-installed monitoring wells MW-01 and MW-02 and a liquid sample was collected from the steam boiler blow-down discharge piping, located in the vicinity of MW-01 (Figure 1-6).

Analytical results reportedly revealed PCE was detected at a concentration of 330,000 ug/Kg in the soil sample collected at soil borings BEI-05 (4.5 to 6 ft. bg.), above the NYSDEC TAGM #4046 RSCO of 1,400 ug/Kg. TCE was detected at 1,900 ug/Kg in this sample, above the RSCO of 700 ug/Kg. Additionally, methylene chloride was detected at a concentration of 4,000 ug/Kg at soil boring BEI-05 (4.5 to 6 ft. bg.), above the RSCO of 100 ug/Kg. However, the analyte was also detected in the associated method blank and therefore, the detection may be due to laboratory contamination. Refer to Figure 1-6 for a summary of PCE and TCE soil sampling analytical results.

PCE and TCE were reportedly detected at concentrations exceeding the NYSDEC Groundwater Standards of 5 ug/L for both compounds in the groundwater samples collected at monitoring wells MW-01 and MW-02, temporary monitoring wells GW-2, GW-6, and GW-7, and the boiler blow-down discharge. PCE concentrations ranged from 8.4 ug/L to 19,000 ug/L and TCE concentrations ranged from 6.5 ug/L to 45,000 ug/L. Additionally, cis-1,2-dichloroethene was detected at concentrations slightly above the Groundwater Standard of 5 ug/L at MW-01, MW-02, GW-2, GW-6. Methylene chloride was detected at a concentration of 58 ug/L at MW-01, above the Groundwater Standard of 5 ug/L; however, the analyte was also detected in the associated method blank and therefore, the detection may be due to laboratory contamination. Additionally, groundwater samples collected at MW-02 and GW-6 reportedly exhibited concentrations exceeding Groundwater Standards of one or more of the VOCs 1-1 dichloroethene, 1,2,4,5-tetramethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 4-isopropyltoluene, ethylbenzene, isopropylbenzene, m,p-xylene, naphthalene, and n-propylbenzene. Refer to Figure 1-6 for a summary of PCE and TCE groundwater and boiler blow-down discharge sampling analytical results.

1.3.3 Interim Site Visit (February, 2008)

A Site reconnaissance was conducted on February 20, 2008 to characterize on-Site conditions through visual inspection and to assess the Site's location with respect to surrounding property uses and natural surface features. In addition, the Site walkthrough included surrounding roads and readily assessable properties, including accessible portions of the Site, to identify visually-apparent environmental conditions. The

assessment revealed that the discharge of liquid from the steam boiler blow-down piping is apparently ongoing. Additionally, containers apparently containing spent dry cleaning liquids appeared to be stored at the facility. These conditions should be reviewed and corrected through inspections by the NYSDEC and/or Nassau County Department of Health (NCDOH). Photograph documentation of conditions at the Site as observed during the February 20, 2008 Site visit is included as Appendix A.

1.3.4 NCDOH Boiler Blow-Down Inspection

As discussed above, BEI previously collected a sample of the steam boiler blow-down liquid from the discharge pipe located in the exterior yard in September 2005. The location of this feature is shown on Figure 1-3. Laboratory analytical results revealed the presence of VOCs and resulted in the identification of this area as a secondary source of dry cleaning-related chemical impacts to the subsurface. An inspection to assess the status of this location was conducted by the NCDOH during July 2008. The discharge was no longer occurring and the blow-down had been connected into the washing machine floor drain during late spring 2008. Soil, groundwater and soil vapor intrusion sampling will be conducted during the RI to further evaluate impacts from the prior discharge.

1.4 Site Conceptual Model

The Site is an active retail dry cleaning facility located in a retail shopping center building near residential properties, and consists of a rectangular portion of the building measuring approximately 1,120 square feet, a boiler room measuring approximately 150 square feet, and a small exterior yard located on the northern portion of the property. The dry cleaning business consists of a customer service area, a dry cleaning equipment room, steam press and work areas, a steam boiler room and the exterior yard. Commercial and residential structures in the vicinity of the Site are constructed with slab on-grade foundations. The area is served by municipal water supply and storm/sanitary sewerage.

A historic release of VOCs commonly associated with the dry cleaning process occurred at the Site based on the results of on-Site soil and groundwater testing conducted during 2005. Two (2) potential sources of these VOCs were identified based on those findings: 1) the dry cleaning equipment area located within the building; and 2) the boiler blow-down piping located in the exterior yard. In addition, VOCs typically associated with petroleum products were found in soil and ground water.

Based on sampling conducted in 2005 by ERM and BEI, PCE and associated breakdown products represent the principal VOCs found in soil and ground water at the Site. PCE levels in soil ranged to 330,000 ug/Kg. Maximum concentrations of PCE and TCE found in ground water were 88,000 ug/L and 45,000 ug/L, respectively. A sample of blow-down liquid being discharged to the ground in the exterior yard in 2005 was found to contain PCE and TCE (25 ug/L and 20 ug/L, respectively). While it is likely that soil exhibiting these VOCs is limited to on-site locations, results of Phase I RI testing will assess the extent of the source and determine whether there is a potential for off-site migration of these compounds in ground water.

Ground water was encountered on-Site at variable depths ranging from approximately 4 to 10 ft. bg. during the 2005 investigations; groundwater flow direction/gradient/velocity has not been determined. The nearest occurrence of surface water is found at the Sarazen Canal, a tidal water body located approximately 260 feet to the northwest of the Site. The shoreline of the Atlantic Ocean is found approximately 2,230 feet south of the Site. In addition to surface water, the presence of underground utilities could exert an influence on groundwater flow and on the migration of chemicals dissolved in ground water.

Potential exposure routes include direct contact with contaminated soil and ground water during Site investigation or construction-related tasks and inhalation of vapors by workers and residents. Ingestion of water is not expected since the area is supplied by a municipal provider; the nearest public supply well is located approximately a quarter mile to the east of the Site and is reportedly in excess of 1,200 feet deep.

1.5 Remedial Investigation Project Organization

The EnviroTrac personnel involved in the project have extensive experience in conducting environmental investigations and remedial actions. The project organization is provided below and resumes for key personnel are presented in Appendix B.

Mr. Jeffrey Bohlen will be the RI/FS project manger for EnviroTrac. Mr. Bohlen will be responsible for overall coordination and implementation of the project. Mr. Bohlen or his designee will keep the NYSDEC and the New York State Department of Health (NYSDOH) updated on the status of the RI/FS.

Mr. James Van Horn will serve as the Quality Assurance Officer (QAO) for EnviroTrac. As necessary, Mr. Van Horn will perform a field and sampling audit and interface with both laboratory and field personnel. Field personnel and the laboratory will bring any quality assurance/quality control concerns to the attention of the EnviroTrac project manager. Mr. Van Horn will work with the data validator to develop a project specific data usability report.

Mr. Thomas Bosshard will serve as the project hydrogeologist. Mr. Bosshard will be responsible oversight of the soil boring and monitoring well installations and the hydraulic conductivity testing. Mr. Bosshard will also be responsible for interpretation of sub-surface geology and hydrogeology and will report to the EnviroTrac project manager and QAO on an as needed basis. Mr. Bosshard will work with the EnviroTrac project manager to ensure that the required data are obtained.

2. REMEDIAL INVESTIGATION

The objectives of the proposed investigative elements include developing an updated and further understanding of environmental concerns previously identified at the Site, and gathering information needed to support remedial evaluations. Due to the small size of the Site, information regarding historic Site use and practices, and results of prior testing conducted that identified impacts resulting from dry cleaning operations, the rationale for the proposed work is to proceed, in a focused manner, to define the extent of these environmental impacts to Site media including soil, groundwater, and soil vapor. The data gathered will be employed to evaluate potential exposure pathways, and to develop information needed to implement interim remedial measures and to formulate remedial alternatives.

The previously conducted investigations at the Site have revealed the presence of volatile chemical constituents present in soil and groundwater. In order to complete the characterization of the Site and to develop the information required for remedy assessment, the following areas of investigation are required:

- Delineate the vertical and horizontal extent of soil contamination, on-and off-site;
- Delineate the vertical and horizontal extent of groundwater contamination, on- and off-site;
- Documentation of groundwater flow characteristics during tidal fluctuations;
- The potential for soil vapor intrusion to local businesses and residences; and
- The potential for impacts to nearby surface water bodies and sediment.

To address these data requirements, the following work will be conducted:

- Definition of source areas on the Site through the installation of soil borings at interior and exterior locations and the collection of soil samples for VOC field screening and laboratory analysis;
- Implementation of a water level evaluation to assess the impacts of tidal fluctuations on groundwater flow patterns at the Site;

- Installation of shallow and deeper monitoring wells, including collection of soil samples for VOC field screening and laboratory analysis;
- Development of the proposed monitoring wells;
- Assessment of groundwater flow patterns utilizing the proposed network of monitoring wells to estimate the direction of groundwater flow and hydraulic gradients;
- Performance of in-situ hydraulic conductivity testing utilizing proposed monitoring wells;
- Collection of groundwater samples from the existing and proposed monitoring wells for laboratory analysis to evaluate the horizontal and vertical extent of dissolved VOCs;
- Collection of sub-slab soil gas and indoor air samples at the Site and at the two adjacent businesses pending access, King's Pharmacy and the Lido Kosher Deli located at 639 and 641 East Park Avenue, respectively;
- Collection of ambient air samples from outdoor locations in the vicinity of the Site;
- The need to conduct additional testing of indoor, sub-slab and outdoor air at the Phase I investigation locations and at other businesses and residences in the vicinity of the Site will be determined through review of these air testing results and groundwater flow and contaminant plume mapping that will be conducted during Phase I; and
- A residential soil vapor intrusion assessment work plan will be prepared and submitted to the NYSDEC and NYSDOH for review and comment utilizing the data gathered during the RI Phase I. The work plan will provide procedures for testing to be conducted at nearby homes during the 2008-2009 heating season.

The following sections detail the data collection tasks that will be implemented during the RI.

2.1 Underground Utility Evaluation

It has been determined that the water table at the Site is shallow. The presence of permeable backfill associated with local underground utilities (e.g., sewer, water), and extending into the water table, could provide preferential flow pathways for groundwater flow and the migration of chemicals in ground water and for the migration of soil vapor. The locations of buried utilities in the vicinity of the Site will be assessed though the one call process and, if needed, through records searches and/or by utilizing a private utility locating service. Geophysical techniques will be utilized to screen each of the proposed locations where intrusive work will be conducted for the presence of utilities and other subsurface objects that could present health and safety concerns for site workers and which could prevent or complicate the implementation of the anticipated activities. These surveys will extend across the Site horizontally as practicable to assess the possible presence of subsurface objects including but not limited to underground storage tanks, buried drums or other metallic containers.

2.2 Tidal Influence Evaluation

Based on the proximity of the Site to the Sarazen Canal, and relatively wide variation in water table elevations measured in 2005 as reported by ERM and BEI, it is possible that ground water in the vicinity of the Site is tidally influenced. A water level evaluation will be conducted to asses this potential and to estimate the magnitude of fluctuation. Data derived from this effort will be used to refine the site conceptual model, more accurately determine appropriate soil sampling intervals, and to establish optimal screen positioning for proposed groundwater monitoring wells. This information will also be used to gain a basic understanding of local groundwater flow patterns and plume migration behavior in the vicinity of the Site, and to assist in developing technical procedures for monitoring of impacted media and in formulating remedial strategy.

The two (2) existing monitoring wells at the Site, installed by ERM in June 2005, are reportedly constructed of 0.75-inch diameter PVC. Due to this construction, they are not well suited for use in assessing water level assessment and can not be utilized for the installation of water level data loggers. Consequently, a 2-inch diameter PVC monitoring

well designated MW-03(5-15) on Figure 2-1 will be installed to a depth of approximately 15 ft. bg., sufficient to penetrate the water table which is currently estimated to be located at 10 feet or less. Further details regarding installation procedures are provided in Section 2.3.3. Upon completion of this well, the top of casing will be surveyed and a digital water level data logger (e.g., In-Situ® miniTROLL®) will be installed to develop a detailed record of water levels. This equipment will record water levels every five minutes over a period of one week, resulting in a total of approximately 2,000 measurements.

2.3 Sub-Surface Evaluation

Two on-site areas of concern (AOCs) have been identified based on testing of soil and ground water conducted on-Site during 2005. Additional source assessment and delineation of these findings will be conducted through the installation of on-Site and off-Site soil borings and groundwater monitoring wells, the collection and analysis of soil, groundwater and soil vapor samples, and through other testing.

A qualified EnviroTrac professional will coordinate and oversee the collection of environmental samples and implementation of RI investigative work including but not limited to:

- Collection of soil samples;
- Preparation of boring logs based on sample observations;
- Performing field screening of soil samples;
- Supervising monitoring well installations and the collection of groundwater samples;
- Preparing daily drilling records;
- Installing and sampling sub-slab soil vapor monitoring points and collecting air samples; and
- Properly labeling, packaging and handling samples for laboratory analysis.

2.3.1 Soil Borings

Soil sampling will be conducted through the installation of soil borings at a minimum of six locations (soil borings SB-06 through SB-11) situated within the building and in the exterior courtyard. This will enable the further evaluation of soil quality within the previously established potential source areas through field screening and laboratory analysis of soil samples. Due to the small footprint of the Site, highly limited work area access, and the shallow depth to ground water, this task will most effectively be accomplished using portable equipment (hand auger or portable tripod). Continuous sampling of the soil will be conducted at each of the locations shown on Figure 2-2 to a final target depth corresponding to the minimum elevation of the water table, based on the results of the tidal study described in Section 2.2. Samples will be screened in the field at a minimum frequency of every 2 to 4 feet to evaluate the relative presence of VOCs using a portable photo-ionization detector (PID). Two (2) samples from each soil boring location will be sent to the laboratory for analysis of VOCs including: 1) the sample representing the 0 to 2-inch depth, below unpaved or vegetative cover (if present) or from the 0-0.5 foot interval below paved locations; and 2) the 6-inch interval from the remaining portion of the soil column exhibiting the highest PID response – the 6-inch interval from immediately above the water table will be submitted as the second sample in the absence of a PID response. If evidence of contamination is found at depth, drilling and soil testing procedure will continue until "clean" soil is found as practicable. In addition, if conditions encountered suggest that contamination may extend laterally beyond the area that is proposed for the Phase I investigation additional soil testing locations will be established through dialogue with the NYSDEC and assessments conducted as practicable.

At completion, the soil borings will be properly sealed to prevent a conduit for potential downward migration of contaminants and/or soil vapor intrusion in the future. Soil boring procedures are provided in the Sampling and Analysis Plan.

A summary of the analyses that will be performed is presented in Table 2-1. Samples will be analyzed by CHEMTECH, Mountainside, New Jersey. CHEMTECH is a NYSDOH, ELAP, ASP/CLP approved laboratory and will be required to maintain this certification throughout the RI.

Samples will be collected and handled under proper chain of custody protocol. The chain of custody form will record the sample and container type, identification, a description, date and time of sampling, sampler name, method of transport and analysis requested.

As detailed in the Health and Safety Plan, during all sub-surface investigations continuous monitoring for volatile organic vapors will be conducted with a field PID instrument. Air monitoring will conform to the NYSDOH Community Air Monitoring Plan (Ground Intrusive Activities) found in Appendix C.

2.3.2 Groundwater Monitoring Wells

The RI Phase I objective is to assess groundwater quality and to identify the horizontal and vertical extent of any impacts in the vicinity of the Site, and to determine if impacted groundwater is possibly migrating off-site.

There are currently two (2) small-diameter monitoring wells installed within previously identified potential source areas; MW-01(5-15) is located in the exterior yard, and MW-02(5-15) is found inside the building. A minimum of five (5) 2-inch diameter PVC monitoring wells (locations MW-03 through MW-07) will be installed at the locations shown on Figure 2-1 to further assess the presence of VOCs in ground water at the Site and to conduct water level evaluations and hydrogeologic assessments. Based on work space and access restrictions, these wells will be installed using either a portable direct-push machine (proposed wells MW-03(5-15) and MW-04(5-15)) or a Geoprobe® direct-push drilling rig (proposed wells MW-05(5-15), MW-06(5-15), and MW-07(5-15)). In addition, two deeper 2-inch diameter PVC monitoring wells (MW-01(15-20) and MW-02(15-20)) will be installed using a portable direct-push machine at the locations of the existing wells to assess vertical groundwater flow potential and to assess whether groundwater contamination extends below the screen zone of these existing wells.

It is possible that additional monitoring wells may be warranted to define the horizontal or vertical extent of contamination in groundwater, based on conditions observed during the implementation of the proposed Phase I soil and groundwater investigative work.

The installation of these additional wells will be discussed with the NYSDEC and if deemed necessary, they will be installed to the extent practicable.

Deep Monitoring Wells

Two deeper monitoring wells will be installed to further assess previously identified soil and groundwater quality impacts at the locations of existing monitoring wells MW-01(5-15) and MW-02(5-15). Soil description, headspace screening and well development procedures will be similar to those used for installing the shallow monitoring wells. Each of the associated borings (designated SB-12 and SB-13, respectively) will be advanced using the direct push method to a total depth of approximately 20 feet below grade. The monitoring wells will be constructed of 2-inch ID, Schedule-40 PVC well screen flush-threaded into Schedule-40, PVC riser pipe of the same diameter. The size of the screen will be No. 10 slot (i.e., 0.010 inch). The anticipated screen length will be five feet, set at the 15 to 20 foot interval but may be changed based upon the results of the shallow well installations. The base of each well will be equipped with threaded bottom plugs, while the top of each well will be equipped with a vented, non-threaded cap. Procedures for monitoring well installation are provided in the Sampling and Analysis Plan.

Soil will be screened at five-foot intervals for the presence of VOCs using a PID during the deep well installation procedures. At each of the two locations, a minimum of two soil samples will be submitted to the laboratory for analysis of the NYSDEC TCL VOCs; this will include a sample from the 13-15 foot and 18-20 foot intervals. Following completion of the proposed deep well installations, the top of casing will be surveyed and a round of groundwater samples will be collected and sent to the laboratory for analysis (Section 2.4).

Shallow Monitoring Wells

Each of the borings conducted at locations MW-03 through MW-07 (soil borings SB-14 through SB-18) will be advanced using the direct push method to a total depth of approximately 15 feet below grade. The shallow monitoring wells will be constructed of 2-inch ID, Schedule-40 PVC well screen flush-threaded into Schedule-40, PVC riser pipe of the same diameter. The size of the screen will be No. 10 slot (i.e., 0.010 inch). The

anticipated screen length will be ten feet, set to bridge the water table, but may be changed based upon site specific conditions as determined through the tidal influence study described in Section 2.2 and/or by the on-site geologist. At a minimum a 5-foot screen length will be used. The base of each well will be equipped with threaded bottom plugs, while the top of each well will be equipped with a vented, non-threaded cap. Procedures for monitoring well installation are provided in the Sampling and Analysis Plan.

Soil will be screened at 2 to 4-foot intervals for the presence of VOCs using a PID during drilling. At each monitoring well location, a soil sample from the 6-inch interval exhibiting the highest PID response will be submitted to the laboratory for analysis of the NYSDEC TCL VOCs; as a default, the sample from the 6-inch interval immediately above the water table will be submitted. Following completion of the proposed well installations, the top of casing will be surveyed and a round of groundwater samples will be collected and sent to the laboratory for analysis (Section 2.4).

Monitoring Well Development

The newly installed monitoring wells will be developed prior to sampling in order to remove residual silts, sands and clays, increase the hydraulic conductivity immediately around the well, and reduce the turbidity of groundwater samples. Well development will continue until a turbidity goal of less than or equal to 50 Nephelometric Turbidity Units (NTUs) is obtained. If this goal cannot be obtained, well development will continue until an amount of groundwater equivalent to 10 well volumes has been removed. This will help ensure that the groundwater samples, and other hydraulic information obtained from these wells, are representative of sub-surface conditions.

All groundwater and sediments resulting from well development will be managed as described in Section 2.9. Wells will be developed using procedures presented in the Sampling and Analysis Plan.

2.4 Groundwater Sampling and Analysis

Groundwater samples will be collected utilizing a bladder pump from existing monitoring wells MW-01(5-15) and MW-02(5-15) and seven new monitoring wells designated MW-01(15-20), MW-02(15-20), MW-03(5-15), MW-04(5-15), MW-05(5-15), MW-06(5-15) and MW-07(5-15). Each water sample from the existing wells will be analyzed for the full NYSDEC TCL/TAL parameters and chloride. Groundwater from the new monitoring wells will be analyzed for the NYSDEC TCL VOCs and chloride. A NYSDEC CLP deliverable package will be provided for all analyses.

Groundwater sampling procedures are presented in the Sampling and Analysis Plan. Excess groundwater generated from the sampling activity will be managed as discussed in Section 2.9.

2.5 Hydraulic Conductivity Estimation

After sufficient time has elapsed for hydraulic stabilization of the newly installed wells, a subset of five wells including shallow wells MW-03(5-15), MW-05(5-15) and MW-07(5-15), and deeper wells MW-01(15-20) and MW-02(15-20) will be tested to estimate the hydraulic conductivity of the formation in the vicinity of the well. The locations of these wells are provided on Figure 2-1. This estimate will be used to estimate groundwater flow rates, assess the potential rate of contaminant transport, and screen potential remedial options, if necessary. The hydraulic conductivity testing will consist of in-situ slug tests using pressure transducers. Test procedures are described in Sampling and Analysis Plan.

2.6 Groundwater Flow Evaluation

The testing conducted at the Site during 2005 did not include the assessment of local groundwater flow patterns. The newly-installed monitoring wells will be used to begin these evaluations.

Tidal Influence Scenario

Based on the relatively small area of investigation and the possibility of tidal influence, it is anticipated that an accurate determination of groundwater flow and corresponding contaminant plume migration potential may be difficult to conduct. A week-long record of water levels at the Site will be collected using digital data loggers installed in monitoring wells MW-01(15-20), MW-02(15-20), MW-04(5-15), MW-05(5-15), and MW-07(5-15). The locations of these wells are provided on Figure 2-1. Resulting data will be used to help resolve these complicating factors and to better understand and assess the significance of tidal influence on water level elevations at the Site.

Similar to the testing described in Section 2.2, digital water level data loggers (e.g., In-Situ® miniTROLL®) will be installed in each of these five (5) wells. This equipment will record water levels every five minutes over a period of one week, resulting in a total of approximately 2,000 measurements for each well. The resulting data will enable a time-lapse evaluation of local groundwater flow patterns under various tidal stages.

No Tidal Influence Scenario

If results of conducting the work described in Section 2.2 do not reveal evidence of any tidal influence at the Site, then groundwater flow patterns will be assessed through the synoptic measurement of water levels in monitoring wells MW-01(15-20), MW-02(15-20), and at the MW-03 through MW-07 locations using an electronic tape or similar device. Subsequently, the corrected elevation data will be posted and contoured on a Site map. Two (2) assessments of groundwater flow will be undertaken during a two week period (i.e., measurement rounds will be spaced approximately one week apart).

2.7 Soil Vapor Intrusion Assessment

On-Site and Near-Site Locations

Evaluations will be conducted during the upcoming heating season (time November 15, 2008 to March 31, 2009 timeframe) to evaluate the potential for soil vapor intrusion.

Initial testing will entail an evaluation of conditions at the Site and at adjacent businesses by collecting 24-hour duration samples, or as deemed appropriate by the NYSDEC and NYSDOH, from sub-slab, indoor air and outdoor air locations for laboratory analysis of EPA Method TO-15 VOCs. A summary of the analyses that will be performed is presented in Table 2-1.

Sub slab soil vapor samples (SL-01 through SL-04) and indoor air samples (IA-01 through IA-03) will be collected at the Site, and at the immediately adjacent business establishments (i.e., Kings Pharmacy located to the west, and the Lido Kosher Deli located to the east). To facilitate the collection of addition rounds of sub slab samples, permanent soil vapor monitoring points will be installed. Two outdoor air samples (OA-01 and OA-02) will be collected at the Site: 1) near the customer entry door located on East Park Avenue; and 2) in the exterior courtyard. Proposed sampling locations are provided on Figure 2-3.

These soil vapor intrusion assessment activities will be conducted in accordance with guidance provided in the New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October, 2006[8]. Test procedures are described in Sampling and Analysis Plan.

Residential Homes

Residences are located near the Site. A residential soil vapor intrusion work plan will be prepared following the collection of site-specific environmental data as described in this Phase I RI Work Plan, and will be submitted to the NYSDEC and NYSDOH for review and comment. Residential SVI testing will be conducted in accordance with the SVI work plan during the upcoming heating season.

2.8 Decontamination

All non-disposable equipment will be decontaminated prior to and after the pertinent field activities. All disposable sampling equipment will be discarded between samples. The purpose of equipment decontamination is to minimize the potential for compromising data validity by reducing the possibility of cross-contamination.

Prior to drilling the first shallow subsurface boring, the equipment used in drilling will be cleaned to remove possible contaminants. All equipment that will come in contact with the soil, as well as water tanks, drill tools, iron casings, pumps and hoses, will undergo the initial cleaning procedure. While working at the Site, the drilling equipment will be decontaminated between boring locations to prevent cross-contamination. The back end of the drill rig and all drilling tools will be decontaminated before leaving the Site. The cleaning process will involve the use of a high-pressure steam cleaner. Clean, potable water will be used for decontamination of drilling equipment and, when needed, to facilitate drilling procedures.

2.9 Handling of Investigation Derived Wastes

Field activities will produce investigation-derived waste (IDW) which will require appropriate management. This IDW includes the following:

- Soil cuttings resulting from the drilling;
- Groundwater from the development and purging of monitoring wells;
- Decontamination fluids and sediments which may settle out of such fluids; and
- Personal protective equipment (PPE) and associated debris resulting from the field activities.

The management of these materials is discussed below.

2.9.1 Soil

Soil cuttings generated during the drilling program of the borings and newly installed monitoring wells will be contained in 55-gallon drums pending analytical results of waste characterization samples provided to the laboratory. Following review of the waste characterization analytical data, and after receiving the necessary approvals from Lido Realty and the NYSDEC, the cuttings will be transported off-site for treatment and/or disposal at a permitted facility.

2.9.2 Groundwater

Groundwater generated during the purging of existing monitoring wells and development/purging of new monitoring wells will be contained in 55-gallon drums pending waste characterization analytical results. Following review of the analytical data, and after receiving the necessary approvals from Lido Realty and the NYSDEC, the purge water/development water will be transported off-site for treatment and/or disposal at a permitted facility.

2.9.3 Decontamination Fluids

Decontamination fluids will be containerized in appropriate 55-gallon drums and temporarily stored on-site. Upon completion of field activities, this material will be properly characterized and, after receiving the analytical results and necessary approvals from Lido Realty and the NYSDEC, will be transported off-site for treatment and/or disposal at a permitted facility.

2.9.4 PPE and Associated Debris

Used PPE and other associated debris (e.g., disposable sampling equipment) will be containerized in appropriate 55 gallon drums and stored temporarily on-site. At the conclusion of field activities, these materials will be appropriately characterized and after receiving the necessary approvals from Lido Realty and the NYSDEC, will be transported off-site for disposal at an appropriate facility.

2.10 Data Usability Report

A Data Usability Summary Report (DUSR) will be prepared for all analytical data generated during the RI. The DUSR will be completed following the NYSDEC guidance for DUSRs. A copy of the NYSDEC guidance is included in Appendix D.

2.11 RI Report

A RI Report will be prepared to document results of the RI and will include a summary of previous investigations. The report will include methodologies used and data generated during the RI. Conclusions on site conditions will be prepared based on the RI data gathered.

A Phase I RI report will be prepared which details the results of the Phase I RI investigation and provides recommendations for required Phase II work. The Phase II report will incorporate the Phase I RI data by reference and provide a complete interpretation of Site conditions, and the defined extent of contamination will be discussed and presented graphically for all environmental media.

2.12 Phase II RI

Phase II of the RI will be implemented following review of the data generated during Phase I. The extent of any additional on-Site investigation necessary will be dependent on the results of the Phase I RI. In addition, off-site sample collection and analysis and other assessments will be performed during Phase II of the RI.

The Phase II investigation will include a human health exposure assessment and an ecological exposure assessment. The Phase II human health exposure assessment and the ecological assessment will be completed following review of any environmental data gathered during the Phase II RI.

2.12.1 Off-Site Delineation of Contamination

The results of the Phase I RI investigation will be used to assess whether the potential for off-site contamination to soil, groundwater, sediment and surface water exists. The Phase I RI data gathered will be used to identify groundwater flow and plume migration direction and will be used to properly locate off-site monitoring wells, if warranted. In addition, the need to conduct any additional off-site soil vapor intrusion studies will be evaluated.

2.12.2 Human Health Exposure Assessment

The human health exposure assessment (HHEA) will consist of an evaluation of the potential routes of human exposure to site related chemicals. The following items will be addressed within the HHEA scope of work:

- evaluation of Site history, chemical, hydrologic, demographic and other information;
- identification and evaluation of potential exposure pathways through a review of data collection activities, analytical protocols, current and surrounding land use, populations at risk and other related data; and
- characterization of completed exposure pathways by the evaluation of chemical release sources, fate and transport, human exposure (contact) points and chemical intake routes.

The human exposure routes that present a potential toxic concern will be identified. Potential human exposures will be characterized using principles and procedures consistent with the following U.S. Environmental Protection Agency (EPA) documents:

- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Interim Final, Part A (December 1989, EPM54011-891002)[9];
- Guidance on Risk Characterization for Risk Managers and Risk Assessors. Memorandum. February 26, 1992[10];
- Guidance for Data Usability in Risk Assessment, Interim Final (October 1990, EPA/540/G-901008)[11];
- Superfund Exposure Assessment Manual (April 1988, EPM54011-881001)[12]; and
- Exposure Factors Handbook (March 1990, EPM60018-891043)[13].

The purpose of the exposure assessment is to identify pathways through which people can be exposed under current and potential future use scenarios. The exposure

assessment utilizes the current conditions at the Site and surrounding area in determining exposure scenarios and exposure concentrations. Additionally, future uses of the Site and surrounding area are also considered.

2.12.3 Fish and Wildlife Impact Analysis

The fish and wildlife impact analysis (FWIA) will be performed following the NYSDEC FWIA procedures presented in the NYSDEC, Division of Fish and Wildlife, "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (dated October, 1994)[14]. The Step I (Site Description) and the pathway analysis and criteria-specific sections of the Step II (Contaminant-Specific Impact Analysis) analysis will be performed.

The objective of the Step I, site description is to identify the fish and wildlife resources, land-use and habitat types that exist in the vicinity of the Site. In addition, fish and wildlife species that may utilize habitats that could potentially be impacted by site-related contaminants are identified. This information is necessary to allow identification of potential pathways of contaminant migration that could impact fish and wildlife resources.

The objective of the Step 11, contaminant specific impact is to determine the impacts, if any, of site-related contaminants on fish and wildlife resources. The pathway analysis evaluates and identifies potential contaminants of concern, sources of contaminants, potential pathways of contaminant migration and potential for fish and wildlife resources to be impacted by site-related contaminants. The criteria-specific analysis determines if reported chemical concentrations represent a potential threat to aquatic life and wildlife.

3. FEASIBILITY STUDY

Upon completion and approval of the Final RI report by the NYSDEC, a Feasibility Study (FS) will be performed utilizing the approach outlined in NYSDEC TAGM HWR-90-4043[15]. The first step involves the development of remedial action alternatives. These alternatives are screened, as necessary or appropriate, during the second step. The third and final step involves the detailed analysis of the remaining remedial alternatives according to the selection criteria specified in the National Contingency Plan (NCP). This process culminates in the recommendation of one or more remedial alternatives in the FS Report.

3.1 Development of Remedial Alternatives

The development of remedial alternatives will involve the following six-step process:

- Development of remedial action objectives specifying the contaminants and media of interest, exposure pathways, receptors and acceptable contaminant levels for each exposure route;
- The media of interest will be determined by the nature and extent of contamination as well as appropriate NYS Standards Criteria and Guidelines (SCGs) and any federal standards that are more stringent than State standards;
- Development of general response actions for each medium of interest, defining containment, treatment, excavation, pumping, or other general actions which might satisfy the remedial action objectives;
- Identification of the volume of material or area(s) of contamination to which the general response actions might be applied;
- Identification and screening of technology types applicable to each general response action to eliminate those that are not implementable; and
- Assembly of the technologies and process options into remedial alternatives, preserving a range of treatment and containment choices.

In the above process, data gathered during the RI is used to identify and screen technology types and process options. Technologies that could prove difficult to implement, might not achieve the remedial action objectives within a reasonable time frame, or might not be applicable or feasible based on site-specific conditions, are eliminated from further consideration. Also, results can be used to guide additional site characterization work, if necessary.

3.2 Interim Remedial Measure (IRM)

Based on the results of RI Phase I, an assessment will be made regarding the need for and feasibility of an interim remedial measure (IRM). The assessment will consider whether an IRM would serve to remove source material and reduce any ongoing environmental damage. IRMs that could be considered to address source area contamination may include excavation of impacted soil, implementation of soil vapor extraction (SVE) technology and through the addition of oxidants through in-situ chemical oxidation (ISCO) applications.

3.3 Screening and Analysis of Remedial Alternatives

The remedial alternatives developed in the previous task may undergo an initial screening to reduce the number of alternatives for detailed analysis. This screening will be accomplished by evaluating alternatives on the basis of effectiveness, implementability (both technical and administrative) and cost. The range of remedial alternatives will be preserved during the screening process. Innovative technologies will be considered throughout the screening process to determine if they provide a potential for better performance, easier implementation or cost savings to demonstrated technologies.

The "No action (Monitoring Only)" alternative will be considered and subjected to further detailed analysis.

3.3.1 Detailed Analysis of Alternatives

A detailed evaluation of remedial alternatives that remain following the preliminary screening will be conducted. This detailed evaluation will follow the process specified in the EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (Interim Final, October 1988)[16] and "Guidance on Superfund Selection of Remedy" (July 1987)[17] as well as the NYSDEC Technical and Administrative Guidance Memorandum No. 4030 entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites", dated September 13, 1989 and revised May 15, 1990[18].

3.3.1.1 Individual Analysis of Each Alternative

EnviroTrac will conduct an analysis of each alternative. The two threshold criteria against which the remedial alternatives will be evaluated are:

- Overall protection of human health and the environment; and
- Compliance with applicable New York State Standard Criteria and Guidelines (SCGS).

Following this, EnviroTrac will analyze the following balancing criteria:

- Short-term impacts and effectiveness;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volume;
- Implementability (i.e., technical and administrative); and
- Cost (i.e., capital, annual operation and maintenance and present worth).

EnviroTrac will analyze the ecological impact and reduction of human exposure for each alternative. Two additional evaluation criteria, state and community acceptance will be addressed by the NYSDEC in the Record of Decision.

To assist with the analysis, the alternatives will be scored using a relative weighting system. Each evaluation criteria will be assigned a relative weighting factor. Each

alternative will be assessed against the evaluation criteria, and will be assigned a relative score representative of the alternatives' achievement of the goals of the evaluation criteria. Following completion of this evaluation, the results of the comparison of alternatives will be tested using a sensitivity analysis. Various design aspects of each alternative will be altered to reflect uncertainties in the design.

3.3.1.2 Comparative Analysis of Alternatives

Following the evaluation of each remedial alternative, a comparative analysis will be performed to determine the relative performance of each alternative against the seven criteria. The remedial alternative(s) or combination of alternatives that receives the highest evaluation will be recommended as the preferred alternative(s).

3.4 Feasibility Study Report

The results of the evaluation of remedial alternatives will be documented in the FS Report. The Report will compile RI conclusions, the final exposure and impact assessments, and the progress of alternative development through the detailed analysis of alternatives. The report will contain a recommendation for the final remedy.

4. PROJECT SCHEDULE

A detailed schedule for the Phase I RI activities is presented in Figure 4-1. An estimated overall project schedule for completion of the RI/FS is provided; however, this schedule is dependent on the extent of Phase II activities and may require modification. The time allotted in the Consent Order for various deliverables (e.g., providing monthly progress reports to parties identified in Subparagraph XI.A.1 by the 10th day of each month subsequent to the approval of the first Work Plan, etc.) has been factored into the schedule. It has been assumed that the NYSDEC will provide comments on documents within 60 days of submittal.

5. REFERENCES

1) New York State Department of Environmental Conservation. Order on Consent and Administrative Settlement, Index #A1-0589-0507, Site #130170.

2) New York District, North Atlantic Division, Corp of Engineers, Atlantic Coast of New York. Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Final Feasibility Report with Final Environmental Impact Statement, Storm Damage Reduction Project, March 1998.

3) United States Department of Agriculture. Soil Survey of Nassau County, New York. February 1987.

4) Holzmacher, McLendon & Murrell, P.C.. City of Long Beach Nassau County, New York Master Water Plan 1971-1985.

5) United States Department of the Interior and United States Geological Survey. Water-Table and Potentiometric-Surface Altitudes of the Upper Glacial, Magothy and Lloyd Aquifers on Long Island, NY in March-April 2000, with a Summary of Hydrogeologic Conditions. Water Resources Investigations Report 01-4165.

6) Environmental Resources Management, Letter Report, July 29, 2005.

7) Berninger Environmental, Inc., Letter Report, November 27, 2005.

8) New York State Department of Health, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October, 2006.

9) United States Environmental Protection Agency. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Interim Final, Part A (December 1989, EPM54011-891002).

10) United States Environmental Protection Agency. Guidance on Risk Characterization for Risk Managers and Risk Assessors. Memorandum. February 26, 1992.

11) United States Environmental Protection Agency. Guidance for Data Usability in Risk Assessment, Interim Final (October 1990, EPA/540/G-901008).

12) United States Environmental Protection Agency. Superfund Exposure Assessment Manual (April 1988, EPM54011-881001).

13) United States Environmental Protection Agency. Exposure Factors Handbook (March 1990, EPM60018-891043).

14) New York State Department of Environmental Conservation, Division of Fish and Wildlife, "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (dated October, 1994).

15) New York State Department of Environmental Conservation. TAGM HWR-90-4043.

16) United States Environmental Protection Agency. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (Interim Final, October 1988).

17) United States Environmental Protection Agency. Guidance on Superfund Selection of Remedy (July 1987).

18) New York State Department of Environmental Conservation. Technical and Administrative Guidance Memorandum No. 4030 entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites", dated September 13, 1989 and revised May 15, 1990.

USGS TOPOGRAPHIC MAP

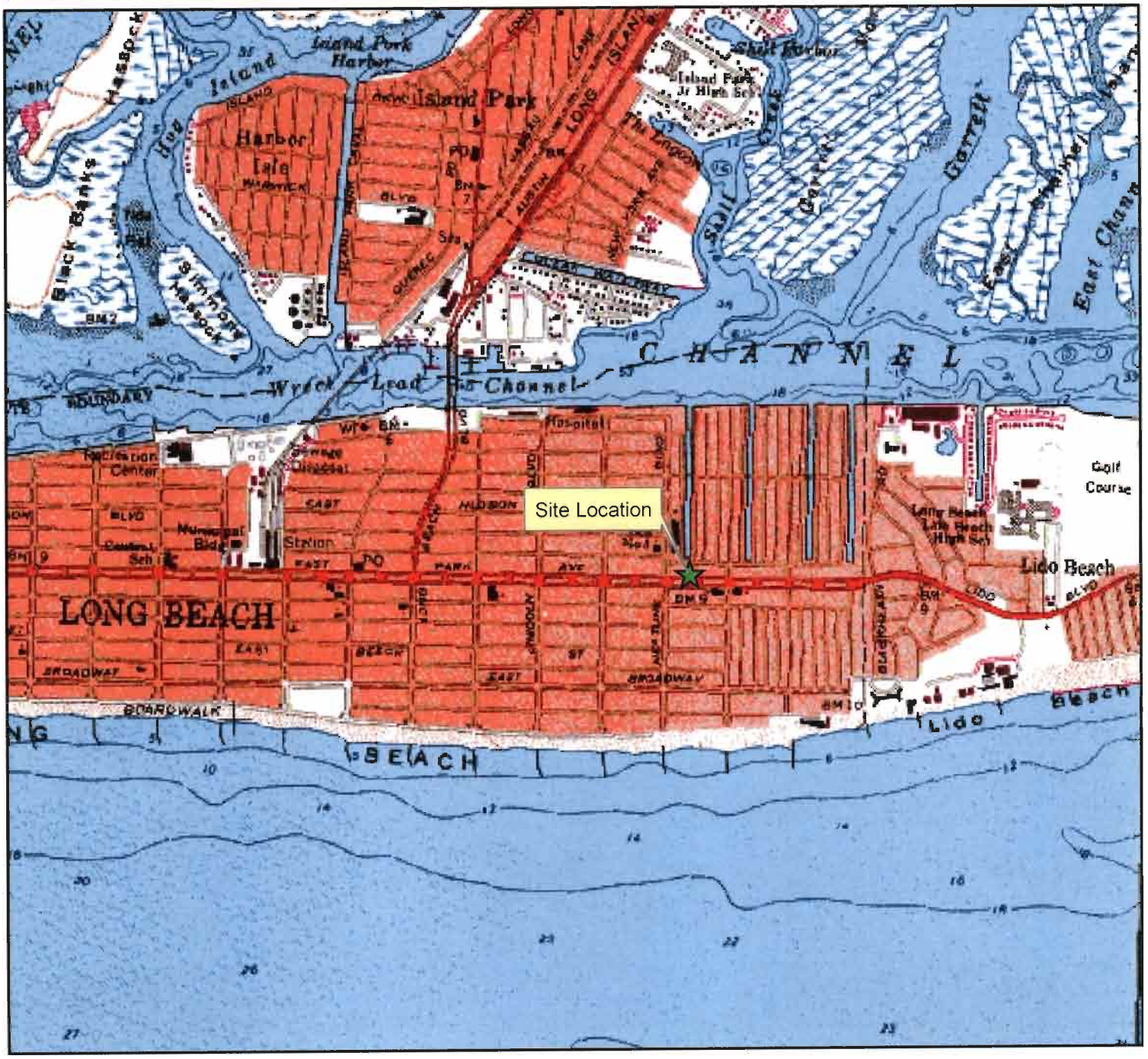


Figure 1-1
Site Location

Fashion Cleaners
641 East Park Avenue
Long Beach, NY 11561-2512

USGS Quadrangle:
Lawrence

Approximate Elevation:
3 feet amsl

0 455 910 1,820 2,730 3,640
Feet

N
W E
S

EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631-924-3001 F:631-924-5001

AERIAL PHOTOGRAPH

Figure 1-2
Site Plan

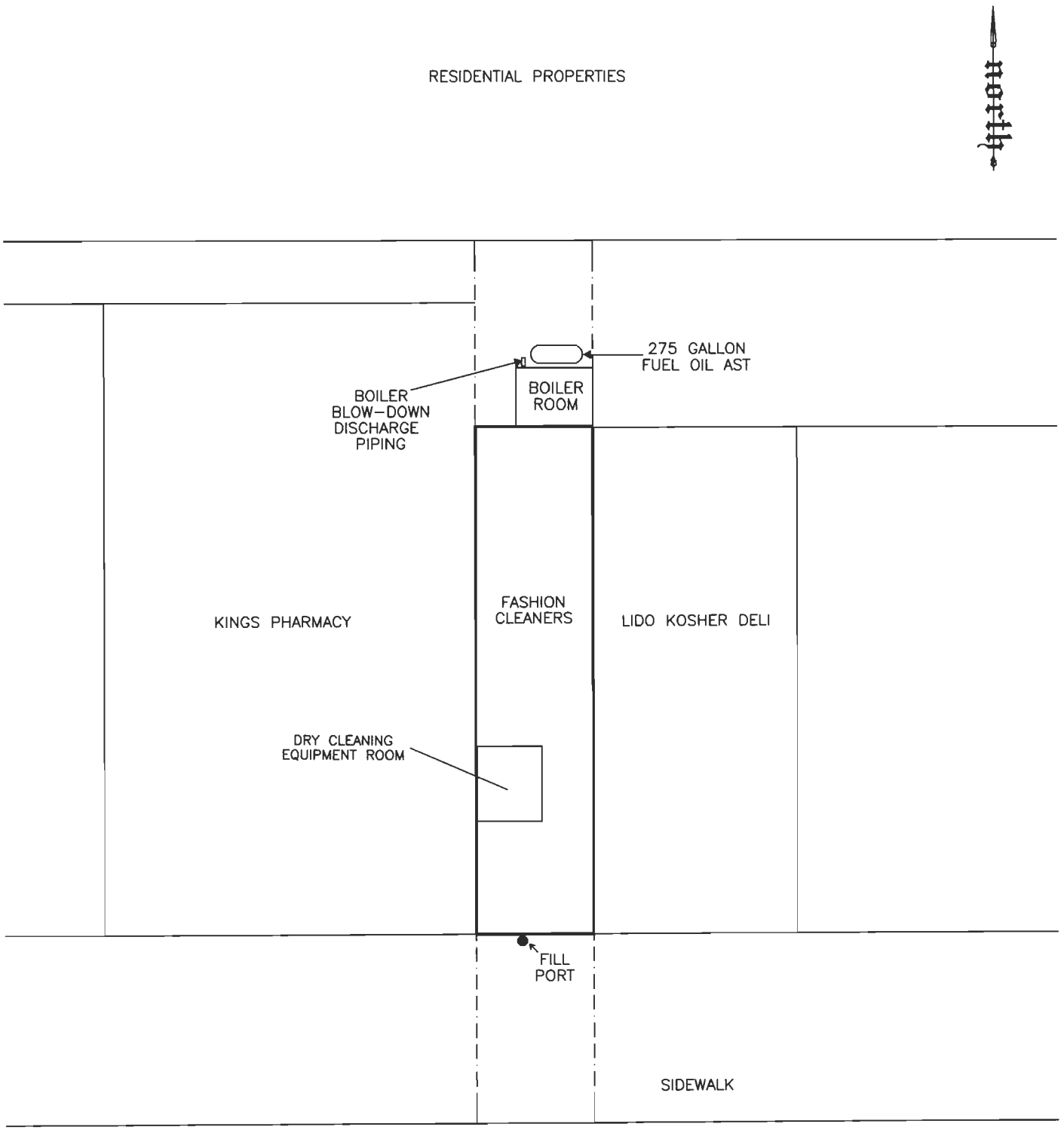
Fashion Cleaners
641 East Park Avenue
Long Beach, NY 11561-2512

Digital imagery taken in 2004

0 15 30 60 90 120
Feet

N
W E
S

EnviroTrac
Environmental Services
5 Old Dock Road
Yaphank, NY 11980
P: 631-924-3001 F:631-924-5001



EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

0 10 FT. 20
1" = 20 FEET

REVISION DATE: MAY 13, 2008

REVISED BY: TB

FASHION CLEANERS
641 EAST PARK AVENUE
LONG BEACH, NEW YORK
11561-2512

SITE LAYOUT

FIGURE #
1-3

USGS TOPOGRAPHIC MAP

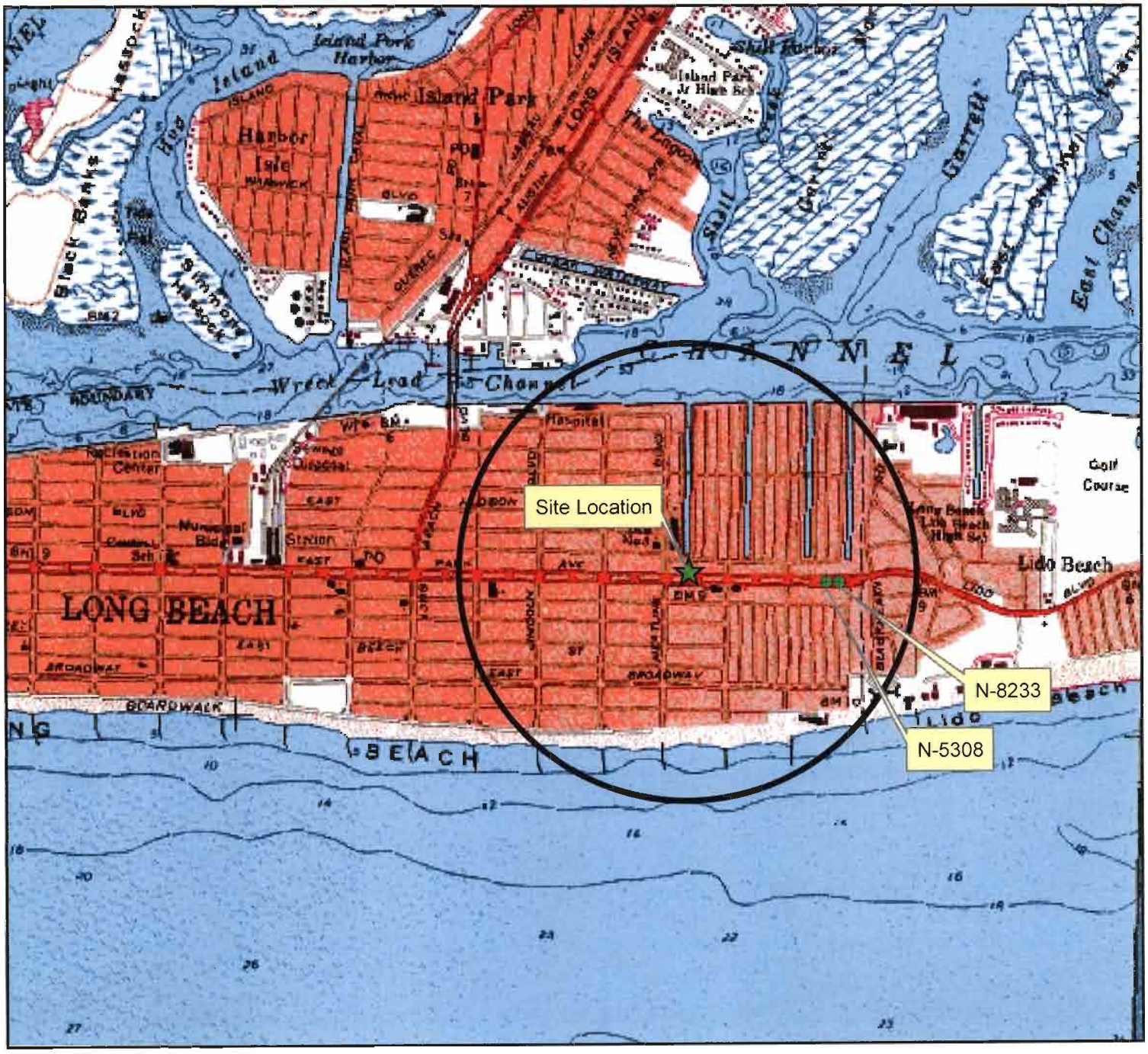


Figure 1-4
Well Radius Search Results

Fashion Cleaners
641 East Park Avenue
Long Beach, NY 11561-2512

USGS Quadrangle:
Lawrence

Approximate Elevation:
3 feet amsl

0 450 900 1,800 2,700 3,600 Feet

N
W E
S

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Environmental Services
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Yaphank, NY 11980
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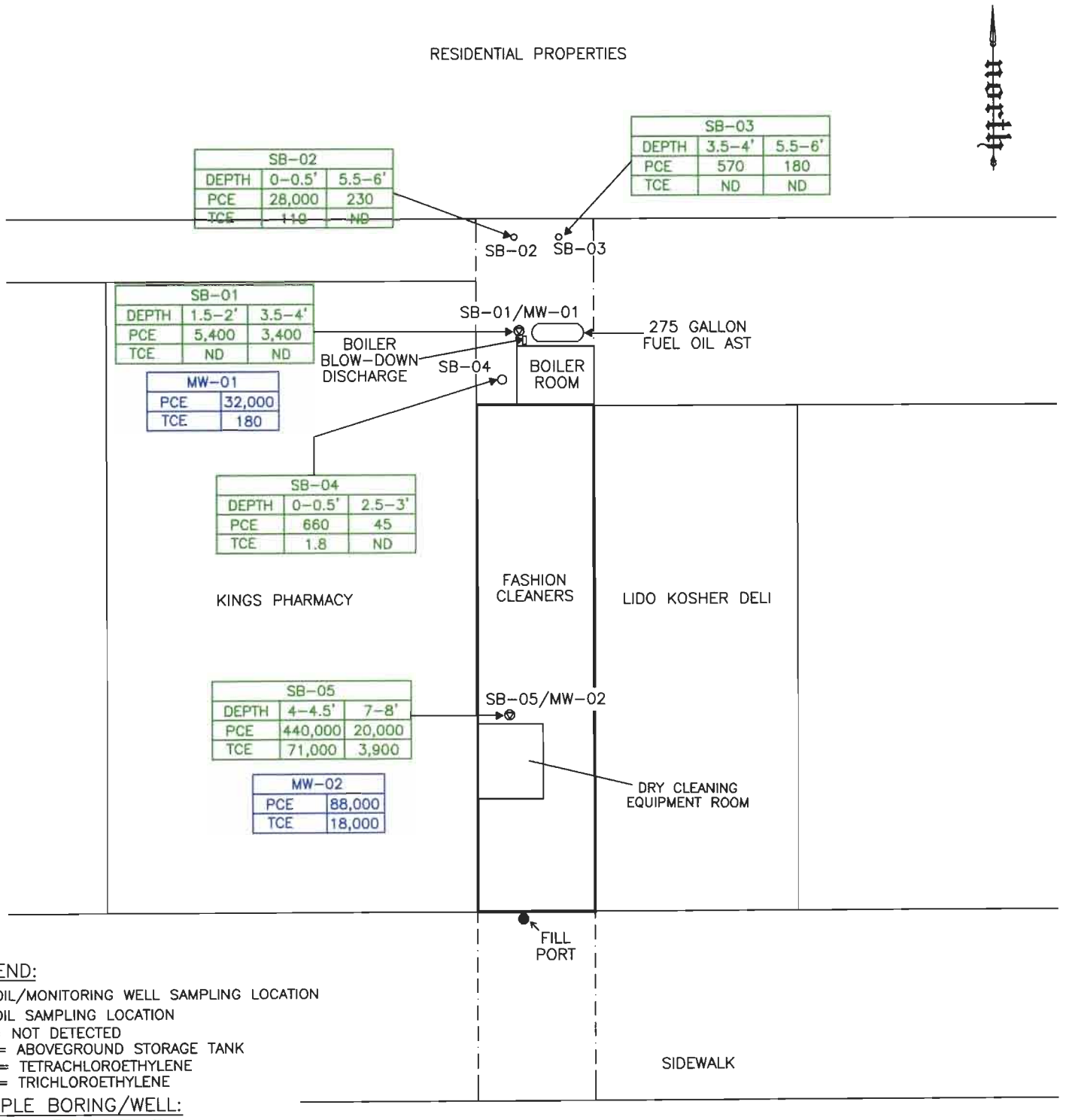


LEGEND:

⊗ SOIL/MONITORING WELL SAMPLING LOCATION
O SOIL SAMPLING LOCATION
ND = NOT DETECTED
AST = ABOVEGROUND STORAGE TANK
PCE = TETRACHLOROETHYLENE
TCE = TRICHLOROETHYLENE

SAMPLE BORING/WELL:

SB-05			
DEPTH	4-4.5'	7-8'	SAMPLING INTERVAL
PCE	440,000	20,000	PCE RESULTS IN ug/Kg
TCE	71,000	3,900	TCE RESULTS IN ug/Kg

WELL ID

MW-02		
PCE	88,000	PCE RESULTS IN ug/L
TCE	18,000	TCE RESULTS IN ug/L

WELL ID

GREEN = SOIL RESULTS
BLUE = GROUND-WATER RESULTS

NOTE: ANALYTICAL DATA SUMMARIZED FROM JULY 29, 2005 LETTER REPORT PREPARED BY ENVIRONMENTAL RESOURSES

EnviroTrac
MANAGEMENT NORTHEAST
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

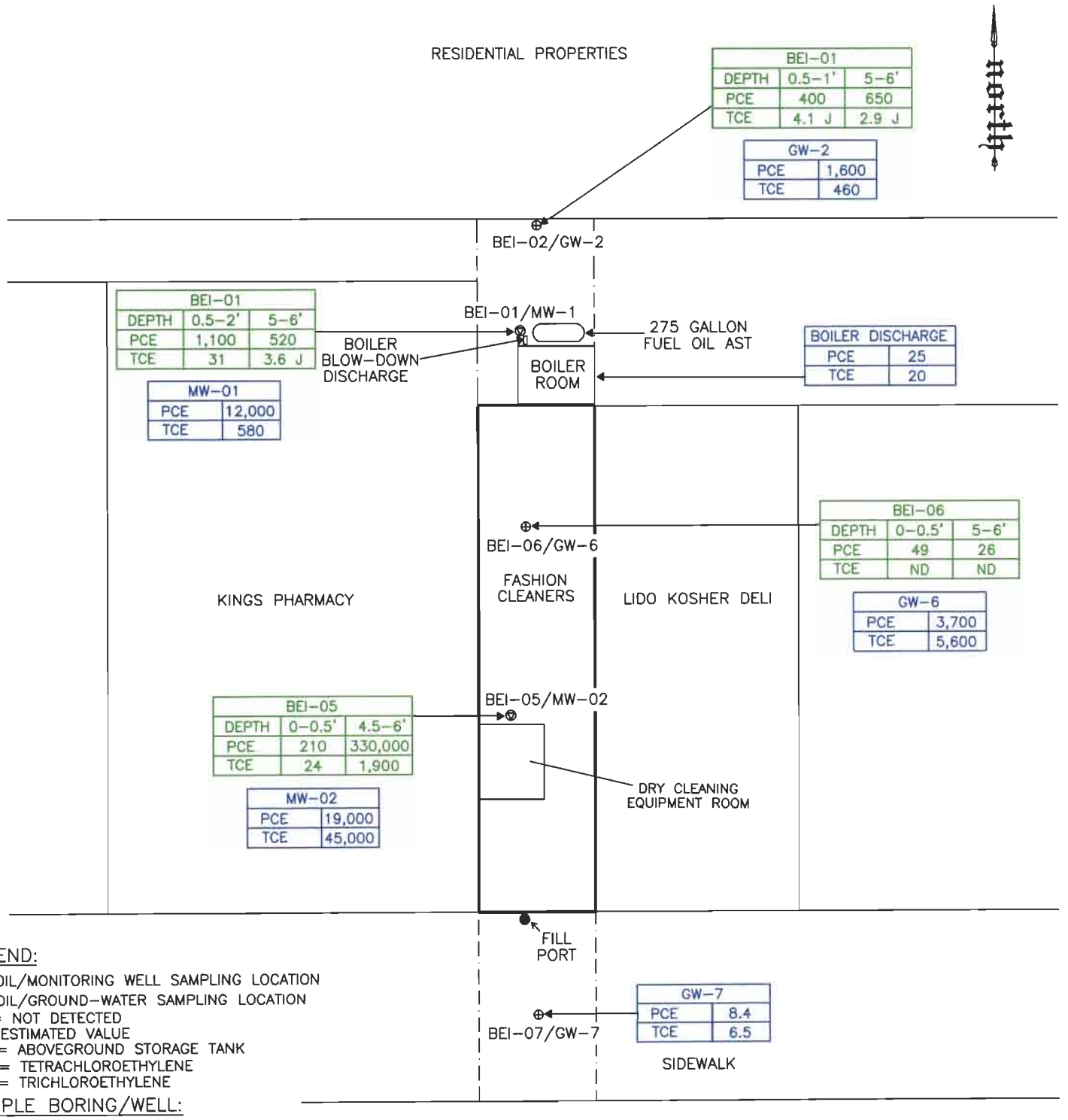
0 10 FT. 20
1" = 20 FEET

REVISION DATE: AUGUST 11, 2008 | REVISED BY: TB

FASHION CLEANERS
641 EAST PARK AVENUE
LONG BEACH, NEW YORK
11561-2512

JUNE 2005
PCE AND TCE
ANALYTICAL RESULTS

FIGURE # 1-5



LEGEND:

⊗ SOIL/MONITORING WELL SAMPLING LOCATION
⊕ SOIL/GROUND-WATER SAMPLING LOCATION
ND = NOT DETECTED
J = ESTIMATED VALUE
AST = ABOVEGROUND STORAGE TANK
PCE = TETRACHLOROETHYLENE
TCE = TRICHLOROETHYLENE

SAMPLE BORING/WELL:

BEI-05		
DEPTH	0-0.5'	4.5-6'
PCE	210	330,000
TCE	24	1,900

WELL ID
SAMPLING INTERVAL
PCE RESULTS IN ug/Kg
TCE RESULTS IN ug/Kg

MW-02	
PCE	19,000
TCE	45,000

WELL ID
PCE RESULTS IN ug/L
TCE RESULTS IN ug/L

GREEN = SOIL RESULTS
BLUE = GROUND-WATER RESULTS

NOTE: ANALYTICAL DATA SUMMARIZED FROM NOVEMBER 27 2005 LETTER REPORT PREPARED BY ENVIRONMENTAL RESOURSES

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0 10 FT. 20
1" = 20 FEET

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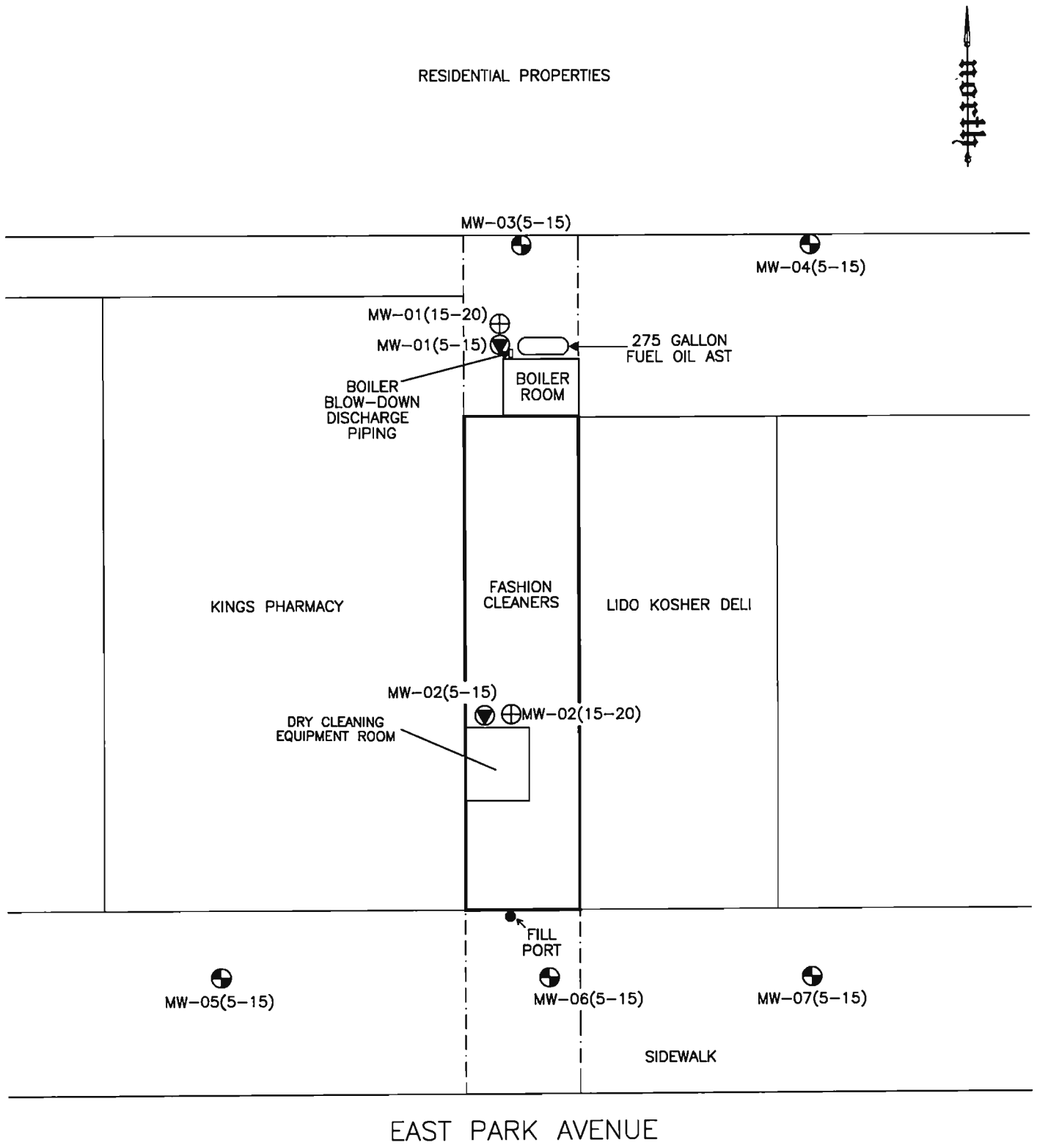
FASHION CLEANERS
641 EAST PARK AVENUE
LONG BEACH, NEW YORK
11561-2512

SEPTEMBER 2005
PCE AND TCE
ANALYTICAL RESULTS

FIGURE # 1-6



LEGEND:

- EXISTING SHALLOW MONITORING WELL
- PROPOSED DEEP MONITORING WELL
- PROPOSED SHALLOW MONITORING WELL

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ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980

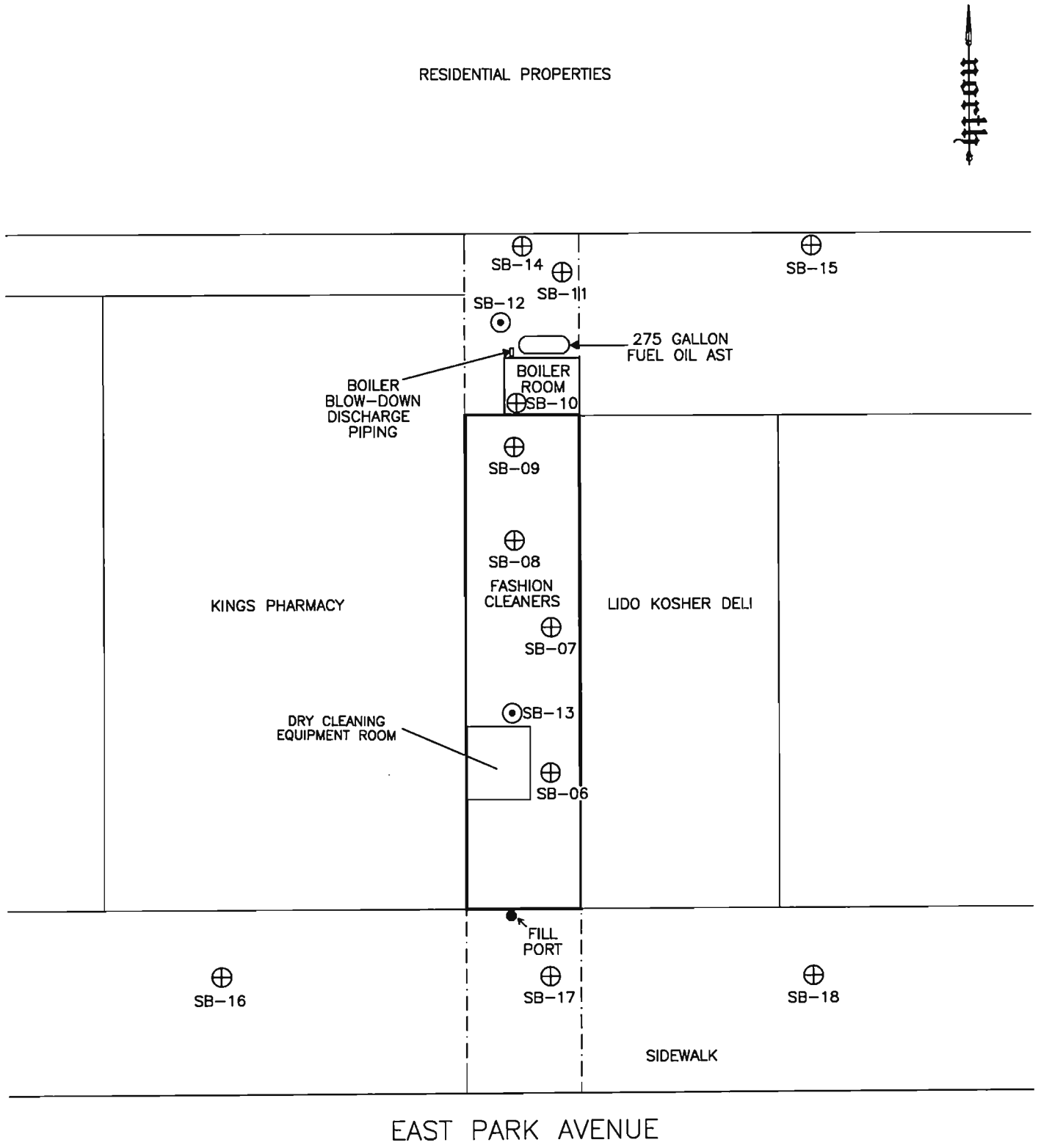
0 10 FT. 20
1" = 20 FEET

REVISION DATE: AUGUST 11, 2008 | REVISED BY: TB

FASHION CLEANERS
641 EAST PARK AVENUE
LONG BEACH, NEW YORK
11561-2512

PROPOSED GROUNDWATER TESTING LOCATIONS

FIGURE # 2-1



LEGEND:

⊕ PROPOSED SOIL BORING

⊙ PROPOSED SOIL BORING AT DEEP MONITORING WELL LOCATION

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PHONE: (631)924-3001 FAX: (631)924-5001

0 10 FT. 20

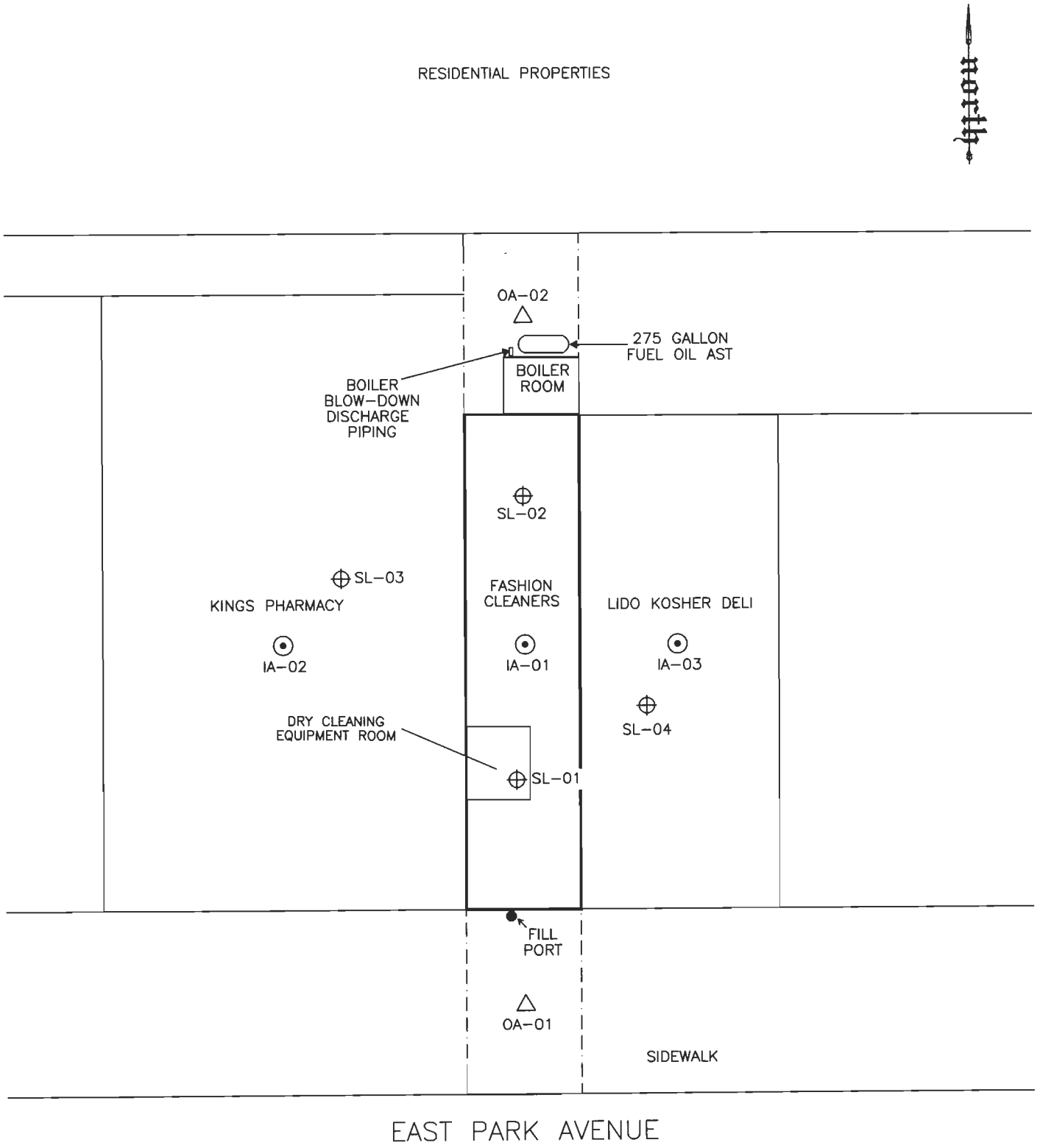
1" = 20 FEET

REVISION DATE: AUGUST 18, 2008 | REVISED BY: TB

FASHION CLEANERS
641 EAST PARK AVENUE
LONG BEACH, NEW YORK
11561-2512

PROPOSED SOIL TESTING LOCATIONS

FIGURE # 2-2



LEGEND:

- ⊕ PROPOSED SUBSLAB SAMPLING LOCATION
- ⊙ PROPOSED INDOOR AIR SAMPLING LOCATION
- △ PROPOSED OUTDOOR AIR SAMPLING LOCATION

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0 10 FT. 20
1" = 20 FEET

REVISION DATE: AUGUST 11, 2008 | REVISED BY: TB

FASHION CLEANERS
641 EAST PARK AVENUE
LONG BEACH, NEW YORK
11561-2512

PROPOSED SOIL VAPOR INTRUSION ASSESSMENT SAMPLE LOCATIONS

FIGURE # 2-3

Figure 4-1
Project Schedule
Remedial Investigation
Fashion Cleaners - 641 East Park Avenue
Long Beach, New York

			RI/FS Approximate Schedule - Week Beginning																		
			2008								2009										
Activity	Start	Finish	11/10	11/17	11/24	12/1	12/8	12/15	12/22	12/29	1/5	1/12	1/19	1/26	2/2	2/9	2/16	2/23	3/2	3/9	3/16
Task I - Revised Work Plan Prep	10/14/08	10/30/08																			
NYSDEC Revised Work Plan Review	10/31/08	11/07/08																			
Task II - Phase I Field Work	11/10//08	12/19/08																			
Mobilization	11/10/08	11/14/08																			
Subsurface Utility Evaluation	11/10/08	11/21/08																			
Tidal Influence Study	11/17/08	12/5/08																			
Soil Boring Installation	11/17/08	11/21/08																			
Laboratory Analysis - Soil Samples[1]	11/24/08	12/5/08																			
Monloring Well Installations	11/17/08	12/5/08																			
Laboratory Analysis - Soil Samples[1]	12/1/08	12/12/08																			
Surveying	12/8/08	12/12/08																			
Groundwater Flow Assessment	12/1/08	12/12/08																			
Monitoring Well Sampling	12/15/08	12/19/08																			
Laboratory Analysis - Groundwater Samples[1]	12/15/08	12/26/08																			
Soil Vapor Intrusion Assessment Sampling	12/15/08	12/19/08																			
Laboratory Analysis - Soil Vapor Intrusion Assessment Air Samples[1]	12/22/08	1/02/09																			
Residential SVI Work Plan	1/13/09	1/13/09																			
DEC/DOH Review (60 days)	1/14/09	3/13/09																			
Task III - Phase I RI Report	1/30/09	1/30/09																			
DEC Review (60 days)	2/02/09	4/03/09																			
Residential SVI Field Work	3/14/09	3/31/09																			
Phase II Work Plan	4/06/09	5/01/09																			
DEC Review (60 days)	5/04/09	7/03/09																			
Phase II Field Work	7/06/09	8/14/09																			
Receive Lab Data	8/28/09	8/28/09																			
Phase II Report	10/9/09	10/9/09																			
FS Report	9/04/09	9/04/09																			

Notes:
1) Two week standard laboratory turnaround.

Figure 4-1
Project Schedule
Remedial Investigation
Fashion Cleaners - 641 East Park Avenue
Long Beach, New York

			RI/FS Approximate Schedule - Week Beginning 2009																			
Activity	Start	Finish	3/23	3/30	4/6	4/13	4/20	4/27	5/4	5/11	5/18	5/25	6/1	6/8	6/15	6/22	6/29	7/6	7/13	7/20	7/27
Task I - Revised Work Plan Prep	10/14/08	10/30/08																			
NYSDEC Revised Work Plan Review	10/31/08	11/07/08																			
Task II - Phase I Field Work	11/10//08	12/19/08																			
Mobilization	11/10/08	11/14/08																			
Subsurface Utility Evaluation	11/10/08	11/21/08																			
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Residential SVI Work Plan	1/13/09	1/13/09																			
DEC/DOH Review (60 days)	1/14/09	3/13/09																			
Task III - Phase I RI Report	1/30/09	1/30/09																			
DEC Review (60 days)	2/02/09	4/03/09																			
Residential SVI Field Work	3/14/09	3/31/09																			
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DEC Review (60 days)	5/04/09	7/03/09																			
Phase II Field Work	7/06/09	8/14/09																			
Receive Lab Data	8/28/09	8/28/09																			
Phase II Report	10/9/09	10/9/09																			
FS Report	9/04/09	9/04/09																			

Notes:
1) Two week standard laboratory turnaround.

Figure 4-1
Project Schedule
Remedial Investigation
Fashion Cleaners - 641 East Park Avenue
Long Beach, New York

			RI/FS Approximate Schedule - Week Beginning															
			2009															
Activity	Start	Finish	8/3	8/10	8/17	8/24	8/31	9/7	9/14	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9
Task I - Revised Work Plan Prep	10/14/08	10/30/08															
NYSDEC Revised Work Plan Review	10/31/08	11/07/08															
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Mobilization	11/10/08	11/14/08															
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DEC Review (60 days)	2/02/09	4/03/09															
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Phase II Work Plan	4/06/09	5/01/09															
DEC Review (60 days)	5/04/09	7/03/09															
Phase II Field Work	7/06/09	8/14/09															
Receive Lab Data	8/28/09	8/28/09															
Phase II Report	10/9/09	10/9/09															
FS Report	9/04/09	9/04/09															

Notes:
1) Two week standard laboratory turnaround.

Table 2-1
Phase I Remedial Investigation - Sample and Analytical Summary
Fashion Cleaners - 641 East Park Avenue
Long Beach, New York

Media	Number of Samples	Number of QA/QC Samples				Total Number of Samples	Analysis[5]
		MS/MSD[1]	Field Dup[2]	Equip Blank[3]	Trip Blank[4]		
Soil - Shallow Soil Borings							
SB-06(depth 1,2), SB-07(depth 1,2), SB-08(depth 1,2), SB-09(depth 1,2), SB-10(depth 1,2), SB-11(depth 1,2)	12	1	1	1	-	15	NYSDEC TCL VOCs
Soil - Monitoring Well Installation Locations							
SB-12(depth 1,2), SB-13(depth 1,2)	4	1	1	1	-	7	NYSDEC Full TCL/TAL, Hg
SB-14(depth 1), SB-15(depth 1), SB-16(depth 1), SB-17(depth 1), SB-18(depth 1)	5	-	-	-	-	5	NYSDEC TCL VOCs
Groundwater							
MW-01(5-15), MW-02(5-15)	2	1	1	1	1	6	NYSDEC Full TCL/TAL, Hg, Chloride
MW-03(5-15), MW-04(5-15), MW-05(5-15), MW-06(5-15), MW-07(5-15), MW-01(15-20), MW-02(15-20)	7	-	-	-	-	7	NYSDEC TCL VOCs, Chloride
Air - Soil Vapor Intrusion Assessment							
SL-01, SL-02, SL-03, SL-04, IA-01, IA-02, IA-03, OA-01, OA-02	9	-	1	-	-	10	EPA Method TO-15 VOCs

Notes:
1) QA/QC samples will include a matrix spike (MS) and matrix spike duplicate (MSD) sample pair at a frequency of not less than 5% (one MS/MSD pair per every 20 samples collected) for each matrix (aqueous and soil).
2) A blind field duplicate sample will be collected at a frequency of one per every 20 samples for each matrix.
3) Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used in the soil sampling program, equipment blanks will be analyzed at a frequency of not less ban 5% (one equipment blank per every 20 samples collected).
4) One trip blank will submitted for analysis for each day that aqueous matrix volatile organic samples are collected. A trip blank will be included in each cooler that contains aqueous matrix volatile organic samples; therefore all volatile organic samples and containers will be shipped to and from the laboratory in the smallest number of coolers possible in order to minimize the number of trip blanks required.
5) The analytical laboratory contracted to perform the sample analyses will be a New York State Department of Health (NYSDOH), Environmental laboratory ApprovalProgram (ELAP) certified laboratory holding the Analytical Services Protocol (ASP) certification.

Appendix A

Photographic Documentation - February 20, 2008 Site Visit

EnviroTrac
Environmental Services

Site Photographic Documentation

1. Looking east at Fashion Cleaners storefront.

4. Location of MW-2 inside building.

2. Rear yard area to north of building.

5. Looking south at dry cleaning operations.

3. Location of MW-1 and boiler blow-down discharge piping in yard area.

6. Alley to west of rear yard area.

EnviroTrac
Environmental Services

Appendix B

Key Project Personnel Resumes

EnviroTrac
Environmental Services

Jeffrey A. Bohlen
Project Manager

Experience Summary

- *Corporate Compliance Audits and Negotiations*
- *Phase I and II Environmental Site Assessments*
- *Remedial Investigation and Feasibility Studies*
- *Geotechnical Surveys and Subsurface Investigations*
- *Storage Tank Management*
- *Health and Safety Monitoring*
- *Design of soil and groundwater flow and contaminant transport*

Education

- *BS Environmental Geology, Minor in Business Marketing/ Management, Long Island University of New York, Southampton Campus, 1995*

Mr. Bohlen has over 12 years experience as a Senior Project Manager and Hydrogeologist in the environmental consulting and construction industry. Specific experience includes: corporate compliance audits relating to both the petroleum and industrial sectors, Phase I and II Environmental Site Assessments (ESAs), conducting two– and three-dimensional hydrogeologic modeling for simulating groundwater flow and contaminant transport, health and safety monitoring, environmental remediation, design of soil and groundwater remediation systems, and management of the remedial process.

As a Senior Project Manager for EnviroTrac Ltd., Mr. Bohlen is responsible for managing staff and resources, preparing technical reports, developing budgets, outlining equipment and labor costs for the management of individual remedial projects. He serves as a client/regulator interface to ensure projects are completed on time, on budget and meet the requirements of the client and/or regulatory agency.

Professional Certifications

Environmental Assessment Association (EAA), Certified Environmental Inspector
Asbestos Air Monitoring Certification
OSHA Lead Construction Training
Visual MODFLOW Certification
OSHA Certification, 40 hr. Health & Safety Training at Hazardous Waste Sites
OSHA Certification, 8 hr. Refresher Health & Safety Training at Hazardous Waste Sites
OSHA Certification-Confined Space Entry and Supervision

EnviroTrac
Environmental Services

5 Old Dock Road
Yaphank, NY 11980

Phone: 631-924-3001
Fax: 631-924-5001
Website: www.envirotrac.com

Jeffrey A. Bohlen
Project Manager

Professional Highlights and Selected Projects

- Mr. Bohlen performed several hundred Phase I and II Environmental Site Assessments for commercial, industrial and public utility clients throughout the New York area. Phase I ESAs have been conducted for both property buyers and sellers. Mr. Bohlen recommends additional investigatory or remedial work, as warranted. These projects are usually conducted quickly as large real-estate transactions are often dependant upon the outcome of the Phase I and II reports.

- As a Senior Project Manager for EnviroTrac, Mr. Bohlen is involved in managing numerous remedial projects throughout New York State. Investigation and delineation techniques have included soil borings, groundwater monitoring well networks, direct push sampling, geophysical methods, soil-gas surveys, aquifer testing, surface water and sediment sampling, waste characterization (soil piles, drums, USTs, ASTs, landfills, etc.), test pits, and computer fate & transport modeling. His extensive experience in the above-referenced techniques allows Mr. Bohlen to design and implement cost-effective and timely investigation programs

- Mr. Bohlen has extensive experience in the selection, design, installation and maintenance of a wide range of soil and groundwater remediation systems. Remedial systems have included both active and passive free product recovery, groundwater pump and treat, soil-vapor extraction, air sparging, bioventing, and bioremediation. Again, his knowledge and experience in many remedial techniques allows him to select the most appropriate system for a given situation.

- Mr. Bohlen has managed over 200 UST system closures in New York State. Responsibilities included coordinating with the State and local regulatory agencies, local fire marshals, building departments and contractors to permit and remove petroleum USTs. Following UST removal, responsibilities included report preparation and submittal to regulators. Results of submittals either documented closure levels or recommended further investigation.

- Mr. Bohlen has a strong working relationship with local and state environmental regulators including the Environmental Protection Agency, New York State Department of Environmental Conservation, Suffolk County Department of Health Services and Nassau County Department of Health. These relationships allow Mr. Bohlen to make accurate recommendations for sites with environmental impact.

- Mr. Bohlen provided litigation support and expert testimony in Federal court for a property owner that was liable to remediate both oil and groundwater contamination caused by a dry-cleaning tenant. The litigation support included aerial photographs, GIS mapping, hydrogeologic studies and contaminate fate and transport modeling. EnviroTrac Ltd.'s litigation support and expert testimony was instrumental in winning the case for the property owner.

Thomas Bosshard
Hydrogeologist

Experience Summary

- *Oversight and management of soil and ground-water investigations*
- *Evaluation of field and laboratory data and technical reporting*
- *Underground storage tank*
- *(UST) closures*
- *Investigations and closures for the USEPA underground injection control (UIC) program*
- *Oversight and coordination of soil and groundwater remediation system operation and maintenance*
- *Phase I and II environmental site assessments*

Education

- *BS Geology, Southern University of New York, Stony Brook, 2001*

Mr. Bosshard has over 7 years experience in the environmental consulting field. He has extensive experience performing and overseeing soil and groundwater investigations and remediation projects, as well as UIC cleanups, UST removals and environmental site assessments. Currently as a Project Manager, Mr. Bosshard coordinates subsurface investigations, monitoring well installations, UST removals and remedial construction projects. These duties include the scheduling of technicians to perform monthly operation and maintenance on existing remediation systems, as well as ground-water monitoring and sampling. His responsibilities also include the preparation of budgets and the financial oversight of projects.

Professional Certifications

OSHA Certification, 40-Hour Health and Safety Training at Hazardous Waste Sites

OSHA Certification, 8-Hour Refresher Health and Safety Training at Hazardous Waste Sites

OSHA Certification, Permit-Required Confined Space Entrant/ Attendant Annual Refresher

United States Department of Energy Brookhaven National Laboratory, Radiological Worker I Training

United States Department of Energy Brookhaven National Laboratory, Contamination, High Contamination and Airborne Radioactivity Training

EnviroTrac
Environmental Services

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Fax: (631) 924-5001
Website: www.envirotrac.com

Thomas Bosshard
Hydrogeologist

Professional Highlights and Selected Projects

- Mr. Bosshard's specific experience includes Phase I and II environmental site assessments throughout New York State in conformance with ASTM standards E1527 and E1528. Mr. Bosshard has also worked in conjunction with other Project Managers to prepare site specific Remedial Action Plans. Such preparations include, product recovery, pump and treat, high vacuum extraction, soil vapor extraction and air sparge. Mr. Bosshard's experience also extends to subsurface soil and groundwater investigations using soil borings, well monitoring, hydropunch/GeoProbe, UST closures, UIC closures, product line closures, hydraulic lift closures, and oil/water separator closures.

- As a geologist, Mr. Bosshard's experience includes oversight and performance of soil and groundwater investigations at numerous petroleum and hazardous waste sites. Investigation techniques included oversight of soil and borings, groundwater monitoring well installation and hydropunch/GeoProbe sampling. Drilling methods include hollow stem auger, air rotary, mud rotary and rock coring.

- Mr. Bosshard has overseen and performed numerous drywell and septic system investigations, remediation and closures. All remediated systems had to meet federal or local guidelines. The drywell/septic systems were then stabilized for future use, removed or abandoned. Mr. Bosshard was also responsible for the disposal of all hazardous and non-hazardous material removed from the drywalls.

- Mr. Bosshard performed oversight for over 70 soil characterization borings for the Metropolitan Transportation Authority. Soil samples were collected using the direct push method and split spoon sampler, screened in the field with a photoionization detector and logged using the Unified Soil Classification System. Each boring was completed as a high specification monitoring/remediation well.

- Mr. Bosshard has conducted numerous multilevel aquifer characterization and sampling programs to monitor the vertical profile of off-site plumes affecting drinking water wells. Methods of aquifer characterization included using geophysical techniques and pump tests.

- Mr. Bosshard oversees and performs operation and maintenance of remediation systems that include product recovery, soil vapor extraction, air sparge, pump and treat and high vacuum extraction. Operation and maintenance responsibilities include sampling, recording system operating conditions, maximization system operation and troubleshooting component failures.

- Mr. Bosshard has performed soil and groundwater sampling for the radiological compound Strontim-90 at the US Department of Energy's Brookhaven National Laboratory. Sample collection methods included test pits and hydropunch/GeoProbe borings.

James Van Horn
Quality Assurance Officer

Experience Summary

- *Cost-benefit analysis, as-builts and estimating*
- *Design, installation, operation, and maintenance of soil and groundwater remediation systems*
- *Subcontractor and engineering/construction oversight*
- *Remedial Investigation/Feasibility Studies. (RI/FS)*
- *Evaluation and design of supplemental water treatment systems*
- *Groundwater Modeling (contaminate fate & Transport, mass balance, title influence, FPH thickness)*
- *Evaluation of Soil-Vapor Intrusion*
- *In-Situ Chemical Oxidation / Bioremediation*

Education

- BS Biotechnology, Rutgers University, New Jersey, 2000 (20+ hours of Chemistry)

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Mr. Van Horn has over 7 years experience as an Engineer in the environmental consulting/construction field. His experience includes preparing exposure assessments, remedial investigations/ feasibility studies, remedial action plans, remediation system design, construction coordination and oversight, project planning and scheduling, bid preparation/contract review as well as research, development, and evaluation of innovative technologies specifically dealing with soil and ground-water remediation systems. Mr. Van Horn has become an authority in the design of the various electrical wiring requirements and controls associated with environmental remediation systems. He has vast knowledge regarding system classifications and wiring techniques required in Hazardous (classified) locations as defined by the National Electric Code. Additionally, Mr. Van Horn has extensive experience in the evaluation and application of innovative technologies for site remediation including bioremediation and in-situ chemical oxidization utilizing ozone, sodium permanganate and potassium permanganate. He has extensive modeling experience that is used in the development of remedial investigation/feasibility studies and remedial action plans providing for effective remedial designs resulting in reduced cost to closure expenditures. He has extensive experience in analytical methodology, data interpretation and validation, development of sampling plans, quality control procedures and auditing techniques. His hands on experience provides for valuable cost benefits, analysis and value engineering.

Professional Certifications

OSHA Certification, 40 hr. Health and Safety Training at Hazardous Waste Sites
OSHA Certification, 8 hr. Refresher Health and Safety Management Site Supervision at Hazardous Waste Sites
OSHA Certification, Confined Space Entry
Smith Driver System Training

James Van Horn
Quality Assurance Officer

Professional Highlights and Selected Projects

- Mr. Van Horn served as Project Engineer for an inactive hazardous waste site in New York State. The record of decision called for a large scale Sodium Permanganate and Potassium Permanganate Injection system through both the construction and operation phases of the system. The system delivered 115,000 pounds of sodium permanganate and 25,000 pounds of potassium permanganate to the subsurface. His responsibilities included project coordination, scheduling, submittal preparation, and construction oversight. When construction was complete he was responsible for the operation of the system, ensuring the proper dosage of permanganate into the subsurface while maintaining a set injection schedule.

- Mr. Van Horn formulated a Comprehensive Human Health Exposure Assessment for a New York State funded soil and ground water remediation project. The Exposure Assessment characterized the exposure setting, identified the various exposure pathways, and evaluated the contaminant fate and transport. Various modeling software was utilized to evaluate groundwater contaminant fate and transport and to evaluate the risk from subsurface vapor intrusion into buildings. The Exposure Assessment was the key factor leading to site closure.

- Project Engineer for a New York State funded sub slab vapor extraction system to mitigate chlorinated solvent vapor intrusion into an occupied commercial facility. Responsibilities include construction oversight, electrical wiring and control design, and system troubleshooting.

- Project Engineer for multiple groundwater pump and treat systems located throughout New York State. His responsibilities include electrical distribution and system control design, construction oversight and is responsible for the scheduling of Operation and Maintenance (O&M) as well as troubleshooting potential problems as they arise.

- Project Engineer responsible for completing a site tidal influence study to determine FPH fate and transport at a bulk petroleum storage facility located on St. Georges Island, Bermuda. The study utilized data collected from multiple data loggers in order to average the site's tidal influence through the Bermuda karst to determine the average hydraulic gradient for the site. This was used to determine FPH fate and transport to in order to provide comprehensive site characterization for the RI/FS.

- Served as the Operation and Maintenance (O&M) Project Engineer/System Manager for a storm water treatment system operating at a petroleum transfer station located in Long Island, NY. Responsibilities included project scheduling and coordination of all O&M duties including system monitoring and sampling, as well as preparation of written reports.

- Engineer assisting in design and responsible for construction oversight and operation of a granulated-activated carbon (GAC) ground-water pump and treat system installed to provide supplemental water treatment to address MTBE in a public drinking water system. The system is designed to treat 300 gallons per minute (gpm) of MTBE-impacted water utilizing two 10,000-pound GAC vessels. Responsibilities include project scheduling and system operation and maintenance.

- Field Engineer assisted in the design and responsible for construction oversight of a granulated-activated carbon (GAC) surface-water pump and treat system. The system is designed to reduce VOC concentrations and adjust the pH of the water to meet municipal storm-water treatment systems limits. Assisted in system wiring and control design. Responsible for the final Electrical Distribution Diagram and Control Panel Schematic.

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Environmental Services

James Van Horn
Quality Assurance Officer

Professional Highlights and Selected Projects (continued)

- Assisted in the design and installation of an air stripper system to provide supplemental water treatment at a public water supply plant. The designed flow rate is 100 gpm and the system treats MTBE-contaminated potable water utilizing an air stripper. Assisted in the system wiring and control design. Responsible for the Electrical Distribution Diagram.

- Provided the engineering design, installation and construction oversight of more than 70 Soil-Vapor Extraction (SVE) and Air Sparging (AS) systems in throughout the east coast. Responsible for project design engineering, scheduling, material/equipment purchasing, construction oversight, P&ID and As-Built Drawings.

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Appendix C

Community Air Monitoring Plans - Ground Intrusive and Non-Intrusive Activities

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Community Air Monitoring Plans (Ground Intrusive and Non-Intrusive Activities)

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Communitv Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the

contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will he compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued.

- If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the

airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

Reference – Draft DER-10 Technical Guidance for Site Investigation and Remediation (Dec, 2002)

Community Air Monitoring Plan for Ground Intrusive Activities

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area on a continuous basis. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor mission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact

the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Community Air Monitoring Plan for Non-Intrusive Activities

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area daily at 1 hour intervals. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume but more frequent intervals of monitoring, as directed by the Safety Officer, must be conducted. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure. whichever is less, is below 5 ppm over background, and

- more frequent intervals of monitoring, as directed by the Safety Officer, are conducted.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 Foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if organic vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of the Work Plan will go into effect.

2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minutes intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

Appendix D

Guidance for the Development of Data Usability Summary Report

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Guidance for the Development of Data Usability Summary Reports

New York State Department of Environmental Conservation
Division of Environmental Remediation

Background:

The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the costly and time consuming process of third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

The DUSR and the data deliverables package will be reviewed by the DER Quality Assurance Unit. If data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

Personnel Requirements:

The Environmental Scientist preparing the DUSR must hold a Bachelors Degree in a relevant natural or physical science or field of engineering and must submit a resume to the Division's Quality Assurance Unit documenting experience in environmental sampling, analysis and data review.

Preparation of a DUSR:

The DUSR is developed by reviewing and evaluating the analytical data package. During the course of this review the following questions must be asked and answered:

1. Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?
2. Have all holding times been met?

3. Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
4. Have all of the data been generated using established and agreed upon analytical protocols?
5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?
6. Have the correct data qualifiers been used?

Evaluation of NYSDEC ASP Matrix Spike Blank (MSB) data - If the MSB recovery is less that the ASP criteria, the positive results should be qualified as J, estimated biased low. If the MSB recovery is less than the ASP criteria, but greater than 10%, the non-detects should be qualified J, biased low. If the MSB recovery is less than 10%, the non-detect data must be rejected.

Any Quality Control exceedances must be numerically specified in the DUSR and the corresponding QC summary sheet from the data package should be attached to the DUSR. All data that would be rejected by the EPA Region 2 Data Validation Guidelines must also be rejected in the DUSR.

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP '95 Rev. guidelines.

Reference – Draft DER-10 Technical Guidance for Site Investigation and Remediation (Dec, 2002)