DRAFT REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS REPORT

FORMER C&B DRY CLEANERS
(NYSDEC SITE NO. E907028)
2241 WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK 14701

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road (716) 655-8842
Elma, NY 14059-0264 (fax) (716) 655-0937

2005.0067.00 DECEMBER 2007

DRAFT REMEDIAL INVESTIGATION/ALTERNAIVES ANALYSIS REPORT
FORMER C&B DRY CLEANERS SITE

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Purpose

Chautauqua County entered into a State Assistance Contract with the New York State Department of Environmental Conservation (NYSDEC) to complete a Remedial Investigation/Alternatives Analysis (RI/AA) program at the Former C&B Cleaners Site (project site). The project site is located at 2241 Washington Street in the City of Jamestown, Chautauqua County, New York, as illustrated in Figure 1. The layout of the project site is shown in Figure 2. The RI was completed pursuant to the Environmental Restoration, or Brownfield, Program, component of Title 5 of the Clean Water/Clean Air Bond Act of 1996, which is administered by the NYSDEC. The purpose of the RI/AA program described herein was to characterize the magnitude and extent of contamination occurring on, and emanating from, the project site, and to develop and evaluate remedial alternatives, if necessary, that will render the site suitable for redevelopment.

TVGA has prepared this report on behalf of the Chautauqua County Department of Public Facilities (CCDPF) to provide a detailed description of the RI/AA program implemented at the Former C&B Cleaners Site. In addition to summarizing and documenting the methods used to investigate the project site, this RI/AA Report describes the physical characteristics of the site; defines the magnitude and extent of contamination encountered; assesses the contamination with respect to fate, transport and exposure; and identifies appropriate remedial action objectives (RAOs). Also discussed in this report are the screening and detailed analysis of remedial alternatives, and the identification of the most suitable remedy available to satisfy the RAOs.

1.2 Site Background

1.2.1 Site Description

The project site is located at 2241 Washington Street in the City of Jamestown, Chautauqua County, New York, and encompasses two tax parcels (SBL 109-3-11.2 and 109-3-12.1). The project site is currently vacant and has not been occupied since at least 1999, when the commercial dry cleaning operations ceased. The project site consists of approximately 0.22 acres of land and the remains of a former approximate 2,170 square feet building that was demolished in July 2003. Building remains include the concrete floors and foundation. Asphalt and gravel access roads and parking areas are located outside the limits of the former building.

The project site is located in an area Zoned C-M (Service and Highway Commercial). Commercial development occurs along the east and west sides of Washington Street in the vicinity of the project site. The project site is bounded to the east by Washington Street, beyond which is a used automobile dealership and soft drink bottler; to the north by a restaurant; to the west by an unpaved parking lot associated with the

aforementioned restaurant; and to the south by a commercial building that is used for the storage of automobiles, automobile parts and service equipment.

1.2.2 Site History

The project site was utilized for commercial dry cleaning operations from approximately 1931 through 1999, when the site was closed and abandoned. Chautauqua County acquired the project site via tax foreclosure from James and Joann Perry in November 2001. Previous owner/operators of the dry cleaning facility also included Ronald and Janice Hodges; A.F. & A. Maruccia, R. Olson & J. O'Connell; and Carpenter and Bacot. With regard to the former structure located on the project site, historical records indicated the following:

- The main portion of the former building was constructed in 1931
- The boiler room at the rear of the former building was constructed in 1936
- An addition on the south side of the building was constructed in 1939

The structure formerly located at the project site was demolished in July 2003.

1.2.3 Previous Environmental Activity

The project site has been the subject of previous environmental assessments, investigations and remedial actions. The following paragraphs outline the scope of services and results from these previous activities.

Preliminary Environmental Site Assessment/Emergency Removal Actions

A Preliminary Environmental Site Assessment (ESA) of the project site was completed in 2001 by the CCDPF and included a records review, site reconnaissance and interviews with knowledgeable persons. Based on this ESA and as referenced above, it was determined that the project site was used almost exclusively for commercial dry cleaning operations until its abandonment in 1999.

An environmental database service company, EcoSearch, was contracted to provide a site-specific environmental database search report for the project site and vicinity. The search of standard local, state and federal record sources relating to the presence or occurrence of facilities or spill sites involving solid and/or hazardous wastes and petroleum products indicated the following:

- C&B Cleaners was listed as a Resource Conservation and Recovery Act (RCRA) conditionally exempt small quantity generator
- The former Jamestown City Landfill (west of the project site) and the Pelican Manufacturing Site (south of the project site) are NYSDEC Inactive Hazardous Waste Sites (IHWS)

- Adjoining properties Pepsi-Cola and McFadden Ford (east of the project site across Washington Street) are both petroleum bulk storage facilities
- A number of petroleum spill sites exist within the vicinity of the project site

The Jamestown City Landfill is designated as a Class 3 IHWS by the NYSDEC. Class 3 sites do not present significant threats to public health or the environment, and do not require immediate response actions. Based on the Class 3 designation and the separation distance from the project site of approximately 1,000 feet, adverse impacts from this landfill to the project site are not expected.

The Pelican Manufacturing Site is designated as a Class 2 IWHS due to confirmed groundwater and surface water contamination by trichloroethene (TCE). Class 2 sites represent a significant threat to public health or the environment, and require remedial action. The remedial actions completed at this site consisted of soil vapor extraction to remove volatile organic compounds (VOCs) from soil; groundwater extraction; and treatment and off-site disposal of contaminated sediments. Remedial activities have ceased and the former on-site building was demolished. Based on a review of NYSDEC records and a discussion with NYSDEC representatives, the remediation has been completed. However, an investigation of on-site and off-site sewers has not been completed. Although remedial activities have ended, the Pelican Manufacturing Site represents a potential environmental threat to the project site due to its close proximity (approximately 200 feet) and the existence of uninvestigated preferential pathways such as the roadway, storm sewers, and sanitary sewers.

The remaining sites identified during the database search are not considered to represent threats to the environmental integrity of the project site based upon their location and/or their current regulatory status.

During the site reconnaissance at the project site, debris including empty drums, discarded laundry machines, and miscellaneous rubbish were observed outside the former building. Abandoned clothing, equipment and materials were observed within the former building. Numerous containers, some partially to completely full, of chemicals and detergents were identified throughout the former building, including:

- Stain remover
- Titanium stripper
- Liquid sour
- Bleach
- Tetrachloroethene (PCE) fabric detergent
- Ethylene-based solvent
- An unnamed solvent

A subsequent emergency removal action of these materials for off-site disposal was initiated by CCDPF and performed by Environmental Services Group, Inc.

A sludge-like material, likely waste generated from cleaning clothes, was observed in a box near a laundry machine, in five-gallon buckets, and on the floor of the boiler room. The majority of the sludge was removed from the project site during the removal of the underground storage tanks (USTs), which is detailed below.

Based on the location of drains and cleanouts within the former building, the drains appear to discharge in the direction of the municipal sanitary sewer system along Washington Street. Indications of underground dry injection wells or septic systems were not observed. Based on a conversation with the City of Jamestown, the former building has been connected to the municipal sewer system since 1931.

A number of pipes protruding from the south side of the boiler room were observed during the site visit. Some of the pipes were associated with the natural gas service to the boiler system. The purpose for several of the remaining pipes in this area could not be readily identified.

Asbestos Survey

Prior to demolition of the building, a pre-demolition asbestos survey was completed to identify and quantify asbestos-containing materials (ACMs). Because the survey determined that ACMs were present in the building, an ACM abatement program was completed prior to demolition. The demolition of the on-site structures occurred in July 2003.

UST Investigation/Removal

Because the site reconnaissance revealed the presence of several abandoned pipes along the north side of the building, raising suspicion of the existence of USTs, a preliminary exploration program was implemented. The CCDPF completed excavations that revealed two USTs on the western side of the building. The USTs were located adjacent to each other and had been abandoned in place (filled with pea gravel). The USTs also contained a liquid with a volatile hydrocarbon odor. The USTs measured approximately 64 inches in diameter, with an estimated capacity of 500 gallons each.

A photoionization detector (PID) was used to screen the soil/fill and the UST contents for total organic vapors (TOVs) during the exploratory excavation. Excavated soil/fill and UST contents with elevated TOV measurements were stockpiled on and covered with high-density polyethylene sheeting. Chemical analysis of samples collected from the southern UST indicated the presence of VOCs, including 1,1,2,2-tetrachloroethane (48,000 ug/kg) and 4-chlorotoluene (3,700 ug/kg).

A removal action was initiated by CCDPF, and on December 19, 2001 both USTs and the associated piping were emptied, cleaned and removed by Global Environmental Industrial, Inc. (GEI) of Dunkirk, New York. A PID was used to screen excavated soil/fill for TOVs and soil samples were collected from the excavation. Analytical results from

soil/fill samples collected from the excavation sidewalls indicated the presence of VOCs, specifically PCE, at concentrations ranging from 7 ug/kg to 25 ug/kg.

Soils present at 6.5 to 8.5 feet below ground surface below the bottom of the UST excavation exhibited visual, olfactory, and photoionic evidence of contamination. Although no Target Compound List (TCL) VOCs were detected in the sample collected from this location, 20 tentatively identified compounds (TICs) were detected. The total concentration of these TICs was 503,300 ug/kg, which was above the then-current NYSDEC guidance level of 10,000 ug/kg for total VOCs.

An additional test pit was excavated approximately 35 feet west of the former USTs to evaluate the soils for evidence of contamination. The test pit was excavated to approximately seven feet below ground surface (bgs), where visual and photoionic evidence of contamination were evident. No TCL VOCs were detected in a sample collected from the bottom of this test pit, but 20 TICs were detected. The total concentration of these TICs was 1,058,370 ug/kg, which was above the then-current NYSDEC guidance level for total VOCs of 10,000 ug/kg.

The excavated soil/fill that exhibited evidence of VOC contamination was placed in a lined roll-off container and covered with high-density polyethylene sheeting. This material was transported to and disposed at an approved landfill facility in Model City, New York.

The data generated during these investigations was not sufficient to determine the magnitude and extent of the contamination within the soil/fill, nor was it sufficient to determine the degree, if any, to which groundwater has been impacted.

1.2.4 Areas of Potential Environmental Concern

Based upon the historical use of the project site for dry cleaning operations, previous assessments, investigations and removal actions completed at the project site, the following potential areas of environmental concern have been identified:

- Former UST Area – Elevated VOC concentrations were detected in soil samples collected in locations under and west of the former USTs.
- Site-Wide Groundwater – On-site groundwater may contain VOCs from on-site and/or off-site sources.
- Preferential Pathways - The close proximity of the project site to the former Pelican Manufacturing site, a Class 2 IHWS with documented TCE impacts, indicates that uninvestigated preferential pathways, such as the roadway and storm and sanitary sewer lines, could act as sources of on-site VOC contamination.
- Soil/Fill – Because the on-site soil/fill is of unknown origin and composition, the material could contain contaminants in excess of the relevant standards.

As such, additional investigation at the project site was warranted.

2.0 METHODS OF INVESTIGATION

The scope of the RI/AA program was generally consistent with that outlined in the NYSDEC-approved April 2005 RI/AA Work Plan (Work Plan). Modifications made to the Work Plan during the completion of the RI were approved by NYSDEC and Chautauqua County and are discussed within this report.

The goals of the RI/AA program were to:

- Characterize the VOC contamination detected in subsurface soil/fill on the project site
- Determine whether the contaminated soil/fill constitutes a characteristic hazardous waste
- Confirm or deny the presence of VOC contamination in subsurface soil/fill materials immediately adjacent to the Swanson building (i.e. southern property boundary of project site)
- Confirm or deny the presence of VOC contamination in the on-site groundwater, and, if present, characterize the groundwater contamination
- Determine groundwater flow direction, gradient and velocity
- Confirm or deny the presence of VOC contamination in off-site groundwater downgradient of the project site
- Generate analytical data from contaminated media to enable the completion of an exposure assessment and the preliminary identification of response actions capable of ensuring the protection of human health and the environment under current and future use scenarios

To accomplish these goals, the following tasks were completed during the field investigation:

- Completion of a passive soil gas survey to locate areas of the project site that contain significant concentrations of VOCs in the subsurface and to assist in optimizing test pit, soil probe, soil boring, and monitoring well locations
- Completion of test pits, on-site and off-site soil probes and soil borings to enable the classification, screening, sampling and chemical analysis of soil/fill samples
- Installation, development and sampling of groundwater monitoring wells on-site and off-site to enable the determination of groundwater flow direction and gradient, as well as the collection and chemical analysis of groundwater samples
- Evaluation of the resulting data and preparation of a report to:
    - Summarize and document the activities performed during the RI
    - Describe the physical characteristics of the project site
    - Describe the magnitude and extent of contamination on-site and off-site, if any
    - Compare the analytical data to applicable regulatory levels
    - Assess the implications of the conditions encountered
    - Provide recommendations relative to future work requirements and remedial action objectives

2.1 Field Investigation

The following subsections describe the scope of field activities associated with the site characterization program. This scope reflects minor deviations and/or additions from the initial scope, as some minor modifications were necessary to account for information obtained during the field investigation or were performed at the request of the NYSDEC. The methods employed during the execution of the field tasks were detailed in the Field Sampling Plan (FSP), while the procedures implemented to ensure the quality of the resulting field and laboratory data were in accordance with the Quality Assurance/Quality Control (QA/QC) Plan. Table 1 summarizes the number of samples collected during the investigative tasks, and the corresponding parameters for which the samples were analyzed. Figures 3 through 5 show the soil gas survey and soil and groundwater sampling locations, respectively.

As shown in these figures and tables, the number of samples, borings, and wells is higher than originally planned. These modifications to the work plan were required to better characterize and delineate the contaminated media at the site and proximal properties. The number and locations of the additional borings, wells, and samples were approved by the NYSDEC prior to the initiation of each task.

2.1.1 Passive Soil Gas Survey

A passive soil gas survey was completed at the project site to determine areas where the highest concentrations of VOCs were present in the soil vapor. Beacon Environmental Services, Inc. (Beacon) supplied the adsorbent vapor modules and equipment utilized for this task. On April 20, 2005, TVGA field personnel installed 14 modules across the project site in an approximately 25-foot grid. The approximate sampling locations and results of the survey are depicted on Figure 3 as well as in the Soil Gas Survey Report in Appendix A.

The approximately one-inch diameter soil vapor holes were drilled to approximately 17 inches below ground surface using an electric auger drill. A one-foot length of copper conduit was inserted in the vapor hole to a depth of approximately 14 inches below grade. The modules were placed in the conduit, and the top of the pipe was plugged using compressed aluminum foil and the remaining annulus filled with soil to limit the influence of ambient air.

On May 3, 2005, the modules were retrieved from the subsurface, properly sealed and transported to Beacon for analytical testing. Each sample was analyzed for 17 halogenated VOCs by gas chromatography and mass spectroscopy (GC/MS) using modified EPA Method 8260B.

2.1.2 Test Pits

Seven test pits were excavated on May 12, 2005. The CCDPF provided the equipment and operator that were used for this task, while TVGA personnel provided field oversight. The objectives of this task were to investigate subsurface areas adjacent to the former building that may contain USTs and visually characterize the soil and fill materials present on the western portion of the project site. The excavated material was also screened for TOVs using a PID. After completion, each test pit was backfilled with the excavated materials. Logs that detail the observations made during the test pit activities are included in Appendix B. The test pit locations are shown on Figure 4.

2.1.3 Soil Probes and Micro-Well Installation

2.1.3.1 Probing Events

A total of 15 soil probes (SP-1 through SP-15) were advanced on May 13, 2005 to characterize the subsurface soil/fill and define the extent of the contamination in these materials. The soil probes were advanced at the locations shown on Figure 4 using direct-push soil sampling equipment to collect continuous samples. The depths of the soil probes ranged from 12 to 16 feet below grade. A subcontractor to TVGA, TREC Environmental Inc. (TREC), provided and operated the direct-push equipment. Micro-wells were not installed in any of the soil probes advanced on May 13, 2005.

During the May 13, 2005 event, 14 soil samples were collected from the soil probes for analytical testing. The portion of the sample with the highest direct TOV measurement was placed in pre-cleaned sampling containers provided by the laboratory for possible VOC analysis. In addition, portions of select samples were homogenized using decontaminated stainless steel bowls and spoons for possible analysis of semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals.

Nine of the soil samples were collected from five soil probes for analysis of Target Compound List (TCL) VOCs plus Tentatively Identified Compounds (TICs) to evaluate the vertical and lateral extent of VOC contamination on-site. To further characterize the contaminated soil, one sample of the soils exhibiting significantly elevated PID measurements in SP-4 was collected for analysis of the extract of the Toxicity Characteristic Leaching Procedure (TCLP) for VOCs, SVOCs, pesticides, herbicides, and metals, as well as the RCRA Characteristics. To characterize the soil/fill materials that did not exhibit evidence of VOC contamination, four samples were collected from four soil probes for analysis of TCL VOCs plus TICs, SVOCs plus TICs, pesticides, and PCBs, and Target Analyte List (TAL) metals plus cyanide. This complete list will herein be referenced as “Full TCL/TAL.”

Based on the analytical results, an additional soil probing event was completed to determine the presence or absence of downgradient impacts of site contaminants. Nine soil probes (SP-16 through SP-24) were advanced on December 20, 2005. Four of the soil probes were located on the project site while five were located off-site. The depths of the soil probes ranged from eight to twelve feet below grade. Micro-wells were installed in six of the soil probes advanced on December 20, 2005. Six of the soil samples were selected from the soil intervals with the highest TOV measurements for analysis of TCL VOCs and TICs.

The second round of soil probes revealed that VOC contamination is migrating off-site via groundwater. To evaluate the magnitude and extent of this migration, a third soil probing event was completed on April 11, 2006. Eight additional off-site soil probes (SP-25 through SP-32) were advanced to facilitate the installation of micro-wells, which were installed in all soil probes except SP-32. Two probes were located north of the project site, one was located to the west, and four were located to the south of the site. The soil probes were advanced at the locations shown on Figure 4. The depths of the soil probes ranged from twelve to sixteen feet below grade. No soil samples were submitted for laboratory analysis during the April 11, 2006 probing event.

Based on the analytical results, a fourth soil probing event was completed to delineate the off-site soil and groundwater contamination. Twelve soil probes (SP-32A through SP-43) were advanced on March 8, 2007. Three soil probes were advanced northwest of the project site, and two were advanced along Washington Street, and seven were advanced on the Pelican Site. The locations of these soil probes are shown on Figure 4. The depths of the soil probes ranged from twelve to sixteen feet below grade. Six soil samples were collected for analysis from these soil probes, and mircowells were installed in ten of the soil probes.

2.1.3.2 Soil Screening

Retrieved soil samples from each soil probe were initially screened for TOVs with a PID by separating the soil column and placing the PID probe tip near the void. This was recorded as a “direct” TOV reading. A representative sample of the recovered soil samples was also placed in a clean jar and sealed to facilitate “headspace” TOV screening. After the headspace in the jar was allowed to reach equilibrium, the PID tip was placed into the air headspace above the soil to obtain a “headspace” TOV measurement. The direct measurements and headspace value (if available), as well as soil descriptions, were recorded on Soil Probe Logs, which are included in Appendix B. After the final depth of each soil probe was reached and sampling was completed, excess soil was placed back into the probe hole from which it originated, unless the soil probe was completed with a micro-well.

2.1.3.3 Micro-Well Installation

A total of 21 groundwater monitoring micro-wells were installed on December 20, 2005, April 11, 2006 and March 8, 2007 to determine if contaminated groundwater is migrating off-site and characterize the extent and magnitude of that migration. Each micro-well soil probe was advanced to a depth such that ten feet of one-inch diameter well screen straddled the water table. The well screen was attached with a flush threaded one inch diameter PVC riser pipe to the surface. Sandpack was backfilled around the screen followed by bentonite chips and/or Portland cement. The micro-wells completed on December 20, 2005 and April 11, 2006 also included a four-inch protective casing over the micro-well. The micro-well Monitoring Well Installation Reports are presented in Appendix B.

2.1.4 Test Borings and Monitoring Well Installation

A total of 15 test borings were advanced on the project site on May 31 and June 1, 2005 to characterize the subsurface soil and facilitate the installation of groundwater monitoring wells. Five groundwater monitoring wells were installed in the test borings to determine the groundwater flow direction and hydraulic gradient of the upper-most water-bearing zone, as well as characterize the groundwater quality at the project site.

Test boring and monitoring well locations were selected based upon the project objectives, ease of access, freedom from obstructions, and safety considerations (appropriate set backs from overhead wires and buried services). The locations of the test borings and the monitoring wells are shown on Figure 4.

The drilling, split-spoon sampling, and monitoring well installation procedures were completed in accordance with the Work Plan. A truck-mounted rotary drilling rig equipped with hollow-stem augers was used to advance the test borings into the overburden materials. Each monitoring well test boring was advanced to approximately 14 feet below grade, and the bottom of each monitoring well was set at approximately 13 feet below grade and the wells were screened in the uppermost water-bearing zone. The depths of the ten remaining test borings ranged from six to ten feet below grade.

Retrieved soil samples from each test boring were screened for TOVs using the procedure detailed in Section 2.1.3.2. The TOV measurements, as well as soil descriptions, were recorded on Test Boring Logs, which are included in Appendix B. Appendix B also includes the Monitoring Well Installation Reports.

To evaluate the vertical and lateral extent of VOC contamination on-site, a total of 15 soil samples were collected from 12 of the test borings. The samples were collected in accordance with the procedures described in Section 2.1.3 and submitted for analysis of TCL VOCs plus TICs. To further characterize the contaminated soil, a sample of soils exhibiting significantly elevated PID measurements was also collected from MW-5 and analyzed for TCLP VOCs.

2.1.5 Monitoring/Micro-Well Development/Sampling

Prior to commencement of development activities at each well, the groundwater level was measured using an electronic water level indicator. Water levels were also measured on June 27, 2005. These data, along with survey data, were used to calculate groundwater elevations and determine the hydraulic gradient and groundwater flow direction at the project site. The monitoring wells were developed and sampled on June 3, 2005 (MW-1, MW-2 and MW-3) and June 7, 2005 (MW-4 and MW-5) in accordance with the procedures detailed in the Work Plan. Well development included evacuation with a peristaltic pump and dedicated pump/down-hole tubing until the indicator parameters (pH, temperature, and conductivity) had stabilized. The Well Development Logs are included in Appendix B.

A representative sample from each monitoring well was collected immediately after completion of development. Sample collection was completed when sufficient well water volume was available for collection of a complete bottle set. It should be noted that each well had recharged approximately 100 percent prior to sample collection. VOC samples were collected with a disposable polyethylene bailer. The remaining samples were collected with the peristaltic pump and dedicated development tubing. Monitoring Well Sampling Logs are included in Appendix B.

A second groundwater sampling event was conducted on January 11 and 12, 2006 and included the collection of groundwater samples from the five monitoring and five micro-wells for TCL VOC analysis. Purging and sampling of the micro-wells were conducted in accordance with the procedures detailed in the Work Plan. Well purging included evacuation of three well water volumes with a peristaltic pump and dedicated down-hole tubing. Each Well Development Purging/Sampling Log is included in Appendix B. A disposable polyethylene bailer was utilized to obtain a representative sample from each well.

Only the seven off-site micro-wells were sampled during the third sampling event. These wells were developed and sampled on April 12, 2006 in general accordance with the Work Plan. For this event, development criteria consisted of the evacuation of five well water volumes with a peristaltic pump and dedicated pump/down-hole tubing. A disposable polyethylene bailer was utilized to obtain a representative sample from each well for TCL VOC analysis. The well development and sampling notes for this event are also included in Appendix B.

The ten micro-wells installed on March 8, 2007 were developed and sampled on March 12, 2007 in general accordance with the Work Plan. Well purging included evacuation of three well volumes with a peristaltic pump and dedicated down-hole tubing. The well development/sampling notes for this event are included in Appendix B.

2.1.6 Additional Water Sampling

The vacant Swanson building, located immediately south of the project site, contains standing water within its basement. The water flows out of the building through a basement-level dilapidated service door located near the southwest corner of the building. Water in this swale disperses into the wetland area located west of the building. A sample of this water was collected at the doorway to evaluate if contaminated groundwater from the project site is infiltrating into the basement.

Due to historic filling activities, the project site and surrounding properties sit approximately four feet above the wetland area to the west and southwest of the Swanson building. The fill terminates at a steep slope, beyond which is the wetland area. The steepness of the slope from the project site to the wetland area made the wetland area inaccessible to the soil probe rig. Therefore, an approximately one-square foot, eight-inch deep hole was dug in the wetland area downgradient of the above-referenced swale. The hole was allowed to fill with water and a sample of the water was collected.

The samples were collected on April 12, 2006 and were submitted to the laboratory for TCL VOC analysis. Neither of the Swanson basement water sample or surface water exhibited any olfactory evidence of contamination. The sample locations are illustrated on Figure 4.

2.1.7 Air Sampling

Pal Joey's restaurant is located immediately adjacent to the north of the project site. To determine if the air quality under the floor slab at Pal Joey's has been affected by the presence of subsurface VOC contamination at the project site, an air sampling event was completed at the restaurant.

TVGA sampling personnel mobilized to Pal Joey's on April 12, 2006 to complete this task. An electric hammer drill and coring bit were used make a two-inch diameter hole in the concrete basement slab. A PID was used to measure the TOVs in the ambient basement air and core hole. To facilitate the collection of a representative "sub-slab" air sample, some of the sub-slab soils were removed to create a space between the bottom of the concrete floor and the soil. A dedicated length of slotted polyethylene tubing was inserted approximately two inches into the space beneath the slab. The core hole was then backfilled with bentonite (hydrated and packed), with the exposed end of the polyethylene tubing providing a conduit for the air sampling device. A Summa canister fitted with regulator was attached to the sample tubing to collect the sub-slab air sample (PJ-Subslab). In addition, an ambient basement background sample (PJ-Base BG) and an outdoor BG sample (PJ-Outside BG) were collected with similar equipment. Each of the three samples, collected as a composite throughout a time period of approximately five and one-half hours, was analyzed for volatile organic compounds (VOCs) using USEPA Method EPA-2 TO-15.

2.1.8 Investigation-Derived Waste

Excess soil from the initial soil probing activities was placed back down the probe holes; therefore, no waste soil was generated during the soil probe activities. Excess soil from the micro-well soil probing activities was minimal and land spread in the immediate vicinity of the respective probe. The soil probe acetate sleeves along with the auger cuttings generated from the monitoring well test boring activities were placed in a 55-gallon drum. The soil cuttings from remaining test borings were placed back into the boreholes from which they originated. The containerized soil and miscellaneous waste were subsequently picked up by Chautauqua County personnel and disposed of at the Chautauqua County Landfill.

All decontamination water was collected and placed in a 55-gallon drum. The well development and purging water that exhibited visual or olfactory evidence of contamination was also placed in the aqueous drum. A sample of the containerized water was collected and analyzed for TCL VOCs. After review of the data, the City of Jamestown Chief Wastewater Treatment Plant Operator approved the water for disposal/treatment in the sanitary sewer. On September 28, 2006, the water drum was poured into the City of Jamestown sanitary system by Chautauqua County personnel. As directed by the Plant's Chief Operator, the water was dumped directly into a system access manhole near the entryway of the Wastewater Treatment Plant.

2.2 Sample Analysis/Validation

2.2.1 Laboratory Analysis

Beacon performed the analysis of the passive soil gas samples, as described in Section 2.1.1. All soil, groundwater, surface water and indoor air samples were submitted to Severn Trent Laboratories (STL), a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory, under proper handling and shipping protocols. The chemical analyses were performed using the applicable methods prescribed by the NYSDEC Analytical Services Protocol (ASP), June 2000. Category B deliverables were generated for these samples. The target analytes for each sample are summarized in Table 1.

The collection method included placing the samples in a laboratory supplied shipping container, typically an insulated cooler. To ensure sample integrity, a Chain-of-Custody (COC) sample record was established and kept with the samples to document each person that handled the samples. The samples were then transported to the respective laboratory for analytical testing. The COC record established for the collected samples was maintained throughout laboratory handling.

2.2.2 Quality Assurance/Quality Control Samples

In addition to field samples, QA/QC samples were collected to evaluate the effectiveness of the QA/QC procedures implemented during the field and laboratory activities associated with the project. These QA/QC samples were collected and analyzed in accordance with the April 2005 QA/QC Plan developed for the project. The QA/QC samples included matrix spike (MS), matrix spike duplicate (MSD) and matrix duplicate (MD) samples, trip blanks, blind field duplicates and equipment blank samples, as appropriate.

2.2.3 Data Validation

A NYSDEC-approved independent data validator performed the validation of the laboratory data in accordance with the *NYSDEC Guidance for the Development of Data Usability Summary Reports* (DUSR). The data package was first reviewed for completeness and compliance relative to the criteria specified in the aforementioned NYSDEC document. The validator then conducted a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package, and applied protocol-defined procedures for the identification and quantitation of the individual analytes to determine the validity of the data. The DUSR includes a narrative summary discussing all quality issues and their impact on the reported results and presents copies of laboratory case narratives. The DUSR is included in Appendix C. It should be noted that the data from the additional sampling events were not validated, and this was approved by the NYSDEC. However, the analytical results for these events are in a format that can be validated by a third party in case validation is later warranted.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

3.1 Physical Setting

The topography of the project site and off-site study areas is generally flat with a gentle slope to the west at grades ranging from 0 to 5 percent. However, the wetland area to the west and southwest of the adjacent Swanson building is approximately four feet lower than the project site and the surrounding properties. Historic filling activities left a steep embankment that separates the project site and nearby properties from the wetland areas. The project site has an average elevation of approximately 1,310 feet above mean sea level (AMSL) based on a review of USGS topographic mapping of the area. A USGS 7.5 Minute Topographic Map is included as Figure 1.

3.2 Geology

Based on a review of the Soil Survey of Chautauqua County, New York, the predominant soil unit occurring on the project site is designated Chenango gravelly loam (CnB). This soil is described as gently sloping, very deep and well drained to excessively drained. It is located on outwash plains, beach ridges and stream terraces. The Surficial Geologic Map of New York - Niagara Sheet depicts the project site as being underlain by kame moraine deposits with variable texture ranging from sand to boulders. Kame moraines originate as deposition at an ice margin during a period of glacial retreat. Based on previous remedial activities and investigations at and near the project site, the overburden consists of approximately six to eight feet of sand and gravel soil/fill material from an off-site source. The specific source of this soil/fill is not known. The soil/fill is sometimes underlain by a thin layer of peat. Native gravelly sand and silt underlie the soil/fill and/or peat. The Geologic Map of New York - Niagara Section, depicts the uppermost bedrock formation beneath the project site area as consisting of upper Devonian Period shales and siltstones of the Conneaut Group, ranging from 250 to 600 feet in thickness.

Historical information and the results of the project site and off-site investigation indicate that soil/fill overlies the native soil across the entire project site and nearly all of the surrounding parcels. Generally, the fill materials consist of grey and brown fine to coarse sand and fine to coarse gravel soils intermixed with varying quantities of red brick, concrete and wood fragments. A cinder-like and an ash-like material were also present in the fill materials in various locations across the project site. The fill materials extend to approximately six to eight feet below grade on the project site.

The native soil underlying the fill materials consists of similar grey and brown fine to coarse sand and fine to coarse gravel soils. However, its classification varies from mostly sand to well graded gravelly sands. Below this sand and gravel soil, a moist silty clay stratum was encountered at the bottom of test boring MW-3 (0.5 feet thick) and MW-4 (1.5 feet thick). These two borings were not advanced through the bottom of this silty

clay stratum so that this barrier to the downward migration of contamination was not punctured.

3.3 Hydrology and Hydrogeology

Storm water runoff occurring on the project site flows to a drainage ditch along the south side of the property or to the west, and ultimately to the wetland area located across the gravel parking lot associated with the adjoining property. Regional groundwater flow direction in the vicinity of the project site, inferred from topographic mapping of the area, is anticipated to be west-southwest, towards the Chadakoin River.

Hydrogeologic conditions across the project site and in the immediate vicinity were investigated through the installation of five monitoring wells (MW-1 through MW-5). Table 2 summarizes the groundwater elevation measurements for the monitoring wells, and Figure 5 shows these measurements and resulting groundwater contours. The groundwater contour map indicates that groundwater flow is generally to the south. Conditions were further investigated through the installation of 21 micro-wells (on-site: SP-16 and SP-19; off-site: SP-21, SP-23 through SP-31 and SP-34 through 42). The micro-wells were not surveyed and therefore groundwater elevation measurements were not reported. Each of the monitoring wells and micro-wells were screened in the upper-most water-bearing zone in the overburden soil/fill. Groundwater in deeper overburden or bedrock was not assessed as part of this investigation because a silty clay layer was identified underlying the project site. This silty clay layer is likely a confining layer that acts as a barrier to the downward migration of contamination at the site. Information obtained at the nearby Pelican Site confirms that the silty clay layer does act as a confining layer and artesian conditions are present below this layer. This upward gradient will further help to reduce the potential for the migration of contamination into deeper strata.

Generally, wet soils were encountered during the soil probe/test boring program at an average depth of approximately eight feet below the existing grade. Static water levels in the monitoring wells were measured on June 3 and 7, 2005, prior to well development. Post-well development static water levels were measured on June 27, 2005. The depth to groundwater averaged approximately six feet below grade across the project site. Three of the off-site micro-wells were located in a topographically low area and had static water levels of one to three feet below existing grade.

4.0 NATURE AND EXTENT OF CONTAMINATION

Soil gas, subsurface soil/fill, surface water, groundwater, and air samples were collected for chemical analysis to determine the magnitude and extent of potential contamination occurring in these media. A summary of the samples collected and the parameters for which the samples were analyzed is presented in Table 1. The following sections summarize and discuss the analytical results generated during the RI. For discussion purposes, this data is compared with the Standards Criteria and Guidance values (SCGs) applicable to each medium sampled, and include:

- Soil/fill: NYSDEC's 6NYCRR Part 375 Environmental Remediation Programs: Part 375-6.8(b): Restricted Use Soil Cleanup Objectives for Commercial Use
- Groundwater: NYSDEC's June 1998 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations in the Technical and Operational Guidance Series (TOGS) 1.1.1
- Soil/Fill analyzed by TCLP: 40 CFR Part 261.24: Maximum Contaminant Levels for Toxicity Characteristic
- Indoor Air: NYSDOH Guidelines for Average Air Level in a Residential Community

A series of summary tables (Tables 3 through 9) comparing the analytical data to the applicable SCGs has been integrated into the following discussions. Table 10 includes a list of data qualifiers used in Tables 3 through 9. The analytical laboratory reports are included in Attachment A. The sampling locations are shown in Figures 3 through 5. Contaminants of concern in soil and tetrachloroethene in groundwater are presented as Figures 6 and 7, respectively.

The laboratory analytical packages prepared by STL for the first sampling event were reviewed and evaluated by an independent subcontractor, Environmental Quality Associates, Inc. (EQA), to assess compliance with the analytical method protocols described in the NYSDEC Analytical Services Protocol (ASP). Data Usability Summary Reports (DUSRs) were prepared by EQA that compare the quality of the performance of the laboratory analyses to that described in the ASP. The text of the DUSRs has been included in Appendix C.

The evaluation of the analytical results for samples collected from the project site indicate that the samples were processed in general compliance with applicable protocols, and the results are usable as reported, or usable with minor edits or qualification as estimated or edits to non-detection. As is typical with metals analyses on soils, matrix interferences were evident in these results, resulting in many qualifications of detected values as estimated. Generally, the samples showed good accuracy and precision.

4.1 Soil Gas Results

The analytical results of this screening activity indicate that high concentrations of VOCs were present in the soil vapor at the project site. Although a soil gas survey does not yield contaminant concentrations that correspond to specific concentrations in the soil or

groundwater, the results do illustrate the portions of the site that are most heavily impacted by VOCs and those areas with no impacts.

The soil gas survey report, presented in Appendix A and Figure 3 shows the soil gas sampling locations. The soil gas results illustrate two distinct areas of the project site with elevated contaminant concentrations. PCE was the primary contaminant detected, while significantly lower concentrations of TCE and 1,1,2-trichloroethane were also detected in a few samples. The detected concentrations of PCE ranged from 380 nanograms per trap (ng/trap) to 52,206 ng/trap, and were highest in the following areas:

- West and southwest of the former UST area on the project site
- Beneath the concrete slab of the former building in the former vicinity of wash tubs

The results of this soil gas survey were used to target particular portions of the project site in subsequent investigative phases.

4.2 Soil Sampling Results

Seven test pits were excavated across the site, as shown on Figure 4. The four test pits located along the southern and western perimeter of the concrete slab revealed no evidence of the presence of USTs. However, the TOV screening indicates the presence of contaminated soils in the vicinity of the southwest corner of the concrete slab. More specifically, TOV measurements from soil in TP-3 ranged from 52 parts per million (ppm) at approximately two feet below grade to 4,000 ppm at approximately four feet below grade. The remaining three test pits revealed the presence of fill materials with significantly lower TOV measurements. It should be noted that excavation depth was limited to four to five feet due to equipment constraints. No sampling was conducted as a part of the test pit program.

Twenty soil probes, ten test borings and five monitoring well borings were completed across the project site, and 24 soil probes were advanced on adjoining properties during the first four sampling events. These locations are shown on Figure 4. The visual and TOV screening of the retrieved soil samples indicates the presence of contaminated soils beneath the central, eastern, south and south-central portions of the project site and on adjoining sites. The TOV measurements of the impacted soils ranged from 20 ppm to 289 ppm at approximately one to eight feet below grade in various locations. The direct TOV measurements of impacted wet/saturated soils ranged from 53 ppm to 2,016 ppm from approximately seven to fourteen feet below grade. The screening of the wet/saturated retrieved soil samples indicates the presence of contaminated groundwater in the above referenced areas. Based on TOV measurements, the most significantly impacted soils are located in the eastern (SP-4) and south-central (MW-5) portions of the site. Additionally, the highest TOV measurements in the wet/saturated soils are located in the central (SP-8) and the south-central (SP-18) portions of the site.

The visual and TOV screening of the retrieved soil samples off-site indicates the presence of contaminated groundwater to the northwest and south of the project site. Elevated PID measurements were not encountered in the unsaturated soils above the water table off-site. The TOV measurements of the impacted areas ranged from 22.3 ppm to 349 ppm at approximately four to thirteen feet below grade. The highest TOV measurements occurred to the south (SP-41) and northwest of the project site (SP-33).

As shown in Table 1, 40 subsurface soil/fill samples were collected from the soil probes and test borings and submitted for chemical analysis to characterize the subsurface materials at the project site. Thirty-five of these samples were analyzed for TCL VOCs. Five samples were analyzed for Full TCL/TAL. For purposes of waste characterization, one of the aforementioned samples was also analyzed for TCLP VOCs. In addition, a sample was also collected and analyzed for TCLP SVOCs, PCBs, pesticides, herbicides, and metals as well as RCRA characteristics of reactivity, corrosivity and flash point. All subsurface soil/fill sample locations are illustrated on Figure 4.

A discussion of the soil/fill analytical results is presented below. Because pesticides, PCBs, and cyanide were either not detected or were not detected at concentrations above the SCGs in any of the soil/fill samples, these analytes will not be discussed below.

4.2.1 VOCs

4.2.1.1 On-site VOCs

Table 3 summarizes the subsurface soil/fill VOC analytical results. Although eleven different TCL VOCs were detected in the on-site subsurface samples, only PCE was detected at concentrations that exceeded the SCGs. PCE was detected in soils throughout the site, but concentrations exceeded the SCGs in only two locations. The PCE concentration in MW-5 was detected at a concentration of 8,000,000 ug/kg and the PCE concentration in TB-5 was detected at a concentration of 160,000 ug/kg, which exceed the SCG of 150,000 ug/kg. MW-5 was placed approximately in the former area of the USTs, and SP-4 was placed proximal to the former location of the wash tubs. Additionally, it should be noted the total concentrations of TICs were greater than 500,000 ug/kg in SP-9.

4.2.1.2 Off-site VOCs

Table 3 also summarizes the off-site soil VOC analytical results. Seven different TCL VOCs were detected in the off-site subsurface samples. However, none of the compounds were detected at a concentration that exceeded its SCG. The results indicate that the soil contamination is limited to the project site.

4.2.2 SVOCs

Table 4 summarizes the TCL SVOC analytical results. SVOCs were detected in each of the four samples submitted for SVOC analysis; however, SVOCs were not detected at concentrations that exceeded the SCGs.

4.2.3 Metals

Table 5 summarizes the metals analytical results. Arsenic and iron were detected at concentrations that exceeded the SCGs in the four on-site soil samples analyzed for TAL metals. Similar levels of iron can be found in natural, uncontaminated soils at generally similar concentrations, and are also often encountered at similar concentrations in urban settings and/or in fill materials. However, arsenic was detected in SP-13 and SP-15 at concentrations over the SCGs and also over the value for natural Eastern USA background values.

4.2.4 TCLP Analysis

Based on elevated PID readings and visual/olfactory evidence of contamination, two samples were submitted for TCLP analysis. The sample collected from two to three feet below grade in SP-4 was analyzed for full TCLP and RCRA characteristics. Only TCLP VOC analysis was performed on the sample collected from four to six feet below grade in boring MW-5. Table 6 summarizes the analytical results for the waste characterization samples.

PCE was detected in the sample collected from MW-5 at a concentration of 45 mg/L, which is more than 64 times greater than the SCG (0.7 mg/L) for waste characterization. Although much lower, the leachable concentration of PCE in the sample collected from SP-4 was 2.7 mg/L, still nearly four times greater than the SCG. Such TCLP concentrations indicate that the impacted soils in these sample locations would be defined as a hazardous waste. In addition, the total PCE concentrations in the sample collected from SP-4 was similar to those detected in other samples collected at the project site, indicating that these other soils would likely also be defined as a hazardous waste.

SVOCs, pesticides, herbicides, and metals were either not detected or not detected at concentrations above the regulatory values in the SP-4 sample. In addition, the RCRA characteristic analyses were within the regulatory values.

4.3 Groundwater

The monitoring wells at the project site were first sampled on June 3 and 7, 2005. Each groundwater sample was analyzed for Full TCL/TAL. A second groundwater sampling event was completed on January 11 and 12, 2006. The second event included sample collection from one on-site and four off-site micro-wells in addition to the five on-site

monitoring wells. A third event included only the off-site micro-wells that were installed in April 2006 and the fourth event only included the off-site micro-wells that were installed in March 2007. Because SVOCs, pesticides, PCBs, and cyanide were not detected at concentrations above the SCGs in any of the initial samples, the samples for the second, third and fourth sampling events were only analyzed for TCL VOCs.

The analytical results are summarized in Tables 7 and 8. A discussion of the groundwater analytical testing data is presented below. Tetrachloroethene (PCE) concentrations in groundwater can be seen on Figure 7. The SVOCs, pesticides, PCBs, and cyanide results are not discussed below because they were not detected in the samples.

4.3.1 VOCs

4.3.1.1 On-site VOCs

Seven different TCL VOCs were detected in at least one of seven on-site groundwater samples at concentrations that exceeded SCGs. PCE was present in the samples at concentrations above the SCG, ranging from 7 to 1,000,000 ug/L, with the most significantly elevated concentrations detected in the groundwater sample from MW-5, in the vicinity of the former USTs. The PCE concentration in the MW-1 sample was only marginally above the SCG for the initial sampling and not detected in the second sample. The PCE concentrations in the remaining on-site locations were significantly above the SCG of 5 ug/L, but none approached the levels in MW-5. The other VOCs detected at concentrations above the SCGs include 1,1,2,2-tetrachloroethane; 1,1-dichloroethene (1,1-DCE); vinyl chloride; cis-1,2-dichloroethene; isopropylbenzene; and TCE. Some of these compounds are breakdown products of PCE.

The results indicate that the groundwater beneath the central and eastern portions of the project site has been significantly impacted by the VOC contamination present in the subsurface soil/fill at the project site. The results also indicate that the groundwater beneath the south-central portion of the site (MW-5 location) is the most severely impacted. This area is immediately downgradient of the former USTs and also adjacent to the southern property line of the project site. The southward groundwater flow direction and presence of high concentrations of contaminants along the southern property boundary indicated the likelihood of downgradient impacts. The groundwater flow direction indicates that the Pelican Site is not a source of contamination at the project site.

4.3.1.2 Off-site VOCs

Five different TCL VOCs were detected in at least one of the 21 off-site groundwater/surface water samples at concentrations that exceeded SCGs.

PCE was present in 15 of the 21 samples at concentrations above the SCG, with concentrations ranging from 6 to 9,200 ug/L. These concentrations were highest near the project site and decreased significantly with distance from the project site. The other VOCs detected at concentrations above the SCGs included 1,1,1-trichloroethane, cis-1,2-DCE, vinyl chloride and TCE, which are breakdown products of PCE.

The results indicate that the groundwater contaminant plume has migrated off-site to the south of the project site, impacting the Swanson and former Pelican properties. The SP-26 results indicate that the contaminant plume slightly extends beyond the northerly boundary of the site toward the adjacent Pal Joey's restaurant, albeit at relatively low concentrations.

4.3.2 Metals

The results of the metals analysis for the groundwater samples revealed exceedances of the SCGs for five analytes. Lead was detected in the MW-4 sample at a concentration of 25.5 ug/L, only 0.5 ug/L above the SCG. Thallium was detected at an estimated concentration of 3.2 ug/L, approximately six times the SCG. The presence of these metals in the groundwater samples may potentially be related to the flow of groundwater through the soil/fill and the dissolution of metals from this material. The other inorganic analytes detected at concentrations above the SCGs (iron, manganese and sodium) are commonly encountered in uncontaminated, natural environments and are associated more with groundwater aesthetics than toxicity.

4.4 Indoor Air Quality at Pal Joey's

Table 9 summarizes the Pal Joey's air quality sampling results. The TOV screening of the sub-slab soils indicated that the soil gas beneath the basement floor has been impacted by the PCE contamination at the project site. After clean-out of the core hole, the TOV measurement from the exposed sub-slab soils was at background concentrations. However, after approximately one-half hour, the TOV measurement from the undisturbed sub-slab soils was 3.9 ppm. The disturbed/removed sub-slab soils exhibited a TOV measurement of 15.9 ppm.

The analytical testing results revealed detectable concentrations of seven VOCs. Six of the compounds were detected at very low concentrations in the outdoor background sample. Such compounds (air conditioning and gasoline related compounds) can be attributed to the presence of automobiles in the immediate vicinity of the sampling area. In addition, this sample did not contain a detectable concentration of PCE.

PCE was detected in the sub-slab and ambient basement samples and these results exceeded the NYSDOH in-door air quality standard for PCE. The concentration of PCE in the sub-slab (190,000 ug/m^3) and ambient basement (2,200 ug/m^3) samples was 1,900 and 22 times, respectively, the SCG. It should be noted that it is possible that the

ambient basement sample concentration may have been impacted by the penetration of the floor for sampling purposes. Regardless, the sub-slab data indicates that a significant potential exists for the degradation of the facility's indoor air quality owing to vapor intrusion from contaminants on the project site.

5.0 INTERIM REMEDIAL MEASURES

Due to the significantly elevated PCE concentrations beneath the floor slab at Pal Joey's restaurant, TVGA contacted Mr. Nick Mouganis of Mitigation Tech (MT). Mr. Mouganis informed TVGA that a PCE vapor mitigation system for Pal Joey's would be relatively straight forward considering the lack of water/dampness in the basement. As such, an IRM was implemented that would achieve the objective of venting the soil gas to the exterior of the building.

The IRM included the design of a vapor intrusion system by MT personnel, who then mobilized to Pal Joey's and installed the system. PVC conduit was placed in areas of potential vapor intrusion (i.e., exposed subsurface soils, stone walls, floor cracks, etc.) and sealed with an impermeable membrane. The conduit was sealed to facilitate the collection and venting of sub-slab vapor, and the conduit was joined to one pipe that exited the building. The system is currently being operated continuously with the collected vapor vented to the exterior atmosphere via an in-line, electrically powered pump.

In order to determine the effectiveness of the system, a post-remedial basement sample air sample was collected and analyzed. As such, TVGA personnel collected an ambient basement background sample on October 10, 2006. A Summa canister was again used to collect an ambient basement background sample [PJ-Base BG(10-10-06)] in the same manner as detailed in 2.1.7 of this RI/AA. The sample was analyzed for VOCs using USEPA Method EPA-2 TO-15.

The post-remedial sample analytical results are presented in Table 9. The analytical testing results revealed detectable concentrations of nine VOCs at very low concentrations. The concentration of PCE, the contaminant of concern, detected in the post remedial sample was 20 ug/m^3, well below the NYSDOH in-door air quality SCG of 100 ug/m^3. Therefore, this IRM has satisfied the objective of mitigating the effects of vapor intrusion from contaminants on the project site.

6.0 CONTAMINANT ASSESSMENT

6.1 Contaminant Fate and Transport

The probable fate and transport of contaminants detected on the project site is a function of the properties of the individual contaminants and available pathways for the contaminants to migrate. The degree to which, as well as the route by which, contaminants migrate is dependent on the physical characteristics of the site and the type and distribution of contaminants. The following sections discuss the probable fate and transport of contaminants in the different types of media at the former C&B Cleaners site.

6.1.1 Subsurface Soil/Fill

The analytical results indicate that the contaminants of concern in the subsurface soil/fill consist of VOCs, most notably PCE. PCE is typically used at dry cleaning facilities, and PCE contamination is common at these facilities. Characteristic hazardous waste concentrations of PCE were detected in the impacted soils at the SP-4 and MW-5 locations. Although the actual extent of the soil/fill material containing characteristic hazardous waste concentrations was not determined during the RI, the PCE concentrations in other samples collected at the project site indicate that the soils in the vicinity of the former UST area would likely also be defined as a hazardous waste.

The potential for the mechanical transport of subsurface soils contaminated with PCE is negligible due to surficial cover. Chemical transport of the subsurface soil/fill contaminants is via surface water infiltration into the subsurface soil/fill or natural groundwater flow that may transport contaminants through the subsurface/fill. PCE has a greater specific gravity than water and is expected to sink below the water table. PCE is also soluble in water and is therefore expected to affect groundwater quality at the project site. This is supported by the elevated concentrations of PCE in the groundwater at the site.

In addition, PCE in the soil will volatilize and could impact the quality of the soil gas at the project site and adjacent properties. With regard to Pal Joey's restaurant, vapor intrusion was confirmed by air sampling within the sub-slab of the structure.

Arsenic has a low solubility and is not expected to significantly affect groundwater quality or migrate substantially in the subsurface. This is supported by the low concentrations of arsenic in the groundwater at the site. Contaminant transport of arsenic will primarily be as airborne dust, although the subsurface deposition of this material limits the potential for fugitive emissions of arsenic-laden dust.

SVOCs, pesticides, herbicides, and the remaining metals were either not detected or not detected at concentrations above the regulatory values. In addition, the RCRA characteristic analyses were within the regulatory values.

6.1.2 Groundwater

The analytical results indicate that the contaminants of concern in the groundwater consist of VOCs, most notably PCE. Free-phase product was not encountered in any of the borings or wells completed at the project site. Although PCE is denser than water, causing it to sink below the water table, the presence of a confining layer below the uppermost water-bearing strata will limit the vertical migration of this contaminant. In addition, the artesian conditions likely present under this confining layer also limit the potential for vertical migration of PCE. Therefore, the migration of VOCs in the groundwater will be primarily in the horizontal direction.

The VOCs detected in the groundwater are soluble and therefore mobile in the saturated zone, and are expected to migrate in the dissolved phase with the flow of groundwater. The VOC contaminant plume at the project site appears to emanate from the former location of the USTs and migrate to the south. Analytical testing has demonstrated that off-site migration of the site contaminants has occurred. The concentrations of VOCs decrease dramatically immediately beyond the project site boundary. Based on the diminishing concentrations and groundwater flow direction, it appears that the contaminant plume terminates in the wetland area located to the south and west of the project site.

The water within the basement of the adjacent Swanson building has a significantly elevated concentration of PCE. The level of the water in the basement is similar to the water level observed in the nearby wells, indicating that the elevated PCE concentrations in the water in the basement are likely the result of groundwater infiltrating into the basement. In addition, the basement water discharges to the environment via a drainage swale at the southwest corner of the building. It should be noted that PCE was not detected in the wetland area sample collected downgradient of the swale. This also supports the contention that the contaminant plume terminates within this wetland area.

Although concentrations of VOCs in groundwater can attenuate through natural processes such as dispersion, volatilization, and biodegradation, the concentrations of VOCs detected in the groundwater at the project site were high to very high and would not likely attenuate to a significant degree in any reasonable amount of time. However, the presence of PCE breakdown products indicates that some biodegradation is occurring.

As with the subsurface soil, the potential exists for the migration of PCE from the groundwater to the on-site soil gas. In addition to on-site soil gas impacts, the soil gas at adjacent properties could also be affected either through the migration of soil gas from the site or from volatilization from contaminated groundwater that has migrated off-site. It is possible that the impacted soil gas could infiltrate into the structures on these properties.

6.2 Evaluation of Potential Receptors

The project site is located in an area that is characterized by retail businesses and commercial properties. Although the project site is currently vacant, it is utilized for overflow-parking for the adjacent Pal Joey's restaurant to the north. It is anticipated that future use of the project site, individually or in combination with other parcels, will include some form of commercial activity.

6.2.1 Subsurface Soil/Fill

Due to the subsurface location of the VOC and arsenic contamination, potential human receptors for contaminated on-site soil/fill include persons involved with invasive activities at the project site under current and planned future use conditions. These may include persons involved in site remediation/redevelopment activities and those involved in utility work on and adjacent to the project site. If remediation is implemented at the project site, human receptors also include persons patronizing the nearby commercial enterprises and those traveling through the area surrounding the project site. Potential environmental receptors include wildlife utilizing the project site (e.g., rodents, birds, etc.).

It is also possible that organic vapors emanating from the contaminated subsurface soil/fill may migrate in the soil gas and impact air quality in the two adjacent structures and/or nearby underground utilities. This situation was confirmed at Pal Joey's restaurant. Therefore, human receptors such as on-site workers or business patrons in either location and utility workers in the project site vicinity may be impacted by on-site contaminants through this mechanism. However, the installation of a vapor mitigation system in the basement of Pal Joey's restaurant has alleviated this issue in that structure.

6.2.2 Groundwater

Groundwater is not used as a source of drinking water in the area. The project site and surrounding residences and businesses within the City of Jamestown are serviced by the City's Board of Public Utilities municipal water supply system. Considering the lack of local reliance on groundwater as a potable water supply source, the potential for exposure to on-site contamination via groundwater appears to be limited to basement/sump infiltration in structures as well as utility corridors in the vicinity of the site.

Two structures are located adjacent to the project site: a restaurant and a commercial building currently used for storage. The commercial building is located immediately downgradient of MW-5, which is the monitoring well with the highest concentration of PCE. The building contains a basement that was historically kept free of water through the use of a sump pump, but the pump is not active and the basement is currently flooded. Because the basement is below the water table and elevated concentrations of VOCs were detected in the water, the source of at least some of the water in the basement is groundwater. Therefore, persons using this structure may be identified as

human receptors that could potentially come in contact with contaminated groundwater in the basement. Since the basement water also discharges to the environment via an exposed ditch, potential human receptors include persons trespassing on the site. Potential environmental receptors include wildlife (e.g., rodents, birds, etc.) utilizing the project site and adjacent properties. If remediation is implemented on the project site, potential human receptors include persons involved in site remediation/redevelopment activities.

It is also possible that organic vapors emanating from the groundwater contaminant plume may migrate in the soil gas and impact air quality in the two adjacent structures and/or nearby underground utilities. This situation was confirmed at Pal Joey's restaurant. Therefore, human receptors such as on-site workers or business patrons in either location and utility workers in the project site vicinity may be impacted by site contaminants through this mechanism. However, the installation of a vapor mitigation system in the basement of Pal Joey's restaurant has alleviated this issue in that structure.

The nearest body of water to which the groundwater at the site will discharge, a large wetlands area, is located to the southwest of the project site. These wetlands separate the Chadakoin River from the project site. The potential exists for the exposure of humans and wildlife (e.g., rodents, birds, fish, etc.) that utilize the wetlands to contaminants if the groundwater plume extends to and discharges into the wetlands. In addition, the surface water in these wetlands is in communication with the Chadakoin River, potentially exposing human and wildlife receptors that utilize the River.

If remedial activities are implemented at the project site that expose contaminated groundwater at the surface and cause the volatilization of contamination, potential human receptors during remediation would include site workers involved in invasive activities, persons patronizing the adjacent businesses, and those traveling through the area surrounding the project site.

6.3 Potential Exposure Pathways

6.3.1 Subsurface Soil/Fill

While the presence of contaminants in subsurface soil/fill represents an exposure risk relative to potential soil gas impacts, no complete exposure pathways were identified for the soil/fill material itself under the current or future use scenarios for the property. This is a function of the subsurface disposition of the contamination and the presence of uncontaminated material overlying the majority of the contaminated subsurface soil/fill, which effectively minimizes the potential for the incidental ingestion of, or dermal contact with the contaminated soil/fill.

However, it is possible that the contaminants in the subsurface soil/fill could impact the soil gas on site as well in the vicinity of the site. The infiltration of contaminated soil gas into nearby structures including commercial enterprises (confirmed at the adjacent Pal

Joey's restaurant) and underground utilities could result in exposures of humans using the structures via inhalation. However, this pathway could be mitigated via the installation of vapor intrusion systems in habitable structures (e.g., Pal Joey's), and the use of appropriate personal protective equipment during work on nearby underground utilities.

If invasive activities such as remediation or redevelopment of the project site occur, human receptors at and near the project site could be exposed to the contaminants in the subsurface soil/fill during excavation in connection with the remedial activities. Potential exposure routes for these receptors include inhalation of VOC vapors and incidental ingestion of, and/or dermal contact with the contaminated soil/fill. However, the use of appropriate personal protective equipment, and the development and implementation of a Soil/Fill Management Plan would minimize the risk of exposure during the remedial activities.

No complete exposure pathways have been identified in connection with the post-remedial period, assuming that the contaminated soil/fill is not exposed at the ground surface, vapor intrusion systems are functioning in impacted structures, if necessary, and utility workers utilize appropriate personal protective equipment.

6.3.2 Groundwater

Because groundwater in the vicinity of the project site is not utilized as a source of potable water, it is not anticipated that exposure via ingestion of contaminated groundwater from drinking water wells is likely. However, groundwater may migrate along the foundations and footers of the structures located in the vicinity of the project site and could infiltrate the basements, as has occurred in the adjacent Swanson building. Such infiltration would result in the potential for direct human exposure to groundwater in basements via incidental ingestion of, or dermal contact with the contaminated media.

Due to the contaminated groundwater reaching the wetlands southwest of the project site, human and environmental receptors could be exposed to groundwater via incidental ingestion of, or dermal contact with, the surface water. The water in these wetlands could also impact water quality in the Chadakoin River, potentially exposing human and environmental receptors through incidental ingestion of, or dermal contact with contaminated water in the River.

Vapor intrusion from contaminated groundwater into the structures proximal to the project site is a potential exposure route, resulting in exposures of humans using the structures via inhalation. However, this pathway could be mitigated via the installation of vapor intrusion systems in habitable structures, and the use of appropriate personal protective equipment during work on nearby buried utilities.

During invasive remediation/redevelopment activities, humans could be exposed to the contaminated groundwater. Potential exposure routes for these receptors include incidental ingestion of, and/or dermal contact with the groundwater. In addition, on-site workers, persons patronizing the adjacent businesses, and those traveling through the area surrounding the project site could be exposed to organic vapors. However, the use of appropriate personal protective equipment and groundwater management techniques would minimize the risk of exposure during maintenance and invasive operations.

With regard to post-remedial exposure pathways, no complete exposure pathways have been identified, assuming that the contaminated groundwater is remediated, downgradient discharge is effectively curtailed, vapor intrusion systems are functioning in impacted structures, if any, and utility workers utilize appropriate personal protective equipment.

7.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

7.1 Remedial Action Objectives

The following sections outline the Remedial Action Objectives (RAOs) identified for each of the contaminated media encountered on the project site, Pal Joey's to the north, and on the two properties (i.e. Swanson and Pelican Sites) located to the south. These RAOs are based upon the findings of the RI, the current use of the project site as a parking lot and the anticipated future use of the properties for commercial uses.

7.1.1 Subsurface Soil/Fill

Contaminants of concern in this medium consist of VOCs, primarily PCE, and arsenic. The RAO for this medium is to prevent exposure of human and environmental receptors via dermal contact, incidental ingestion or inhalation of organic vapors. Characteristic hazardous waste, by definition, poses a risk to groundwater resources and PCE was detected at hazardous levels in two samples. Therefore, the RAO for groundwater protection is to prevent the leaching of contaminants from the hazardous subsurface soil/fill into the groundwater.

7.1.2 Groundwater

Contaminants of concern in this medium consist of VOCs, primarily PCE, exceeding the SCGs. The RAO for this medium is to prevent exposure of human and environmental receptors to groundwater via dermal contact and incidental ingestion. Remedial actions described in this report intend to reduce PCE concentrations in groundwater to 10 ppm or lower.

7.2 General Response Actions

General response actions for each affected media have been identified and are described in the following subsections. Although these general response actions include no action as a remedial option, the no action response does not address the RAOs identified in the preceding section and is included for comparison purposes only. The general response actions are summarized in Table 11.

7.2.1 Subsurface Soil/Fill

General response actions available to address the RAOs for subsurface soil/fill include:

- No action
- Institutional controls
- In-situ treatment utilizing chemical oxidation
- Excavation and off-site disposal

The placement of a cover to limit the potential for exposure to elevated arsenic was also considered but was rejected due to the limited effort necessary to excavate the material when compared to the placement and annual maintenance and monitoring of the cover.

7.2.2 Groundwater

General response actions available to satisfy the RAO identified for groundwater include:

- No action
- Institutional controls
- Annual groundwater monitoring
- Short term in-situ treatment utilizing chemical oxidation
- Long term in-situ treatment utilizing Hydrogen-Releasing Compound (HRC)
- Ex-situ treatment by air stripping

7.3 Remediation Areas and Volumes

Remediation areas and volumes have been estimated based on the results of the site investigation.

7.3.1 Soil/Fill Volume

The estimated areal extent of the VOC-impacted subsurface soil/fill is shown on Figure 6. Based on the analytical results, it is assumed that the entire area contains soil with PCE at hazardous concentrations. Within the area around MW-5, the hazardous soil/fill must be addressed separately due to the exceptionally high PCE concentrations. Soil with such high concentrations cannot be directly disposed at a hazardous waste landfill and must be treated prior to internment or be incinerated. This area is approximately 720 square feet in size with a depth of six feet, resulting in approximately 160 cubic yards of impacted soil/fill. The remaining soil/fill to be excavated outside of the MW-5 area encompasses approximately 3,250 square feet with an estimated depth of six feet. This results in approximately 725 cubic yards of impacted soil/fill.

The size of the area with slightly elevated arsenic concentrations is estimated to be 20 feet by 20 feet, with a depth of 7.5 feet (to the top of the groundwater table), resulting in approximately 110 cubic yards of material.

7.3.2 Groundwater

Chlorinated hydrocarbons exceeding the SCGs were detected in each of the groundwater samples collected from the monitoring wells on the project site as well as fifteen of the twenty one off-site groundwater samples. Therefore, it has been determined that the groundwater throughout the project site as well as on the Swanson and Pelican Sites to the south and on the Pal Joey's site to the north is contaminated and will require remedial

action. As shown on Figure 7, the areal extent of the contaminant plume encompasses an area of approximately 25,000 square feet both on-site and off-site.

7.4 Development of Alternatives

The general response actions for each media identified in Section 7.2 have been assembled into a series of remedial action alternatives. These alternatives are summarized in Table 12 and outlined in the following subsections.

7.4.1 Alternative A – No Action

This alternative represents the "No Action Alternative". Under this alternative, the project site would remain in its current state and no environmental monitoring, remedial activities, institutional or additional access controls would be implemented. This alternative does not satisfy the RAOs for the current use scenario, nor is it supportive of the future use of the project site as a commercial property. It has, however, been retained for detailed analysis to provide a point of comparison for more intensive alternatives.

7.4.2 Alternative B – Limited Excavation and In-Situ Treatment

This alternative combines institutional controls; in-situ treatment of the soil/fill utilizing chemical oxidation; excavation of the most hazardous soil/fill and the arsenic-contaminated soil/fill; in-situ treatment of on-site and off-site groundwater utilizing HRC; and environmental monitoring. Under this alternative, the most hazardous soil/fill, occurring in the vicinity of MW-5, would be removed from the project site because it contains concentrations too high for in-situ remediation via chemical oxidation. The remaining contaminated soil/fill with VOC concentrations amenable to in-situ remediation would be treated in-situ using chemical oxidation.

Specifically, this remedial alternative includes:

- Development of deed restrictions that limit the future use of the three sites (C&B, Swanson, and Pelican) to commercial and/or industrial activities, require the installation of a soil vapor barrier within both existing and future buildings, and prohibit the use of on-site groundwater.
- Completion of a Pre-Design Investigation to pre-determine the limits of the arsenic excavation.
- Excavation and off-site disposal of the arsenic-contaminated soil.
- Limited excavation, off-site pre-treatment, and off-site disposal of the hazardous soil/fill in the vicinity of MW-5.
- In-situ treatment of the remaining contaminated soil/fill through the injection of chemical oxidants into the subsurface area of the contaminated soil/fill. The material would be injected through a series of direct push technology probe holes advanced throughout the contaminated soil/fill areas. According to the manufacturer's recommendations, five applications would be required.

- Post-injection confirmatory subsurface soil sampling analyzing for TCL VOCs.
- In-situ treatment of contaminated groundwater with Hydrogen Releasing Compound (HRC). The material would be injected through a series of direct push technology probe holes advanced throughout contaminated groundwater areas. Under the Swanson Building, the injection would be performed by horizontal directional drilling due to the physical constraints associated with having a drill rig working within the building. Three applications 18 months apart will be required to significantly reduce contaminant concentrations.
- Reinstallation of MW-5.
- Annual groundwater monitoring/reporting for a period of 10 years.
- Development of a site management plan for any excavation activities to take place on the site.

7.4.3 Alternative C – Swanson Building Demolition, Complete Excavation of Contaminated Soil/Fill, and In-Situ Groundwater Treatment

This alternative involves the removal and disposal of the contaminated subsurface soil/fill down to the top of the groundwater table. Following the excavation and off-site disposal of the contaminated soil/fill, clean fill would be brought on-site to backfill the excavations. The contaminated groundwater plume area would be treated in-situ using both a chemical oxidant and HRC. The chemical oxidant would be used in the most significantly impacted area, near MW-5, and HRC would be used elsewhere throughout the on-site and off-site VOC plume. Additionally, short-term groundwater monitoring would be conducted to measure the effectiveness of the treatment program. Finally, the Swanson building would be demolished and the groundwater under the former building footprint would be treated.

The rationale behind the demolition of the structure is that the dilapidated Swanson Building is worth less than the cost to remediate around the structure. Chautauqua County hired an independent appraiser to perform a real estate appraisal of the Swanson property in April 2007. A copy of the appraisal report is included as Appendix E. The report conclusions can be summarized as follows:

- The unimpaired Market Value of the property is estimated to be only $47,000. (The unimpaired value is developed under the hypothetical condition that the property is not contaminated. Since contamination is known to exist on-site, the actual market value can be considered to be much less.)
- The property is considered a legal-non-conforming structure for use under the present zoning regulations, as it has inadequate parking space and does not conform to the side or rear yard requirements.
- The “Highest and Best Use” of the property is for assemblage to adjoining sites for continued commercial use.
- The building is in “poor” condition which is defined as: “Repair and overhaul needed on numerous components. Numerous functional inadequacies,

substandard utilities, etc. Excessive deferred maintenance and abuse, limited value-in-use, approaching abandonment and major reconstruction; reuse or change in occupancy is imminent. Effective age is near end of the scale, regardless of the actual chronological age."

In short, the property value is minimal given the site's current condition.

This alternative includes the following actions:

- Development of deed restrictions that limit the future use of the three sites (C&B, Swanson, and Pelican) to commercial and/or industrial activities, require the installation of a soil vapor barrier within both existing and future buildings, and prohibit the use of on-site groundwater.
- Pre-Design Investigation to pre-determine the limits of the arsenic excavation.
- Excavation and off-site disposal of the arsenic-contaminated soil.
- Demolition and off-site disposal of the Swanson Building.
- Excavation, off-site pre-treatment and off-site disposal of the hazardous soil/fill in the vicinity of MW-5.
- Following the MW-5 excavation, but prior to backfilling, chemical oxidant will be mixed into the groundwater in the bottom of the excavation to rapidly reduce the concentrations of PCE in this most contaminated area. Sampling will be performed four weeks after the application to monitor the effectiveness of the treatment.
- Excavation and off-site disposal of the remaining VOC-contaminated subsurface soil/fill areas.
- Post-excavation confirmatory subsurface soil sampling analyzing for TCL VOCs
- Following the chemical oxidant treatment and backfilling, the entire plume of on-site and off-site groundwater contamination (see Figure 7) would be treated through one in-situ injection of HRC into the saturated zone. The HRC would be injected through a series of direct-push technology probe holes. One HRC treatment event is expected.
- Reinstallation of MW-3, MW-4 and MW-5.
- Groundwater monitoring would be conducted annually to measure the effectiveness of HRC injections for a period of five years. Reporting of the results would occur on an annual basis.

7.4.4 Alternative D – Complete Excavation of Contaminated Soil/Fill and Ex-Situ Groundwater Treatment by Air Stripping

This alternative involves the removal and disposal of the on-site contaminated subsurface soil/fill. This excavation will be completed to greater depths than in other alternatives, down to the clay layer observed in some of the deeper borings, allowing the withdrawal of the most highly contaminated groundwater from the excavation for ex-situ treatment. Following the excavation and off-site disposal of the contaminated soil/fill and removal of

the water within the excavation, clean fill would be brought on-site to backfill the excavation. The off-site contaminated groundwater plume area would be treated by installing a system of groundwater collection trenches that intercept the groundwater flow and drain it by gravity to a sump chamber at the lowest point of the sites. The water would then be pumped to an air stripper where air would be forced through it to transfer the volatile organics from the water to the gas phase. The contaminated gas would then be collected and treated by carbon absorption. The treated groundwater would be discharged into the municipal sanitary sewer.

This alternative includes the following actions:

- Pre-Design Investigation to pre-determine the limits of the arsenic excavation.
- Excavation and off-site disposal of the arsenic-contaminated soil.
- Excavation down to the clay layer (anticipated to be at 13 feet below grade), off-site pre-treatment and off-site disposal of the hazardous soil/fill in the vicinity of MW-5.
- Excavation and off-site disposal of the remaining VOC-contaminated subsurface soil/fill areas down to the clay layer (anticipated to be at 13 feet below grade).
- Post-excavation confirmatory subsurface soil sampling analyzing for TCL VOCs. Once confirmatory samples indicate that the excavation limits have been reached, the excavation will be backfilled with imported soil.
- Installation of a system of groundwater drainage trenches to intercept and transport all of the contaminated groundwater to a precast concrete sump chamber. The trenches will be placed along the Swanson Building to capture any contaminated groundwater underneath the building.
- Ex-situ treatment of all contaminated on-site groundwater by air stripping. All of the groundwater collected in the sump will be pumped to an air stripper that will transfer the VOCs from the dissolved phase into the gas phase. The contaminated gas will be treated by carbon absorption. The treated groundwater will be discharged to the municipal sanitary sewer.
- Installing a soil-vapor venting system in the Swanson Building and plugging the existing sump in the building and piping the subslab drainage effluent water directly to the sanitary sewer.
- Removal of the treatment facilities and site decommissioning once the remedy is complete.

7.4.5 Alternative E – Complete Excavation of Contaminated Soil/Fill, and In-Situ Groundwater Treatment

This alternative involves the removal and disposal of the contaminated subsurface soil/fill down to native soil. Following the excavation and off-site disposal of the contaminated soil/fill, clean fill would be brought on-site to backfill the excavations. The contaminated groundwater plume area would be treated in-situ using both a chemical oxidant and HRC. The chemical oxidant would be used in the most significantly impacted area, near MW-5, and HRC would be used elsewhere throughout the VOC plume. Additionally, short-term

groundwater monitoring would be conducted to measure the effectiveness of the treatment program. This alternative includes the following actions:

- Pre-Design Investigation to pre-determine the limits of the arsenic excavation.
- Excavation and off-site disposal of the arsenic-contaminated soil.
- Excavation, off-site pre-treatment and off-site disposal of the hazardous soil/fill in the vicinity of MW-5.
- Following the MW-5 excavation, but prior to backfilling, chemical oxidant will be mixed in the groundwater in the bottom of the excavation to rapidly reduce the concentrations of PCE in this most contaminated area. Sampling will be performed four weeks after the application to monitor the effectiveness of the treatment.
- Excavation and off-site disposal of the remaining contaminated subsurface soil/fill areas.
- Post-excavation confirmatory subsurface soil sampling analyzing for TCL VOCs. Once confirmatory samples indicate that the excavation limits have been reached the excavation will be backfilled with imported soil.
- Following the chemical oxidants treatment, the entire plume of on-site and off-site groundwater contamination (see Figure 7) would be treated through one in-situ injection of HRC into the saturated zone. The HRC would be injected through a series of direct-push technology probe holes. Under the Swanson Building, the injection would be performed by horizontal directional drilling due to the physical constraints associated with having a drill rig working within the building.
- Reinstallation of MW-3, MW-4 and MW-5
- Installing a soil-vapor venting system in the Swanson Building and plugging the existing sump in the building and piping the subslab drainage effluent water directly to the sanitary sewer.
- Groundwater monitoring would be conducted annually to measure the effectiveness of HRC injections for a period of five years. Reporting of the results would occur on an annual basis.

8.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

8.1 General Discussion

The remedial alternatives outlined in Section 7 were individually and comparatively evaluated with respect to the following six criteria as defined in 6 NYCRR 375:

- Overall Protection of Human Health and the Environment
- Compliance with Standards, Criteria, and Guidance
- Short-Term Effectiveness
- Long-Term Effectiveness
- Reduction of Toxicity, Mobility and Volume
- Feasibility

These criteria are discussed in greater detail below. A seventh criterion, community acceptance, will be evaluated by the NYSDEC at the conclusion of the public comment period.

8.1.1 Overall Protection of Human Health and the Environment

This threshold assessment addresses whether a remedy provides adequate protection, and describes how risks posed through each pathway are eliminated, reduced, or controlled. This evaluation allows for consideration of whether the alternative poses any unacceptable short-term or cross-media impacts.

8.1.2 Compliance with Standards, Criteria, and Guidance

A site's remedial program must be designed so as to conform to standards and criteria that are generally applicable, consistently applied, and officially promulgated, and are either directly applicable, or are not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with [6 NYCRR 375-1.10(c)(1)(i)].

8.1.3 Short-Term Effectiveness

The effectiveness of alternatives in protecting human health and the environment during construction and implementation of the remedial action is evaluated under this criterion. Short-term effectiveness is assessed in terms of protection of the community, protection of workers, environmental impacts, and time until protection is achieved.

8.1.4 Long-Term Effectiveness

The evaluation of this criterion focuses on the long-term protection of human health and the environment at the completion of the remedial action. Effectiveness is assessed with respect to the magnitude of residual risks; adequacy of controls, if any, in managing

treatment residuals or untreated wastes that remain at the site; reliability of controls against possible failure; and potential to provide continued protection.

8.1.5 Reduction of Toxicity, Mobility and Volume

This evaluation criterion addresses the preference for selecting a remedial action alternative that permanently and significantly reduces the volume, toxicity, and/or mobility of the hazardous wastes and/or constituents. This preference is satisfied when the treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media. The following is the hierarchy of remedial technologies ranked from most preferable to least preferable:

- Destruction
- Separation/treatment
- Solidification/chemical fixation
- Control and isolation

8.1.6 Feasibility

A feasible remedy is one that is appropriate for site conditions, is capable of being successfully carried out with available technology, and considers, at a minimum, implementability and cost-effectiveness.

8.2 Individual Analysis of Alternatives

The evaluations of the six criteria discussed above for each of the remedial alternatives are presented in the following subsections and summarized in Table 13.

8.2.1 Alternative A – No Action

8.2.1.1 Overall Protection of Human Health and the Environment

The No Action Alternative does not satisfy the RAOs because of its inability to eliminate the potential for the exposure of the public, future construction and site workers, and wildlife to on-site contaminants. Therefore, this alternative is not protective of human health and the environment with respect to the surrounding community because contamination would remain on-site and would not be effectively contained.

8.2.1.2 Compliance with Standards, Criteria, and Guidance

The contaminated soil/fill will remain on the site. Contaminant concentrations in groundwater occurring on, and emanating from, the site will continue to exceed the SCGs.

8.2.1.3 Short-Term Effectiveness

No institutional controls or remedial actions will be implemented under this alternative and, as a result, the impacted properties would not be suitable for redevelopment. While implementation of this alternative will not create any additional threats to human health or the environment, the potential remains for the human and wildlife receptors to be exposed to contaminants at the project site.

8.2.1.4 Long-Term Effectiveness

Under this alternative, the properties would remain in their current state and, therefore, the potential will remain for the human and wildlife receptors to be exposed to contaminants. The groundwater contaminant plume, shown on Figure 7, will continue to impact downgradient receptors. In addition, the groundwater contaminant plume may eventually reach the wetlands and/or the Chadakoin River in the future and impact surface water quality.

8.2.1.5 Reduction of Toxicity, Mobility and Volume

This alternative would not reduce the toxicity, mobility or volume of contamination.

8.2.1.6 Feasibility

As this alternative requires no action at the project site, this alternative is considered to be implementable. As shown in Table 14, there is no cost associated with this alternative. However, this alternative does not effectively protect human health and the environment.

8.2.2 Alternative B – Limited Excavation and In-Situ Treatment

8.2.2.1 Overall Protection of Human Health and the Environment

This alternative would achieve the RAOs for the contaminated soil/fill through removal or treatment. However, while the in-situ treatment of soils is generally effective, heterogeneity in the soil/fill may cause the treatment application to miss certain areas. Therefore, a site

management plan would be required to address any future invasive activities at the project site. Additionally, to eliminate the threat of human exposure to organic vapors from any remaining contaminated soil/fill, a deed restriction would be put into place that would require the installation of a soil vapor barrier for any future building construction activities.

While HRC has been shown to be effective in reducing VOC concentrations in groundwater, the process takes a significant amount of time (estimated at five years). As a result, persons occupying the nearby buildings could be affected by organic vapors from the contaminant plume.

Although short-term exposure risks to construction workers and the surrounding community could result from invasive activities at the project site, these risks could be effectively minimized through the use of standard construction and health and safety precautions.

8.2.2.2 Compliance with Standards, Criteria, and Guidance

The contaminated soil/fill will be either removed from the site or treated in-situ. However, the presence of heterogeneities in the soil may result in some soil areas not being fully treated. Contaminant concentrations in groundwater occurring on, and emanating from the site, will decrease as a result of the HRC treatment; however, the groundwater treatment will require five or more years to significantly reduce contaminant concentrations.

8.2.2.3 Short-Term Effectiveness

This option will remove the most contaminated soil from the site and the remaining contaminated soil will largely be treated in a relatively short time-frame. Three groundwater treatments will occur over a longer period, delaying redevelopment of the site. In the short-term, groundwater concentrations will remain elevated and will continue to impact the air quality in the Swanson Building.

8.2.2.4 Long-Term Effectiveness

This alternative would address the contaminated soil/fill in the long-term through the combination of removal and in-situ treatment. However, the presence of heterogeneities in the soil may result in some soil areas not being fully treated. The potential for exposure to groundwater and/or associated organic vapors in the Swanson Building is not addressed by this alternative.

8.2.2.5 Reduction of Toxicity, Mobility and Volume

This remedial action alternative would, over the long-term, reduce the volume, mobility and toxicity of the contaminated soil/fill and groundwater through a combination of removal and in-situ treatment.

8.2.2.6 Feasibility

This remedial action alternative is appropriate for current and future site conditions and uses. Materials and equipment for the excavation and in-situ treatment of the hazardous soil/fill are readily available. This alternative would be easily implementable since the project site is generally free of structures, debris, and woody vegetation; the site is graded to a regular topographic surface; and access to the site is good. As shown in Table 15, the estimated cost of this alternative is approximately $4,844,400.

8.2.3 Alternative C – Swanson Building Demolition, Complete Excavation of Unsaturated Contaminated Soil/Fill and In-Situ Groundwater Treatment

8.2.3.1 Overall Protection of Human Health and the Environment

This alternative is protective of human health and the environment under current and future use scenarios. This alternative would satisfy the short- and long-term goals for the protection of human health and the environment outlined in the RAOs. The implementation of this alternative would eliminate the risks to potential receptors posed by the soil/fill and the groundwater. In addition, this alternative would eliminate any impacts to groundwater posed by the soil/fill. Although short-term exposure risks to construction workers and the surrounding community could result from invasive activities at the project site, these risks could be effectively minimized through the use of standard construction and health and safety precautions.

8.2.3.2 Compliance with Standards, Criteria, and Guidance

All contaminated soil/fill would be excavated and disposed of at an appropriate off-site location, and only the uncontaminated material and new, clean, off-site fill and topsoil would remain. Additionally, the groundwater will also be treated in-situ through the injection of a chemical oxidant in the most contaminated area and HRC throughout the plume.

8.2.3.3 Short-Term Effectiveness

The RAOs for the soil/fill will be addressed through the excavation and disposal of the contaminated material. The chemical oxidation treatment will quickly reduce the highest concentrations of PCE in groundwater, and the remainder of the plume will be addressed through a single application of HRC, which should be effective in reducing groundwater concentrations over the course of two years. Impacts to air quality in the Swanson Building will be eliminated via the demolition of the structure. Although short-term exposure risks to construction workers and the surrounding community could result from construction activities at the site, these risks would be effectively minimized through the use of a soil/fill management plan and standard construction and health and safety precautions. It is anticipated that the entire remedial program can be implemented during one construction season.

8.2.3.4 Long-Term Effectiveness

This alternative would effectively address exposure to contaminated soil/fill in the long-term through removal of all contaminated soil/fill from the project site with disposal at an appropriate off-site landfill and through the in-situ treatment of contaminated groundwater.

8.2.3.5 Reduction of Toxicity, Mobility and Volume

The proposed remedial action alternative would effectively reduce the toxicity, mobility, and volume of the contaminants through excavation and proper off-site disposal of all contaminated soil/fill. In addition, this alternative would eliminate any impacts to groundwater posed by the soil/fill, thereby reducing the mobility of contaminants in the groundwater. The toxicity of groundwater both on and off the site would be reduced by in-situ treatment.

8.2.3.6 Feasibility

This remedial action alternative is appropriate for current and future site conditions and uses. Materials and equipment for excavating and disposing of the hazardous soil/fill and the in-situ treatment of the remaining contaminated soil/fill and groundwater are readily available. The excavation of the hazardous soil/fill and injection of the in-situ treatment materials would be easily implemented since the properties are generally free of structures (with the exception of the Swanson Building), debris, and woody vegetation; and access to them is good. However, the owner of the Swanson Building has not yet agreed to the demolition of the structure.

The Swanson building would be relatively easy to demolish being primarily block and brick construction. It should also be noted that demolishing the Swanson building is much more cost effective than preserving it given it current condition. The building's roof system is rotted and collapsing, there are no functioning utilities within the building (eg. water, sewer, electric, heat, etc), windows in the basement area are either missing or broken, the basement door needs replacement, and the basement is flooded. Furthermore, Chautauqua County hired an independent appraiser to perform a real estate appraisal of the Swanson property in April 2007. A copy of the appraisal report is included as Appendix E.

Finally, this alternative could be completed within one construction season. As shown in Table 16, the estimated cost of this alternative is approximately $3,077,000.

8.2.4 Alternative D – Complete Excavation of Contaminated Soil/Fill and Ex-Situ Groundwater Treatment by Air Stripping

8.2.4.1 Overall Protection of Human Health and the Environment

This alternative is protective of human health and the environment under current and future use scenarios. This alternative would satisfy the short- and long-term goals for the protection of human health and the environment outlined in the RAOs. The implementation of this alternative would eliminate the risks to potential receptors posed by the soil/fill and the groundwater. In addition, this alternative would eliminate any impacts to groundwater posed by the contaminated soil/fill. Although short-term exposure risks to construction workers and the surrounding community could result from invasive activities at the project site, these risks could likely be effectively minimized through the use of standard construction and health and safety precautions.

8.2.4.2 Compliance with Standards, Criteria, and Guidance

All contaminated soil/fill would be excavated and disposed of at an appropriate off-site location, and only the uncontaminated material and new, clean, off-site fill and topsoil would remain. No negative impacts to groundwater quality from this clean material are anticipated. Additionally, the groundwater will also be treated through by collecting the entire plume and air stripping it.

8.2.4.3 Short-Term Effectiveness

The RAOs for the soil/fill will be addressed through the excavation and disposal of the impacted material. The air stripping treatment will reduce the concentration of PCE in groundwater, and the treated water will be discharged into the municipal sanitary sewer for additional treatment. Impacts to air quality in the Swanson Building will be reduced by the collection and treatment of contaminated groundwater beneath it. The deeper excavation and withdrawal and treatment of the most contaminated groundwater from the excavation will result in the quickest possible cleanup of the most highly contaminated groundwater.

Although short-term exposure risks to construction workers and the surrounding community could result from construction activities at the site, these risks would be effectively minimized through the use of a soil/fill management plan and standard construction and health and safety precautions. It is anticipated that the entire remedial program can be implemented in one construction season. Additional time may be required depending on the effectiveness of the groundwater collection system and air stripping treatment.

8.2.4.4 Long-Term Effectiveness

This alternative would effectively address exposure to contaminated soil/fill in the long-term through removal of all contaminated soil/fill from the project site with disposal at an appropriate off-site landfill and through the ex-situ treatment of contaminated groundwater.

8.2.4.5 Reduction of Toxicity, Mobility and Volume

The proposed remedial action alternative would effectively reduce the toxicity, mobility, and volume of the contaminants through excavation and proper off-site disposal of all contaminated soil/fill. In addition, this alternative would eliminate any impacts to groundwater posed by the soil/fill, thereby reducing the mobility of contaminants in the groundwater. The toxicity of groundwater both on and off the site would be reduced by ex-situ treatment.

Although free-phase product was not observed during the investigation, the very high groundwater concentrations indicate that free-phase product may be present. If present, this product may rest on the clay layer observed in some of the deeper borings. The excavation will extend to this layer and allow the immediate removal of any free–phase product.

8.2.4.6 Feasibility

This remedial action alternative is appropriate for current and future site conditions and uses. Materials and equipment for excavating and disposing of the hazardous soil/fill and the in-situ treatment of the remaining contaminated soil/fill and groundwater are readily available. The excavation of the hazardous soil/fill and injection of the in-situ treatment materials would be easily implemented since the properties are generally free of structures (with the exception of the Swanson Building), debris, and woody vegetation; and access to them is good. In addition, this alternative could be completed within one construction season. As shown in Table 17, the estimated cost of this alternative is approximately $2,039,000.

8.2.5 Alternative E – Complete Excavation of Contaminated Soil/Fill and In-Situ Groundwater Treatment by Air Stripping

8.2.5.1 Overall Protection of Human Health and the Environment

This alternative is protective of human health and the environment under current and future use scenarios. This alternative would satisfy the short- and long-term goals for the protection of human health and the environment outlined in the RAOs. The implementation of this alternative would eliminate the risks to potential receptors posed by the soil/fill and the groundwater. Although short-term exposure risks to construction workers and the surrounding community could result from invasive activities at the project site, these risks could likely be effectively minimized through the use of standard construction and health and safety precautions.

8.2.5.2 Compliance with Standards, Criteria, and Guidance

All contaminated soil/fill would be excavated and disposed of at an appropriate off-site location, and only the uncontaminated material and new, clean, off-site fill and topsoil would remain. No negative impacts to groundwater quality from this clean material are anticipated. Additionally, the groundwater will also be treated in-situ through the injection of a chemical oxidant in the most contaminated area and HRC throughout the entire plume.

8.2.5.3 Short-Term Effectiveness

The RAOs for the soil/fill will be addressed through the excavation and disposal of the impacted material. The chemical oxidation treatment will quickly reduce the highest concentrations of PCE in groundwater, and

the remainder of the plume will be addressed through a single application of HRC. Impacts to air quality in the Swanson Building will be reduced by the in-situ treatment of contaminated groundwater beneath it as well as the installation of a vapor mitigation system.

Although short-term exposure risks to construction workers and the surrounding community could result from construction activities at the site, these risks would be effectively minimized through the use of a soil/fill management plan and standard construction and health and safety precautions. It is anticipated that the entire remedial program can be implemented during one construction season.

8.2.5.4 Long-Term Effectiveness

This alternative would effectively address exposure to contaminated soil/fill in the long-term through removal of all contaminated soil/fill from the project site with disposal at an appropriate off-site landfill and through the in-situ treatment of both on-site and off-site contaminated groundwater.

8.2.5.5 Reduction of Toxicity, Mobility and Volume

The proposed remedial action alternative would effectively reduce the toxicity, mobility, and volume of the contaminants through excavation and proper off-site disposal of all contaminated soil/fill. In addition, this alternative would eliminate any impacts to groundwater posed by the soil/fill, thereby reducing the mobility of contaminants in the groundwater. The toxicity of groundwater both on and off the site would be reduced by in-situ treatment.

8.2.5.6 Feasibility

This remedial action alternative is appropriate for current and future site conditions and uses. Materials and equipment for excavating and disposing of the hazardous soil/fill and the in-situ treatment of the remaining contaminated soil/fill and groundwater are readily available. The excavation of the hazardous soil/fill and injection of the in-situ treatment materials would be easily implemented since the properties are generally free of structures (with the exception of the Swanson Building), debris, and woody vegetation; and access to them is good. In addition, this alternative could be completed within one construction season. As shown in Table 18, the estimated cost of this alternative is approximately $3,424,000.

8.3 Comparative Analysis and Recommendation

A comparative evaluation of the remedial alternatives is presented in the form of a matrix, shown on Table 13, which includes ratings for each of the criteria discussed above. The comparison of the alternatives is based upon a qualitative system that utilizes relative ratings of *high*, *medium* and *low* to define each alternative's performance with respect to the aforementioned criteria. These ratings are then equated to a numerical scale to produce a relative numerical score for final comparison purposes. The ratings equate to the following conditions and numerical scores:

RATING	DESCRIPTION	NUMERICAL RATING
HIGH	SATISFIES CRITERIA TO A HIGH DEGREE	3
MEDIUM	SATISFIES CRITERIA TO A MODERATE DEGREE	2
LOW	MINIMALLY SATISFIES CRITERIA	1

The aggregate numerical score for each of the alternatives evaluated is shown near the bottom of the matrix. Higher relative scores represent a higher level of effectiveness with respect to the evaluation criteria.

As reflected by Table 13, Alternative D has been identified as the most cost-effective alternative. Alternative D would fully satisfy the RAOs developed for the site, would have a high degree of long-term effectiveness and would render the C&B site as well as the Swanson Property suitable for commercial use. In addition, the complete removal of all contaminated soil in Alternative D will ensure that all VOC-contaminated soil/fill has been addressed. This alternative will effectively reduce the groundwater concentrations in the shortest time, and will also remove any free-phase product present at the site. Based upon the relatively higher degree of short-term effectiveness as well as the high degree of protection to human health and the environment afforded by this alternative, Alternative D is recommended for implementation.

Under the recommended alternative, a site management plan should be developed for remediation activities but would not be necessary for future development. In addition, air monitoring, appropriate personal protective equipment, and dust suppression measures should be employed during remediation activities to prevent exposure of the public and construction workers to the contaminants in the soil/fill and groundwater.

9.0 SUMMARY AND CONCLUSIONS

An RI/AA program was implemented at the Former C&B Cleaners Site on behalf of Chautauqua County. The project site is located at 2241 Washington Street in the City of Jamestown, Chautauqua County, New York, and is currently vacant. Chautauqua County received State financial assistance to conduct this program under the Environmental Restoration, or Brownfield, Program, component of Title 5 of the Clean Water/Clean Air Bond Act of 1996. The objective of this program was to characterize the magnitude and extent of contamination occurring on, and emanating from, the project site. The resulting data were used to evaluate the potential risks to human health and the environment and to develop and evaluate remedial alternatives that would render the site suitable for redevelopment.

9.1 Site Conditions

The project site is currently vacant and has not been occupied since at least 1999. The site consists of approximately 0.22 acres of land and the remains of a former building that was demolished in July 2003. Building remains include the concrete floors and foundation system.

The project site was utilized for commercial dry cleaning operations from approximately 1931 through 1999, when the dry cleaning facility ceased operations and the project site was abandoned. Chautauqua County acquired the project site via tax foreclosure in November of 2001. An environmental investigation completed by CCDPF and others revealed the presence of various chemicals/detergents, two USTs and the presence of ACMs on and within the structure. The chemicals/detergents and two USTs were removed from the project site and properly disposed. The tank excavation sidewalls and bottom exhibited visual, olfactory and photoionic evidence of impacted subsurface soils. Analytical testing of soil samples from the tank excavation and a test pit confirmed the presence VOCs in the subsurface soils at the project site, prompting this RI/AA project.

9.2 Investigation Approach

The site investigation was completed in accordance with the April 2005 RI/AA Work Plan. This investigative work included the following activities:

- Site Survey
- Passive Soil Gas Survey
- Test Pit Excavations
- Soil Probe Advancement
- Test Boring Advancement
- Subsurface Soil/Fill Sampling
- Monitoring Well Installation
- Groundwater Elevation Monitoring
- Groundwater Sampling/Analytical Testing
- Indoor Air Quality Testing

- Completion of a Vapor Intrusion IRM
- Data Evaluation

9.3 Physical Setting

The topography of the project site is generally flat with a gentle slope to the west at grades ranging from 0 to 5 percent. The site has an average elevation of approximately 1,310 feet above mean sea level (AMSL). Storm water runoff occurring on the project site flows to a drainage ditch along the south side of the property or to the west, and ultimately to the wetlands area located across the gravel parking lot associated with the adjoining property. The groundwater flow direction on the project site is to the south, while the regional groundwater flow direction, inferred from topographic mapping of the area, appears to be west-southwest towards a wetlands area and the Chadakoin River. The parking areas located north and west of the project site building appear to have been elevated above the wetlands area through the placement of fill. Historical information and the results of the site investigation indicate that soil/fill overlies the native soil across the entire site. Bedrock was not encountered during this investigation.

9.4 Nature and Extent of Contamination

9.4.1 Soil/Fill Material

40 subsurface soil/fill samples were collected from the soil probes and test borings and submitted for chemical analysis to characterize the subsurface materials at the project site. Thirty-five of these samples were analyzed for TCL VOCs. Five samples were analyzed for Full TCL/TAL. For purposes of waste characterization, two of the aforementioned samples were also analyzed for TCLP VOCs. In addition, a sample was also collected and analyzed for TCLP SVOCs, PCBs, pesticides, herbicides, and metals as well as RCRA characteristics of reactivity, corrosivity and flash point.

Volatile organic compounds, primarily PCE, were identified as the primary contaminants of concern at the project site. PCE is typically used in dry cleaning operations, and PCE contamination is thus commonly encountered at dry cleaning facilities. Eleven different TCL VOCs were detected in the on-site subsurface samples However, only PCE concentrations exceeded the applicable levels in two sampling locations. The PCE concentration in MW-5 and TB-5 were 8,000,000 ug/kg and 160,000 ug/kg, respectively, which exceed the SCG of 150,000 ug/kg.

A sample was collected from SP-4 and submitted for a Full TCLP analysis and RCRA characteristics. Additionally, a sample was collected from the boring MW-5 and submitted for a TCLP VOC analysis. PCE was detected in the sample collected from MW-5 at a concentration of 45 mg/L, which is more than 64 times greater than the SCG for waste characterization (0.7 mg/L). Although much lower, the leachable concentration of PCE in the sample collected from SP-4 was 2.7 mg/L, still nearly four times greater than the SCG. Such TCLP concentrations indicate that the impacted soils in these sample

locations would be defined as a hazardous waste. In addition, the total PCE concentrations in these two samples were similar to those detected in other samples collected at the project site, indicating that these other soils, such as those in the vicinity of the former USTs, would likely also be defined as a hazardous waste.

Generally, the most severely impacted subsurface soils are present on the project site in the following locations:

- In the vicinity of the former UST area on the project site
- West and southwest of the former UST area
- Beneath the concrete slab of the former building in the former vicinity of wash tubs

Seven different TCL VOCs were detected in the off-site subsurface soil/fill samples. However, none of the compounds were detected at a concentration that exceeded its SCG. These results indicate that soil contamination is limited to the project site. SVOCs were detected in each of the four on-site samples submitted for SVOC analysis, however, SVOCs were not detected at concentrations that exceeded the SCGs.

Arsenic and iron were detected at concentrations that exceeded the SCGs in the four on-site soil samples analyzed for TAL metals. Similar levels of iron can be found in natural, uncontaminated soils at generally similar concentrations, and are also often encountered at similar concentrations in urban settings and/or in fill materials. However, arsenic was detected at concentrations over 5.5 times the SCG and also over the value for natural Eastern USA background values.

A sample was collected from SP-4 and submitted for a Full TCLP analysis and RCRA characteristics. Additionally, a sample was collected from the boring MW-5 and submitted for a TCLP VOC analysis. PCE was detected in the sample collected from MW-5 at a concentration of 45 mg/L, which is more than 64 times greater than the SCG for waste characterization (0.7 mg/L). Although much lower, the leachable concentration of PCE in the sample collected from SP-4 was 2.7 mg/L, still nearly four times greater than the SCG. Such TCLP concentrations indicate that the impacted soils in these sample locations would be defined as a hazardous waste. In addition, the total PCE concentrations in these two samples were similar to those detected in other samples collected at the project site, indicating that these other soils, such as those in the vicinity of the former USTs, would likely also be defined as a hazardous waste.

Generally, the most severely impacted subsurface soils are present on the project site in the following locations:

- In the vicinity of the former UST area on the project site
- West and southwest of the former UST area
- Beneath the concrete slab of the former building in the former vicinity of wash tubs

9.4.2 Groundwater

9.4.2.1 On-site Groundwater

Groundwater at the project site was evaluated by sampling the six groundwater monitoring wells installed on the site for this investigation. Each groundwater sample was analyzed for Full TCL/TAL. SVOCs, pesticides, PCBs, and cyanide were not detected at concentrations above the SCGs in any of the samples. The results of the TAL metals analysis for the groundwater samples revealed exceedances of the SCGs for five analytes. The presence of these metals in the groundwater samples may potentially be related to the flow of groundwater through the soil/fill and the dissolution of metals from this material. Other inorganic analytes detected at elevated concentrations are commonly encountered in uncontaminated, natural environments and are associated more with the groundwater aesthetics than toxicity.

As with the soil/fill, VOCs were identified as the contaminants of concern in the groundwater, and PCE was identified as the primary contaminant detected in the groundwater samples. In addition, breakdown products of PCE were identified in the groundwater.

Seven different TCL VOCs were detected in at least one of the six groundwater samples at concentrations that exceeded SCGs. The groundwater in the south-central portion of the site is the most severely impacted. This area is immediately downgradient of the former USTs and also adjacent to the southern property line of the project site. Because the groundwater flow direction is to the south, the groundwater contaminant plume has migrated off-site. The groundwater flow direction, as well as the relatively low concentrations of TCE detected in the on-site groundwater samples, indicates that the Pelican Site does not appear to be a source of contamination at the project site. TCE was the primary contaminant of concern at the Pelican Site.

9.4.2.2 Off-site Groundwater

Off-site groundwater quality was evaluated by installing and sampling microwells on the parcels adjacent to the site. Each groundwater sample from the off-site wells was analyzed for TCL VOCs. Elevated concentrations of PCE were detected in the off-site groundwater samples as well as the water in the basement of the Swanson building. Other VOCs detected at concentrations above the SCGs are breakdown products of PCE and include cis-1,2-DCE, vinyl chloride and TCE. No VOCs were detected in the water sample collected from the wetland area downgradient of the project site.

9.4.3 Air Quality

Air sampling was conducted at Pal Joey's restaurant, located immediately north of the project site, to determine if the air quality under the basement floor slab had been affected by the presence of PCE contamination at the project site.

The TOV screening of the sub-slab soils indicated that the soil gas beneath the basement floor contained elevated concentrations of VOCs. In addition, the sub-slab and ambient basement sample results exceeded of the NYSDOH indoor air quality standard for PCE. The outdoor air background sample did not contain a detectable concentration of PCE. The sub-slab data indicated that a vapor intrusion mitigation system is required at Pal Joey's to alleviate potential degradation of the facility's indoor air quality.

Due to the elevated PCE concentrations beneath the sub-slab at Pal Joey's restaurant, an IRM was implemented to protect the indoor air quality of the structure. This IRM included the installation of vapor barriers and an air pump within the basement of Pal Joey's, to vent any VOCs in the sub-slab to the atmosphere. Subsequent sampling demonstrated that the IRM successfully protects air quality within the structure.

9.5 Contamination Assessment

9.5.1 General Assessment

Under current and planned future use conditions, potential human receptors for on-site contaminants include:

- Patrons and workers utilizing proximal commercial properties
- Utility workers involved in maintenance activities on underground utilities on and adjacent to the project site
- Persons utilizing the downgradient wetlands and Chadakoin River

Potential environmental receptors include wildlife utilizing the project site (e.g., rodents, birds, etc.) as well as wildlife utilizing the downgradient wetland area and Chadakoin River.

If remedial activities were implemented at the project site, potential human receptors during construction would also include persons involved in remediation/redevelopment site activities; patrons and workers utilizing commercial properties; and those living in and traveling through the area surrounding the project site.

9.5.2 Subsurface Soil/Fill

The contaminants of concern in the subsurface soil/fill consist of VOCs, most notably PCE, and arsenic. The potential for the mechanical transport of contaminated subsurface soils is negligible due to surficial cover. Chemical transport of the subsurface

soil/fill contaminants is via surface water infiltration into the subsurface soil/fill or natural groundwater flow that may transport contaminants through the subsurface/fill. Additionally, PCE in the subsurface soil may volatilize and impact the soil gas on-site as well as off-site.

Due to the subsurface location of the soil/fill contamination, potential human receptors for contamination in the subsurface soil/fill include persons involved in site remediation/redevelopment activities and those involved in utility work on and adjacent to the project site. If remediation is implemented at the project site, human receptors also include persons patronizing the nearby commercial enterprises and those traveling through the area surrounding the project site. Human receptors such as on-site workers or business patrons in proximal buildings and utility workers in the project site vicinity may be exposed to site contaminants through impacts to soil gas from the subsurface soil.

In addition, it is likely that PCE in the soil will volatilize and impact the quality of the soil gas at the project site and adjacent parcels. With regard to Pal Joey's, impacted soil gas infiltration was confirmed by air sampling in the building.

No complete exposure pathways relative to subsurface soil/fill have been identified in connection with the post-remedial period, assuming that the contaminated soil/fill and groundwater is remediated and vapor intrusion systems are functioning in impacted structures, if necessary.

9.5.3 Groundwater

The analytical results indicate that the contaminants of concern in the groundwater consist of VOCs, most notably PCE. Based on the findings of the investigation, the migration of VOCs in the groundwater will be primarily in the horizontal direction. The VOC contaminant plume at the project site appears to emanate from the former location of the USTs and migrate to the south. Based on the detection of elevated concentrations of PCE in the off-site groundwater samples, it is apparent that VOC migration off-site via groundwater flow has occurred. Based on the diminishing concentrations, it appears that the contaminant plume terminates in the wetland area to the south and west of the project site.

The lack of local reliance on groundwater as a source of potable water limits the potential receptors to contaminated groundwater to persons using the proximal commercial enterprises and workers in underground utilities in the vicinity of the project site. If discharge to the downgradient wetlands or the Chadakoin River occurs, the potential for the exposure of humans and wildlife receptors that utilize the wetlands to contaminants exists. As with the subsurface soil, human receptors such as on-site workers or business patrons in the adjacent structures may be exposed to on-site contaminants through soil gas impacts from the volatilization of contaminants in the groundwater.

If remedial activities are implemented at the project site that expose contaminated groundwater at the surface and cause the volatilization of contamination, potential human receptors during remediation would include site workers involved in invasive activities, persons patronizing the adjacent businesses, and those traveling through the area surrounding the project site. With regard to post-remedial exposure pathways, no complete exposure pathways have been identified, assuming that the contaminated groundwater is remediated, downgradient discharge is effectively curtailed, and vapor intrusion systems are functioning in impacted structures, if any.

9.6 Remedial Action Objectives

Remedial Action Objectives (RAOs) were identified for each of the contaminated media encountered on the project site. These RAOs are based upon the findings of the RI and the anticipated future use of the project site for commercial enterprises, and include:

- Subsurface Soil/Fill - Prevent exposure of human and environmental receptors to these contaminants via dermal contact, incidental ingestion or inhalation. Additionally, prevent the leaching of contaminants to groundwater.
- Groundwater - Prevent exposure of receptors to groundwater via dermal contact and incidental ingestion.

9.7 Remedial Alternatives

9.7.1 Alternative A – No Action

Under this alternative, the site would remain in its current state and no environmental monitoring, remedial activities, institutional or additional access controls would be implemented.

9.7.2 Alternative B – Limited Excavation and In-Situ Treatment

This alternative combines institutional controls; in-situ treatment of the soil/fill utilizing chemical oxidation; excavation of the most hazardous soil/fill and the arsenic-contaminated soil/fill; in-situ treatment of on-site and off-site groundwater utilizing HRC; and environmental monitoring. Under this alternative, the most hazardous soil/fill, occurring in the vicinity of MW-5, would be removed from the project site because it contains concentrations too high for in-situ remediation via chemical oxidation. The remaining contaminated soil/fill with VOC concentrations amenable to in-situ remediation would be treated in-situ using chemical oxidation.

9.7.3 Alternative C – Swanson Building Demolition, Complete Excavation of Contaminated Soil/Fill, and In-Situ Groundwater Treatment

This alternative involves the removal and disposal of the contaminated subsurface soil/fill down to the top of the groundwater table. Following the excavation and off-site disposal

of the contaminated soil/fill, clean fill would be brought on-site to backfill the excavations. The contaminated groundwater plume area would be treated in-situ using both a chemical oxidant and HRC. The chemical oxidant would be used in the most significantly impacted area, near MW-5, and HRC would be used elsewhere throughout the on-site and off-site VOC plume. Additionally, short-term groundwater monitoring would be conducted to measure the effectiveness of the treatment program. Finally, the Swanson building would be demolished and the groundwater under the former building footprint would be treated.

9.7.4 Alternative D – Complete Excavation of Contaminated Soil/Fill and Ex-Situ Groundwater Treatment by Air Stripping

This alternative involves the removal and disposal of the on-site contaminated subsurface soil/fill. This excavation will be completed to greater depths than in other alternatives, down to the clay layer observed in some of the deeper borings, allowing the withdrawal of the most highly contaminated groundwater from the excavation for ex-situ treatment. Following the excavation and off-site disposal of the contaminated soil/fill and removal of the water within the excavation, clean fill would be brought on-site to backfill the excavation. The off-site contaminated groundwater plume area would be treated by installing a system of groundwater collection trenches that intercept the groundwater flow and drain it by gravity to a sump chamber at the lowest point of the sites. The water would then be pumped to an air stripper where air would be forced through it to transfer the volatile organics from the water to the gas phase. The contaminated gas would then be collected and treated by carbon absorption. The treated groundwater would be discharged into the municipal sanitary sewer.

9.7.5 Alternative E – Complete Excavation of Contaminated Soil/Fill, and In-Situ Groundwater Treatment

This alternative involves the removal and disposal of the contaminated subsurface soil/fill down to native soil. Following the excavation and off-site disposal of the contaminated soil/fill, clean fill would be brought on-site to backfill the excavations. The contaminated groundwater plume area would be treated in-situ using both a chemical oxidant and HRC. The chemical oxidant would be used in the most significantly impacted area, near MW-5, and HRC would be used elsewhere throughout the VOC plume. Additionally, short-term groundwater monitoring would be conducted to measure the effectiveness of the treatment program.

9.8 Recommended Alternative

Based upon the high degree of protection to human health and the environment afforded by this alternative, its short-term effectiveness, and its high degree of implementability and cost-effectiveness, Alternative D is recommended for implementation.

U.S.G.S. JAMESTOWN QUADRANGLE

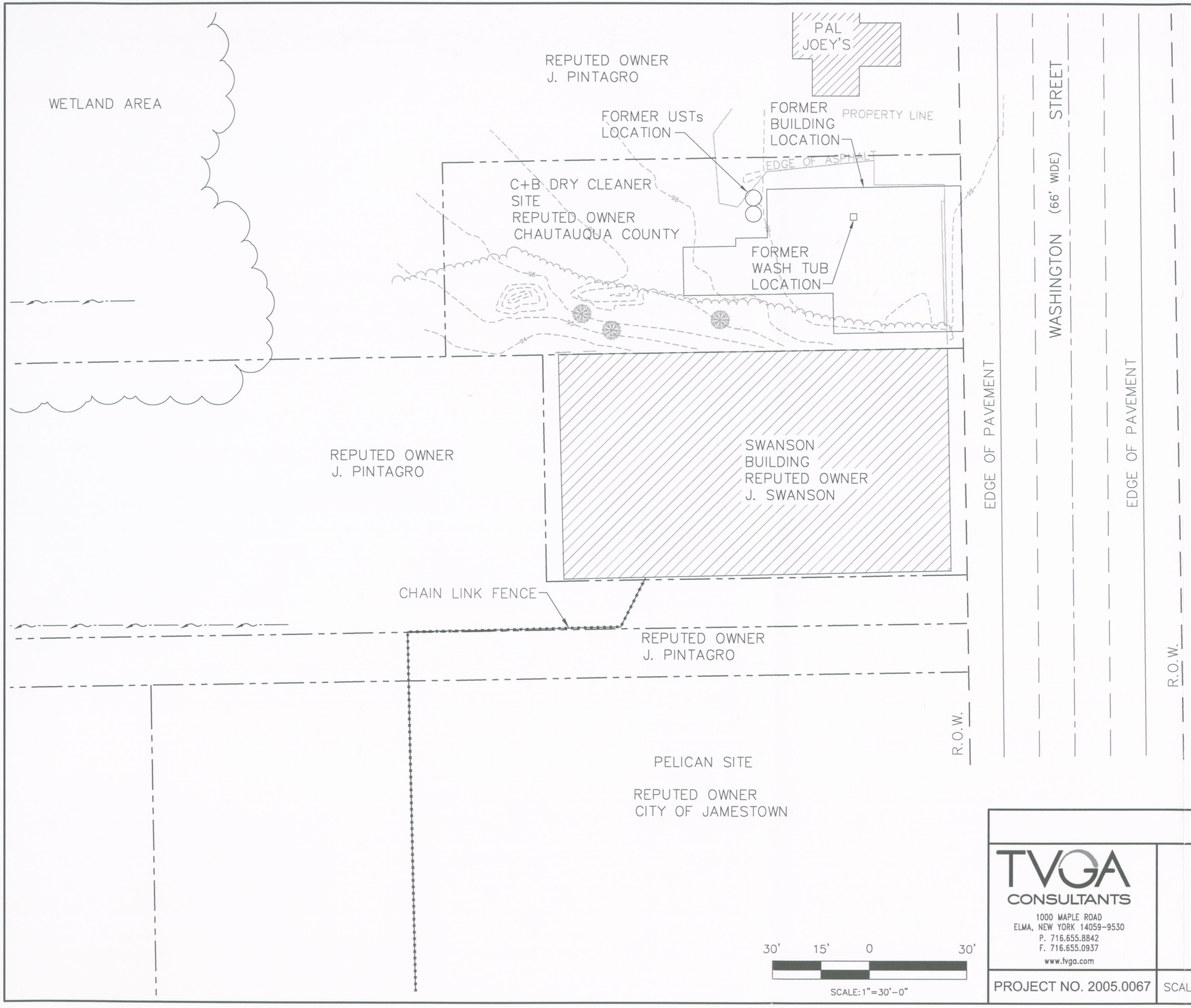
SITE LOCATION MAP

TVGA
CONSULTANTS
1000 MAPLE ROAD, P.O. BOX H
ELMA, NEW YORK 14059-0264
P. 716.655.8842
F. 716.655.0937
www.tvga.com

C & B CLEANERS
2241 WASHINGTON STREET
JAMESTOWN, NEW YORK 14701

PROJECT NO. 0020031	SCALE 1" = 1000'	DATE: 07/08/03	FIGURE NO. 1

S:\Engineering\0020031 - Chaut Co Pilot\CADD\C&BCLEANERS.dwg 10/26/2007 10:31:02 AM EDT



GENERAL NOTES:

1. FOR COMPLETE BOUNDARY INFORMATION SEE SURVEY PREPARED BY OTHERS.
2. ALL ELEVATIONS BASED ON ASSUMED DATUM SEE MAP FOR BENCHMARK DESCRIPTION.
3. SITE FEATURES OTHER THAN ON THE C+B DRY CLEANER SITE WERE GENERATED FROM AERIAL PHOTOGRAPHY AND RECORD TAX MAPS FOR ILLUSTRATIVE PURPOSES ONLY.

LEGEND

- GROUND SURFACE CONTOUR
- PROPERTY LINES
- DITCH LINES
- WOODED AREA

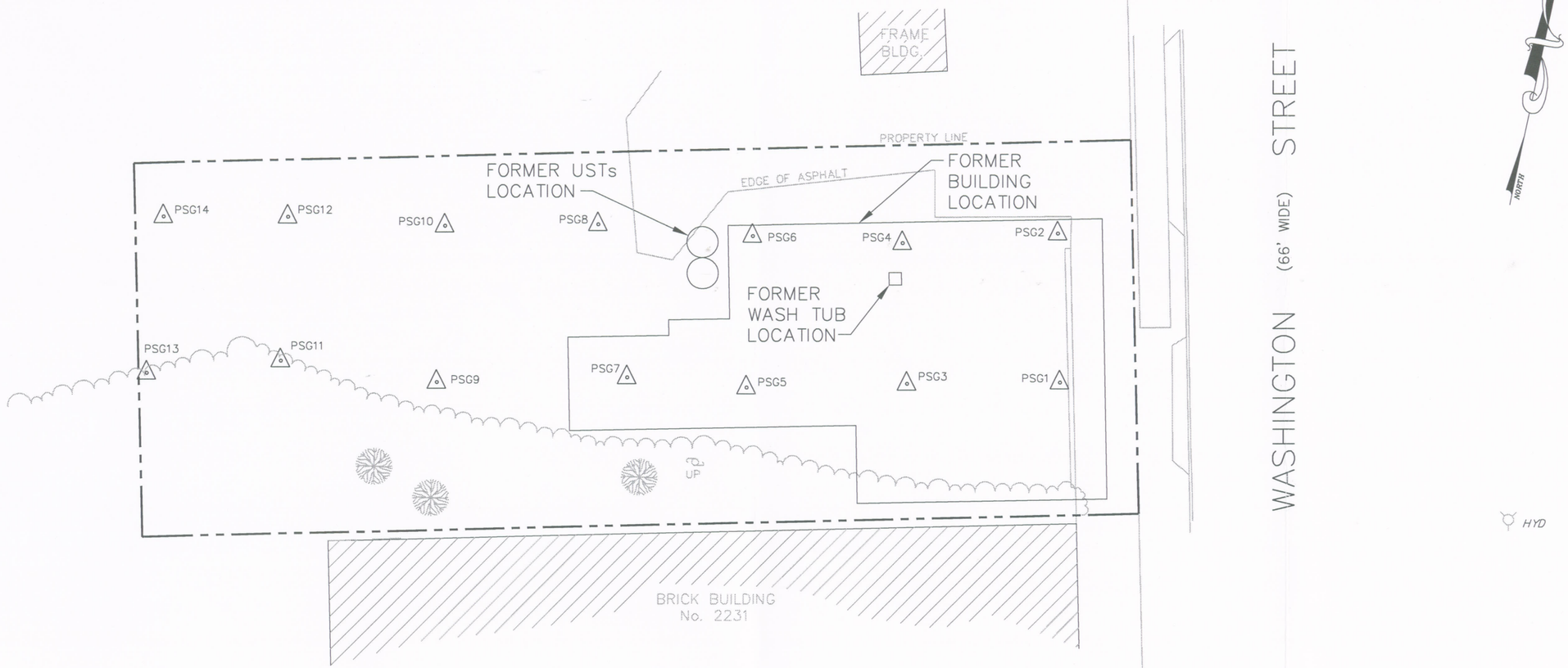
SITE PLAN

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER C & B DRY CLEANER

WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK

PROJECT NO. 2005.0067	SCALE: 1" = 30'	DATE: 6/2007	**FIGURE NO. 2**



LEGEND

- PASSIVE SOIL-GAS SAMPLE LOCATION
- EXISTING UTILITY POLE
- HYD EXISTING FIRE HYDRANT

20' 10' 0 20'

SCALE: 1"=20'-0"

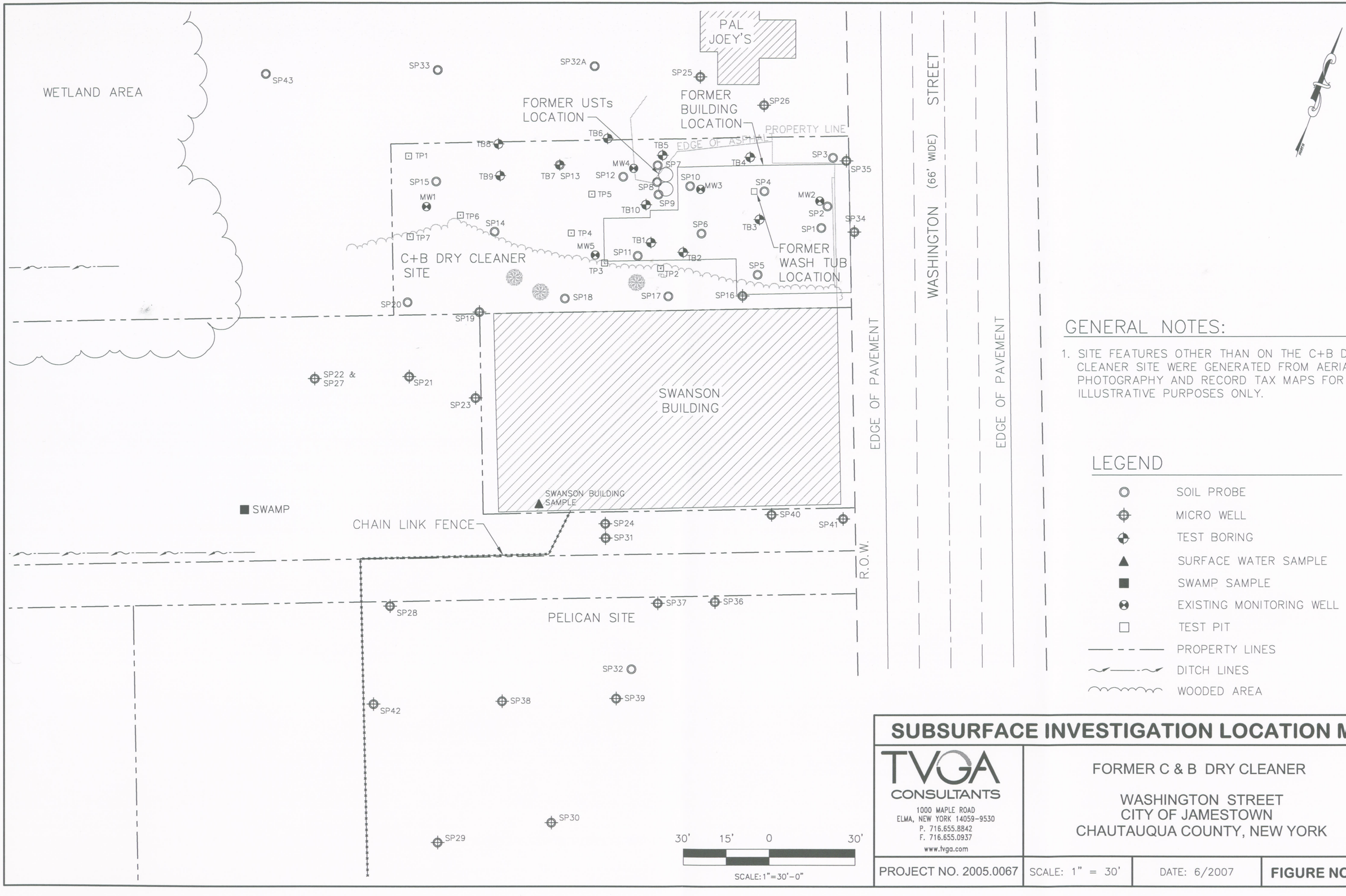
PASSIVE SOIL GAS SURVEY LOCATIONS

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER C & B DRY CLEANER

WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK

PROJECT NO. 2005.0067	SCALE: 1" = 20'	DATE: 6/2007	**FIGURE NO. 3**



GENERAL NOTES:

1. SITE FEATURES OTHER THAN ON THE C+B DRY CLEANER SITE WERE GENERATED FROM AERIAL PHOTOGRAPHY AND RECORD TAX MAPS FOR ILLUSTRATIVE PURPOSES ONLY.

LEGEND

- SOIL PROBE
- MICRO WELL
- TEST BORING
- SURFACE WATER SAMPLE
- SWAMP SAMPLE
- EXISTING MONITORING WELL
- TEST PIT
- PROPERTY LINES
- DITCH LINES
- WOODED AREA

SUBSURFACE INVESTIGATION LOCATION MAP

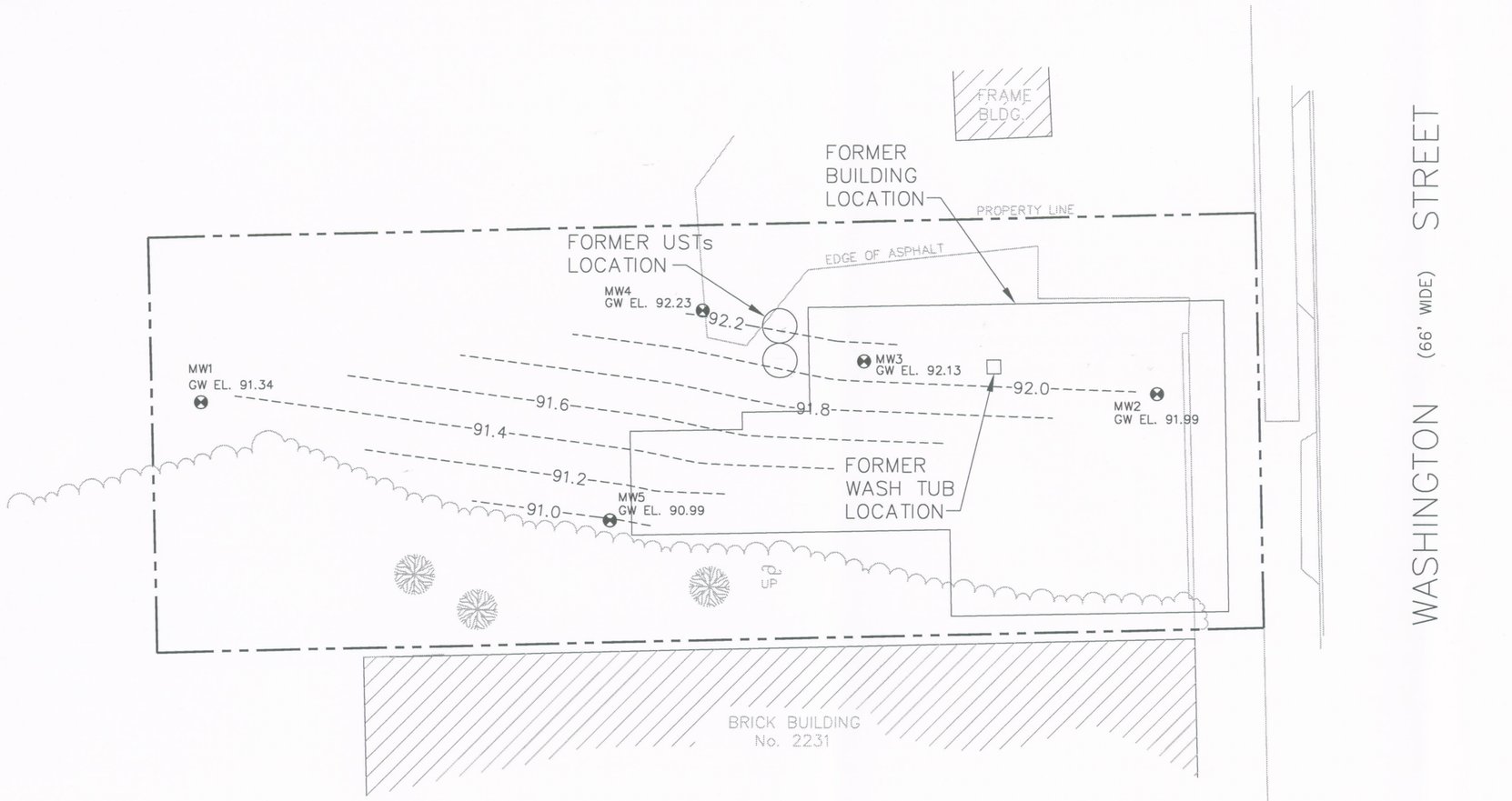
TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER C & B DRY CLEANER

WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK

PROJECT NO. 2005.0067	SCALE: 1" = 30'	DATE: 6/2007	FIGURE NO. 4

N:\2005.0067.00-C&B Dry Cleaner\Engineering\CADD\MARCH-07\2005.0067-FIG4.dwg, 12/6/2007 10:04:45 AM, dshaffer



WASHINGTON STREET (66' WIDE)

HYD

LEGEND

MW1 GW EL. 91.34	MONITORING WELL W/GROUND WATER ELEVATION RECORDED JUNE 27, 2005
	EXISTING UTILITY POLE
HYD	EXISTING FIRE HYDRANT
	EXISTING BRUSH LINE
--91.0--	EXISTING GROUNDWATER CONTOUR (06-27-05)

20' 10' 0 20'

SCALE: 1"=20'-0"

MONITORING WELL LOCATION PLAN & GROUNDWATER CONTOURS

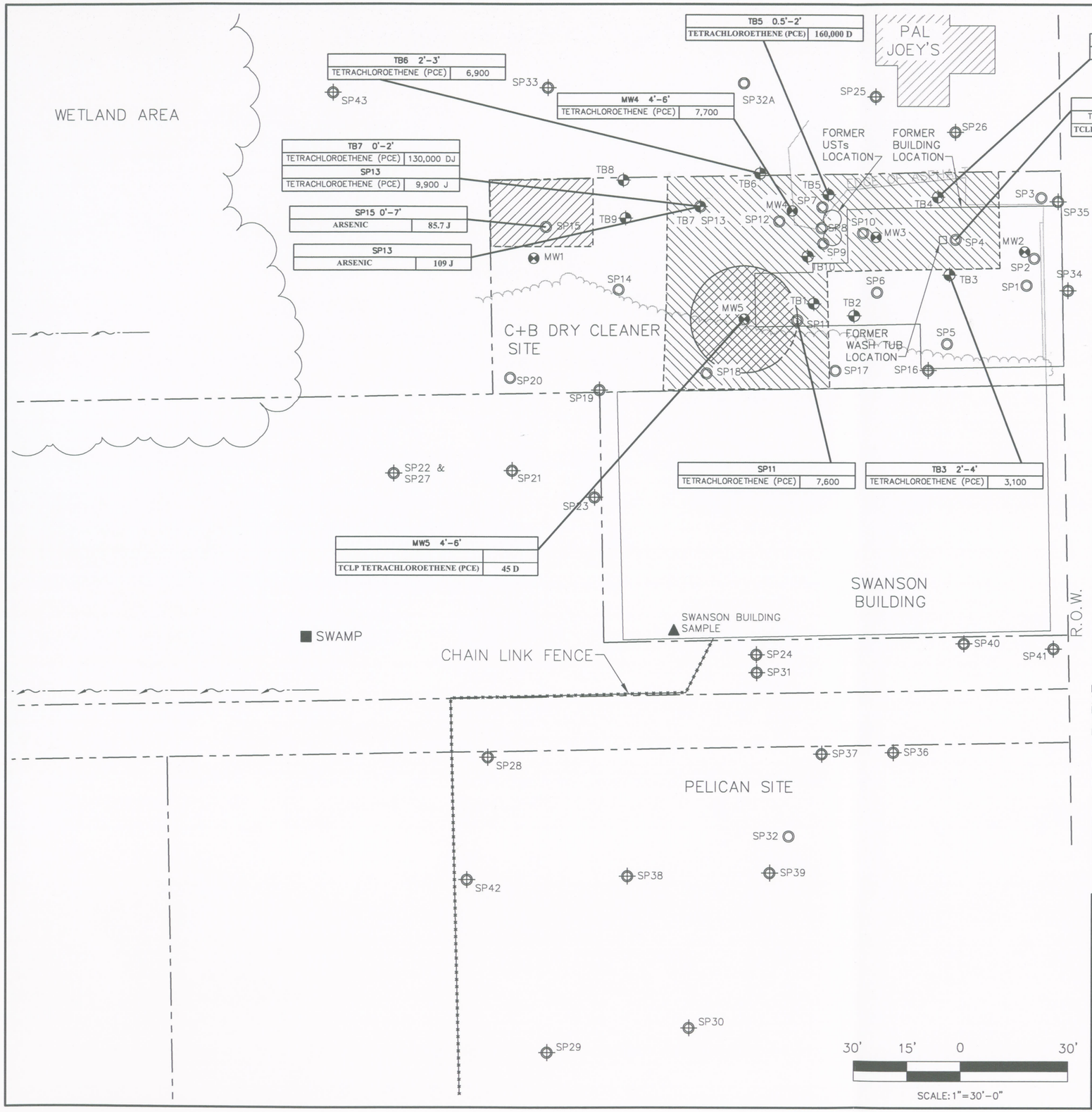
TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER C & B DRY CLEANER

WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK

PROJECT NO. 2005.0067	SCALE: 1" = 20'	DATE: 6/2007	**FIGURE NO. 5**

N:\2005.0067.00-C&B Dry Cleaner\Engineering\CADD\MARCH-07\2005.0067-FIG5.dwg, 12/6/2007 10:17:05 AM, dshaffer



NOTES:

1. PCE CONCENTRATIONS IN ug/KG.
2. ARSENIC CONCENTRATIONS IN mg/KG.
3. TCLP CONTAMINATIONS IN mg/L.
4. CONCENTRATIONS IN SC6S IN BOLD.
5. SITE FEATURES WERE GENERATED FROM AERIAL PHOTOGRAPHY AND TAX MAPS FOR ILLUSTRATIVE PURPOSES ONLY. NO SITE SURVEY WAS PERFORMED

LEGEND

- HAZARDOUS SOIL AREA
- ESTIMATED ARSENIC EXCAVATION AREA
- HAZARDOUS SOIL REQUIRING PRE-DISPOSAL TREATMENT
- SOIL PROBE
- MICRO WELL
- TEST BORING
- SURFACE WATER SAMPLE
- SWAMP SAMPLE
- EXISTING MONITORING WELL
- PROPERTY LINES
- DITCH LINES
- TREE/BRUSH AREA

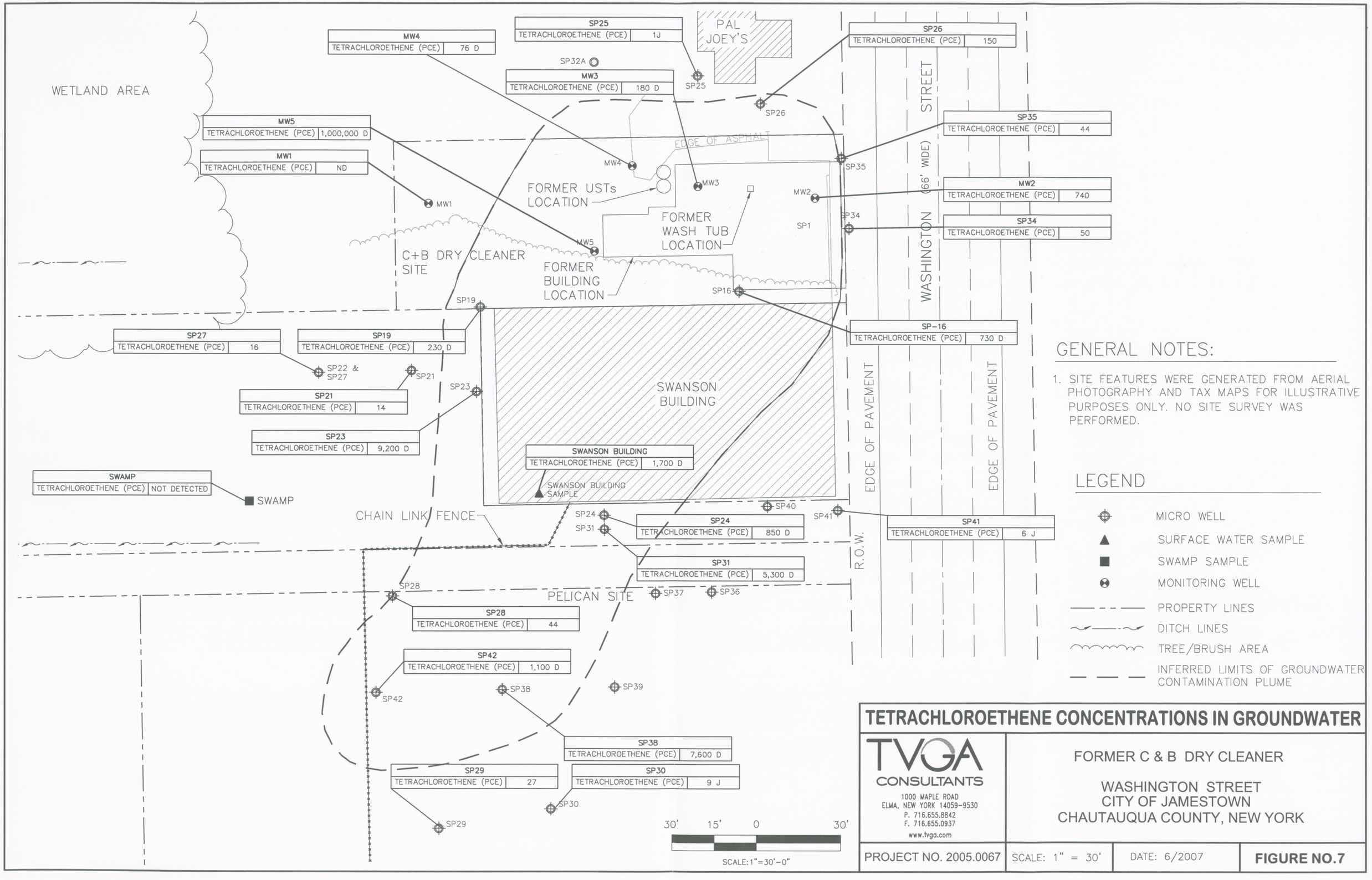
CONTAMINANTS OF CONCERN IN SOIL

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER C & B DRY CLEANER

WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK

PROJECT NO. 2005.0067	SCALE: 1" = 30'	DATE: 8/2007	**FIGURE NO. 6**



GENERAL NOTES:

1. SITE FEATURES WERE GENERATED FROM AERIAL PHOTOGRAPHY AND TAX MAPS FOR ILLUSTRATIVE PURPOSES ONLY. NO SITE SURVEY WAS PERFORMED.

LEGEND

- MICRO WELL
- SURFACE WATER SAMPLE
- SWAMP SAMPLE
- MONITORING WELL
- PROPERTY LINES
- DITCH LINES
- TREE/BRUSH AREA
- INFERRED LIMITS OF GROUNDWATER CONTAMINATION PLUME

TETRACHLOROETHENE CONCENTRATIONS IN GROUNDWATER

TVGA CONSULTANTS
1000 MAPLE ROAD
ELMA, NEW YORK 14059-9530
P. 716.655.8842
F. 716.655.0937
www.tvga.com

FORMER C & B DRY CLEANER

WASHINGTON STREET
CITY OF JAMESTOWN
CHAUTAUQUA COUNTY, NEW YORK

PROJECT NO. 2005.0067	SCALE: 1" = 30'	DATE: 6/2007	**FIGURE NO.7**

N:\2005.0067.00-C&B Dry Cleaner\Engineering\CADD\MARCH-07\2005.0067-FIG7.dwg, 12/6/2007 10:17:33 AM, dshaffer

Table 1
Former C & B Dry Cleaners Site RI/AA

Sampling/Analysis Summary

Field Program	Sample I.D.	Depth (ft bgs)	Direct PID (ppm)	Sample Collected/ Depth (ft bgs)	Soil Analysis	1st Round Groundwater Analysis	2nd Round Groundwater Analysis	3rd Round Groundwater Analysis	Comments [Depth in ft bgs]
On-site Soil Probes	1	0-16	BG	none	N/A	N/A	N/A	N/A	wet at 8
	2	0-12	BG-1.0	none	N/A	N/A	N/A	N/A	wet at 7.5
	3	0-12	BG-1.0	0-8	Full TCL/TAL	N/A	N/A	N/A	sample wet; wet at 4.5
	4			2	TCL VOCs	N/A	N/A	N/A	
		1.5-3.5	289	2.0-3	Full TCLP;Corr;FP				
		3.5-7	36	4	TCL VOCs				
		7.0-12.5	89	7.5-10	TCL VOCs				sample wet; wet at 7
		12.5-15.0	0.7	none	N/A				moist
	5	0-15	BG-0.8	none	N/A	N/A	N/A	N/A	wet at 10
	6	0-8.5	0.8	8.0-10	TCL VOCs	N/A	N/A	N/A	
		8.5-15	2.4						sample wet; wet at 8.5
	7	1.5-3.0	36	none	N/A	N/A	N/A	N/A	
		3.0-15	BG-3.3						wet at 9
	8	0.5-4	31-45	none	N/A	N/A	N/A	N/A	
		5.5	4.8						
		10.0-15	83-391						wet at 10
	9	1.5-7.5	43	6.0-7.0	TCL VOCs	N/A	N/A	N/A	
		7.5-13	36-173	8.0-10.0	TCL VOCs				sample wet;wet at 7.5
		13-14	32	13.0-14	TCL VOCs				sample wet
	10	1.0-7.5	6.0-23	none	N/A	N/A	N/A	N/A	
		7.5-12	116-175						wet at 7.5
	11	1.0-4.0	36	0.0-12	Full TCL/TAL	N/A	N/A	N/A	
		4.0-12	6.0-12						sample 1/2 wet; wet at 9.5
	12	1.0-3.0	95	none	N/A	N/A	N/A	N/A	
		3.0-7.0	21	none	N/A				
		7.0-12.5	61-125	8.0-9	TCL VOCs				sample wet; wet at 7
		12.5-13.5	BG	none	N/A				
	13	0.0-7.5	3.0-4.0	0-8.5	Full TCL/TAL	N/A	N/A	N/A	
		7.5-8.5	53						some wet soil in sample; wet at 7
		8.5-15	1.1-4.0	none	N/A				
	14	0-15	BG-1.7	12.0-15	TCL VOCs	N/A	N/A	N/A	sample wet; wet at 12
	15	0.0-12	BG	0.0-7	Full TCL/TAL	N/A	N/A	N/A	wet at 7

Table 1
Former C & B Dry Cleaners Site RI/AA

Sampling/Analysis Summary

Field Program	Sample I.D.	Depth (ft bgs)	Direct PID (ppm)	Sample Collected/ Depth (ft bgs)	Soil Analysis	1st Round Groundwater Analysis	2nd Round Groundwater Analysis	3rd Round Groundwater Analysis	Comments [Depth in ft bgs]
Test Borings	1	0-8	BG	2.0-4.0	TCL VOCs	N/A	N/A	N/A	wet at 7.25
	2	1.0-10	BG-0.6	1.0-4	TCL VOCs	N/A	N/A	N/A	wet at 9.5
	3	1.0-10	0.1-0.3	2.0-4	TCL VOCs	N/A	N/A	N/A	wet at 8.25
	4	0.0-8	0.9-2.3	2.0-4	TCL VOCs	N/A	N/A	N/A	wet at 8
	5	0.5-2	25.5	0.5-2	TCL VOCs	N/A	N/A	N/A	
		2.0-8	6.2-10.7	4.0-6	TCL VOCs				wet at 8
	6	0.0-3	0.5-7	2.0-3	TCL VOCs	N/A	N/A	N/A	
		3.0-6	0.6	4.0-6	TCL VOCs				wet at 6
	7	0.0-2	9.8	0.0-2	TCL VOCs	N/A	N/A	N/A	
		2.0-6	1.7-2.3	none	N/A				wet at 5.5
	8	0.0-6	BG	2.0-4	TCL VOCs	N/A	N/A	N/A	wet at 6
	9	0.0-6	0.2	2.0-4	TCL VOCs	N/A	N/A	N/A	wet at 6
	10	0-2	11.4	none	N/A	N/A	N/A	N/A	
		2.0-4	39.2	2.0-4	TCL VOCs				
		4.0-8	10.0-22	4.0-6	TCL VOCs				wet at 8
Monitoring Well	MW1	0.0-14	BG-1.4	none	N/A	Full TCL / TAL	TCL VOCs	N/A	wet at 9
	MW2	0.0-14	BG-0.4	none	N/A	Full TCL / TAL	TCL VOCs	N/A	wet at 8.25
	MW3	0.0-6	0.6-15.1	none	N/A	Full TCL / TAL	TCL VOCs	N/A	
		6.0-13.5	61-138	none	N/A				wet at 5.75
		13.5-14	12.8	none	N/A				becomes moist
	MW4	0-2	2.0	none	N/A	Full TCL / TAL	TCL VOCs	N/A	
		2.0-8	20.9-21	4.0-6	TCL VOCs				wet at 8
		8.0-14	0.2-0.4	none	N/A				
	MW5	0.0-2	6.0	none	N/A	Full TCL / TAL	TCL VOCs	N/A	
		2.0-4	20	none	N/A				
		4.0-14	145-1428	4.0-6	TCL VOCs / TCLP VOCs				wet at 7

Table 1
Former C & B Dry Cleaners Site RI/AA

Sampling/Analysis Summary

Field Program	Sample I.D.	Terminal Depth (ft bgs)	Dry Sample-Highest Direct/Head PID (ppm) @ Depth (ft bgs)	Wet Sample-Highest Direct/Head PID (ppm) @ Depth (ft bgs)	Sample Collected/ Depth (ft bgs)	Soil Analysis	1st Round Groundwater Analysis	2nd Round Groundwater Analysis	3rd Round Groundwater Analysis	Comments [Depth in ft bgs]
On-site Soil Probes	SP 16	12.0	BG @ All / 4.1 @ 4-8	0.5 @ 8.5 / 4.1 @ 4-8	6	TCL VOCs	N/A	TCL VOCs	N/A	wet at 7.0; Micro-well installed
	SP 17	12.0	BG @ All / 6.5 @ 4-8	BG @ All / 6.5 @ 4-8	none	N/A	N/A	N/A	N/A	wet at 7.25
	SP 18	12.0	0.3 @ 4 / 129.1 @ 4-8	2,016 @ 12 / 4,718 @ 8-12	5	TCL VOCs	N/A	N/A	N/A	moist to wet at 4.0, saturated at 6.0
	SP 19	10	4.5 @ 2 / 32.8 @ 0-4	BG @ All / 5.3 @4-8	4	TCL VOCs	N/A	TCL VOCs	N/A	wet at 4.25; Micro-well installed
	SP 20	12.0	BG @ All / 0.5 @ 4-8	BG @ All / 0.5 @ 4-8	4	TCL VOCs	N/A	N/A	N/A	wet at 6.5
Off-site Soil Probes	SP 21	12.0	BG @ All / 1.0 @ 0-4	BG @ All / 0.3 @ 4-8	3	TCL VOCs	N/A	TCL VOCs	N/A	wet at 4.0; Micro-well installed
	SP 22	12.0	BG @ All / 0.4 @ 4-8	BG @ All / 0.4 @ 4-8	none	N/A	N/A	N/A	N/A	wet at 7.0
	SP 23	8.0	BG @ All / no sample	4.3 @ 7 / no sample	3	TCL VOCs	N/A	TCL VOCs	N/A	wet at 4.0; Micro-well installed
	SP 24	15.0	0.3 @ 6 / no sample	BG @ All / no sample	none	N/A	N/A	TCL VOCs	N/A	wet at 7.0; hole collapsed- pushed drive point to 15.0; Micro-well installed
	SP 25	15.5	BG @ All / head not done	BG @ All / 5.3 @4-8	none	N/A	N/A	N/A	TCL VOCs	wet at 6.25; Micro-well installed
	SP 26	15.0	BG @ All / head not done	1.9 @ 6-8 / head not done	none	N/A	N/A	N/A	TCL VOCs	wet at 7.00; Micro-well installed
	SP 27	11.6	see SP 22	see SP 22	none	N/A	N/A	N/A	TCL VOCs	completed in SP 22 hole; wet at 7.0; Micro-well installed
	SP 28	14.0	BG @ All / head not done	36.2 @ 8-10 / head not done	none	N/A	N/A	N/A	TCL VOCs	wet at 8.0; Micro-well installed
	SP 29	12.0	BG @ All / head not done	BG @ All / head not done	none	N/A	N/A	N/A	TCL VOCs	wet at 8.25; Micro-well installed
	SP 30	12.0	BG @ All / head not done	BG @ All / head not done	none	N/A	N/A	N/A	TCL VOCs	wet at 8.0; Micro-well installed
	SP 31	16.0	BG @ All / head not done	22.3 @ 12-13 / head not done	none	N/A	N/A	N/A	TCL VOCs	wet at 8.0; Micro-well installed
	SP 32	16.0	BG @ All / head not done	BG @ All / head not done	none	N/A	N/A	N/A	N/A	wet at 7.0

Table 1
Former C & B Dry Cleaners Site RI/AA

Sampling/Analysis Summary

Field Program	Sample I.D.	Terminal Depth (ft bgs)	Dry Sample-Highest Direct PID (ppm) @ Depth (ft bgs)	Wet Sample-Highest Direct PID (ppm) @ Depth (ft bgs)	Sample Collected/ Depth (ft bgs)	Soil Analysis	1st Round Groundwater Analysis	2nd Round Groundwater Analysis	3rd Round Groundwater Analysis	4th Round Groundwater Analysis	Comments [Depth in ft bgs]
On-site Soil Probes	SP 35	12.0	BG @ All	BG @ All	none	N/A	N/A	N/A	N/A	TCL VOCs	damp at 4, saturated at 8
Off-Site Soil Probes	SP 32A	12.0	BG @ All	BG @ All	10	TCL VOCs	N/A	N/A	N/A	TCL VOCs	wet at 7
	SP 33	12.0	BG @ All	220 @ 7.8-8	none	N/A	N/A	N/A	N/A	N/A	wet at 7.8, saturated at 8
	SP 34	12.0	BG @ All	BG @ All	none	N/A	N/A	N/A	N/A	TCL VOCs	damp at 4, saturated at 9
	SP 36	16.0	BG @ All	0.7 @ 16	15	TCL VOCs	N/A	N/A	N/A	TCL VOCs	wet at 6.5
	SP 37	12	BG @ All	0.6 @ 10	none	N/A	N/A	N/A	N/A	TCL VOCs	damp at 0, saturated at 8
	SP 38	12.0	0.4 @ 4	5.2 @ 6	none	N/A	N/A	N/A	N/A	TCL VOCs	damp at 0, wet at 4
	SP 39	12.0	BG @ All	5.2 @ 6	none	N/A	N/A	N/A	N/A	TCL VOCs	damp at 0, wet at 7.5
	SP 40	16.0	BG @ All	BG @ All	none	N/A	N/A	N/A	N/A	TCL VOCs	damp at 0, wet at 6
	SP 41	12.0	349 @ 7.5	349 @ 8	7.5 and 10	TCL VOCs	N/A	N/A	N/A	TCL VOCs	damp at 0, wet at 8
	SP 42	12.0	BG @ All	0.3 @ 4.5 and 8.5	11	TCL VOCs	N/A	N/A	N/A	TCL VOCs	damp at 0, wet at 4
	SP 43	12.0	1.2 @ 4.5	2.6 @ 5	7.5	TCL VOCs	N/A	N/A	N/A	N/A	damp at 4, wet at 5, saturated at 8

1. Head space PID reading was not completed during this event

Table 2
Former C & B Dry Cleaners Site RI/AA

Groundwater Elevation Summary

Monitoring Well I.D.	Ground Surface Elevation	Top of PVC Casing (TOC) Elevation	June 3, 2005		June 7, 2005		June 27, 2005	
			Depth to Groundwater from TOC	Groundwater Elevation	Depth to Groundwater from TOC	Groundwater Elevation	Depth to Groundwater from TOC	Groundwater Elevation
MW-1	96.16	95.67	4.24	91.43	NM	NA	4.33	91.34
MW-2	99.16	98.48	6.40	92.08	NM	NA	6.49	91.99
MW-3	99.28	98.74	6.53	92.21	NM	NA	6.61	92.13
MW-4	98.57	97.98	NM	NA	5.69	92.29	5.75	92.23
MW-5	97.34	99.41	NM	NA	8.79	90.62	8.42	90.99

Notes:

1. All measurements and elevations are in feet.
2. TOC = Top of PVC casing

NM= Not measured this day

NA= Not applicable

Table 3
Former C&B Dry Cleaners Site RI/AA
Summary of VOC Analytical Results -
Subsurface Soil Samples

LOCATION		ON-SITE											
SAMPLE I.D.	PART 375 SOIL CLEANUP OBJECTIVES: COMMERCIAL	MW-4	MW-5	TB-1	TB-2	TB-3	TB-4	TB-5	TB-5	TB-6	TB-6	TB-7	TB-8
Interval Sampled (ft bgs)		4-6	4-6	2-4	1-4	2-4	2-4	0.5-2	4-6	2-3	4-6	0-2	2-4
DATE SAMPLED		6/1/2005		6/2/2005									
TCL VOCs	CONCENTRATION (ug/Kg)	CONCENTRATION (ug/Kg)											
Cyclohexane	500,000*	1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	370 J	1,300 U	1,400 U	1,300 U	1,500 U	11 U
Ethylbenzene	390,000	1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	380 J	1,300 U	1,400 U	1,300 U	1,500 U	11 U
Methylcyclohexane	500,000*	1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	8,400 DJ	1,300 U	1,400 U	1,300 U	1,500 U	11 U
Methylene chloride	500,000	1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	1,300 U	1,300 U	1,400 U	1,300 U	1,500 U	14 U
Tetrachloroethene (PCE)	150,000	7,700	8,000,000 DJ	33	13	3,100	18,000	160,000 D	2,700	6,900	5,900	130,000 DJ	9 J
Total Xylenes	500,000	1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	3,000	1,300 U	1,400 U	1,300 U	1,500 U	11 U
Trichloroethene (TCE)	200,000	1,300 U	210 J	11 U	10 U	1,700 U	1,400 U	490 J	1,300 U	1,400 U	1,300 U	1,500 U	11 U
Total TICs	-	0	1,400	10	0	0	0	11,990	0	0	0	0	0
Total VOCs	-	**7,700**	**8,001,610**	**43**	**13**	**3,100**	**18,000**	**184,630**	**2,700**	**6,900**	**5,900**	**130,000**	**9**

LOCATION		ON-SITE											
SAMPLE I.D.	PART 375 SOIL CLEANUP OBJECTIVES: COMMERCIAL	TB-9	TB-10	TB-10	SP-3	SP-4	SP-4	SP-4	SP-6	SP-9	SP-9	SP-9	SP-11
Interval Sampled (ft bgs)		2-4	2-4	4-6	0-8	2	4	7.5-10	8-10	13-14	6-7	8-10	0-12
DATE SAMPLED		6/2/2005			5/13/2005								
TCL VOCs	CONCENTRATION (ug/Kg)	CONCENTRATION (ug/Kg)											
Acetone	500,000	1,400 U	1,400 U	1,300 U	11 U	1,300 U	11 U	11 U	4 J	1,500 U	11 UJ	5,600 U	1,300 U
cis-1,2-Dichloroethene	500,000	1,400 U	1,400 U	1,300 U	11 U	1,300 U	11 U	2 J	14	1,500 U	11 UJ	5,600 U	1,300 U
Cyclohexane	500,000*	1,400 U	1,400 U	1,300 U	11 U	1,300 U	11 U	11 U	11 U	1,500 U	11 UJ	5,600 U	1,300 U
Ethylbenzene	390,000	1,400 U	1,400 U	1,300 U	11 U	1,300 U	11 U	11 U	11 U	1,500 U	11 UJ	5,600 U	1,300 U
Methylcyclohexane	500,000*	1,400 U	1,400 U	1,300 U	11 U	1,300 U	11 U	2 J	11 U	1,500 U	11 UJ	5,600 U	1,300 U
Methylene chloride	500,000	1,400 U	1,400 U	1,300 U	12 U	1,300 U	11 U	11 U	8 J	1,500 U	11 UJ	5,600 U	1,300 U
Tetrachloroethene (PCE)	150,000	730 J	110,000 D	24,000	46	28,000 D	78	190	20	1,500 U	17 J	870 J	7,600
Toluene	500,000	1,400 U	1,400 U	1,300 U	22	610 J	15	220	11 U	340 J	4 J	1,400 J	690 J
Trichloroethene (TCE)	200,000	1,400 U	1,400 U	1,300 U	11 U	1,300 U	2 J	28	12	1,500 U	11 UJ	5,600 U	1,300 U
Total TICs	-	0	0	0	41	32,800	0	0	6,150	12,200	0	593,000	0
Total VOCs	**-**	**730**	**110,000**	**24,000**	**109**	**61,410**	**93**	**442**	**6,208**	**12,540**	**21**	**595,270**	**8,290**

LOCATION		ON-SITE						
SAMPLE I.D.	PART 375 SOIL CLEANUP OBJECTIVES: COMMERCIAL	SP-12	SP-13	SP-14	SP-15	SP-16	SP-18	SP-20
Interval Sampled (ft bgs)		8-9	0-8.5	12-15	0-7	6	5	4
DATE SAMPLED		5/13/2005						
TCL VOCs		CONCENTRATION (ug/Kg)						
Acetone	500,000	2,800 U	1,400 UJ	12 UJ	12 U	12 U	11 U	21
Carbon Disulfide	500,000*	2,800 U	1,400 UJ	12 UJ	12 U	12 U	11 U	2 J
cis-1,2-Dichoroethene	500,000	2,800 U	1,400 UJ	12 UJ	12 U	12 U	11 U	13 U
Methylcyclohexane	500,000*	2,800 U	1,400 UJ	12 UJ	12 U	12 U	11 U	13 U
Methylene chloride	500,000	2,800 U	1,400 UJ	12 UJ	21	6 J	10 BJ	8 J
Tetrachloroethene (PCE)	150,000	740 J	9,900 J	8 J	8 J	5 J	300 D	13 U
Toluene	500,000	490 J	1,400 UJ	9 J	12 U	12 U	11 U	13 U
Trichloroethene (TCE)	200,000	2,800 U	1,400 UJ	12 UJ	12 U	12 U	11 U	13 U
Total TICs	-	418,000	17,230	0	149	7	94	7
Total VOCs	**-**	**419,230**	**27,130**	17	178	18	404	38

Notes:
1. Part 375 Soil Cleanup Objective source is NYSDEC 6NYCRR Part 375 Environmental Remediation Programs (Part 375) Determination of Soil Cleanup Objectives and Cleanup Levels for restricted commercial use (Part 375-6.8(b) effective December 14, 2006.
2. Shaded boxes represent exceedances of the regulatory value.
3. (-) = No regulatory value is associated with this analyte.
4. ug/Kg = micrograms per Kilogram (equivalent to parts per billion (ppb)).
5. Only analytes detected in one or more samples are shown.
6. ND = Non Detected
7. Definitions of data qualifiers are presented in Table 9.

* Soil Cleanup Objectives for Individual Organic Volitiles and semivolatiles were capped at 500,000 unless otherwise specified

Table 3 (con't)
Former C&B Dry Cleaners Site RI/AA
Summary of VOC Analytical Results -
Subsurface Soil Samples

LOCATION																					
								OFF-SITE													
SAMPLE I.D.	PART 375 SOIL CLEANUP OBJECTIVES: COMMERCIAL	SP-19		SP-21		SP-23		SP-32A		SP-36		SP-41 COMPOSITE		SP-42		SP-43	
Interval Sampled (ft bgs)		4		3		3		10		15		-		11		7.5	
DATE SAMPLED		5/13/2005						3/12/2007									
TCL VOCs	CONCENTRATION (ug/Kg)																
Acetone	500,000	11	U	13	U	11	U	12	U	3	BJ	1,300	U	7	BJ	3	BJ
Bromomethane	500,000*	11	U	13	U	11	U	12	U	11	U	220	J	11	U	12	U
Carbon Disulfide	500,000*	11	U	13	U	11	U	12	U	11	U	1,300	U	11	U	12	U
Cyclohexane	500,000*	11	U	13	U	11	U	12	U	11	U	1,600		11	U	12	U
cis-1,2-Dichoroethene	500,000	11	U	13	U	7	J	12	U	10	J	1,300	U	49		12	U
Methylcyclohexane	500,000*	11	U	13	U	11	U	12	U	11	U	5,600		11	U	12	U
Methylene chloride	500,000	6	J	13	U	8	J	5	BJ	7	BJ	1,300	U	6	BJ	6	BJ
Tetrachloroethene (PCE)	150,000	480	D	13	U	160		12	U	4	J	1,300	U	11	U	12	U
Toluene	500,000	11	U	13	U	11	U	12	U	11	U	1,300	U	11	U	12	U
Trichloroethene (TCE)	200,000	11	U	13	U	11	U	12	U	11	U	1,300	U	11	U	12	U
Total TICs	-	6		-		-		18		18		60,800		21		181	
Total VOCs		**492**		**0**		**175**		**23**		**42**		**68,220**		**83**		**190**	

Notes:
1. Part 375 Soil Cleanup Objective source is NYSDEC 6NYCRR Part 375 Environmental Remediation Programs (Part 375) Determination of Soil Cleanup Objectives and Cleanup Levels for restricted commercial use (Part 375-6.8(b) effective December 14, 2006
2. Shaded boxes represent exceedances of the regulatory value.
3. (-) = No regulatory value is associated with this analyte.
4. ug/Kg = micrograms per Kilogram (equivalent to parts per billion (ppb)).
5. Only analytes detected in one or more samples are shown.
6. ND = Non Detected
7. Definitions of data qualifiers are presented in Table 9.

* Soil Cleanup Objectives for Individual Organic Volitiles and semivolatiles were capped at 500,000 unless otherwise specified

Table 4
Former C&B Dry Cleaners Site RI/AA

Summary of SVOC and Pesticide/PCB Analytical Results - Soil Samples

Sample I.D.	PART 375 SOIL CLEANUP OBJECTIVES: COMMERCIAL	SP-11		SP-13		SP-15		SP-3	
Interval Sampled (feet bgs):		**0-12**		**0-8.5**		**0-7**		**0-8**	
Date Sampled:		**5/13/2005**		**5/13/2005**		**5/13/2005**		**5/13/2005**	
TCL SVOCs (ug/Kg)									
2-Methylnaphthalene	500,000*	400	U	66	J	50	J	1,900	U
Acenaphthene	500,000	400	U	2,000	U	390	U	230	J
Anthracene	500,000	16	J	69	J	390	U	540	J
Benzo(a)anthracene	5,600	44	J	200	J	34	J	1,200	J
Benzo(a)pyrene	1,000	23	J	130	J	18	J	550	J
Benzo(b)fluoranthene	5,600	65	J	270	J	53	J	1,400	J
Benzo(k)fluoranthene	500,000	62	J	78	J	15	J	360	J
Bis(2-ethylhexyl) phthalate	500,000*	1,400		2,200		1,400		2,800	
Carbazole	500,000*	400	U	2,000	U	390	U	210	J
Chrysene	56,000	39	J	270	J	48	J	1,300	J
Dibenzo(a,h)anthracene	560	16	J	52	J	390	U	190	J
Dibenzofuran	500,000*	400	U	2,000	U	20	J	120	J
Di-n-butyl phthalate	500,000*	16	J	58	J	18	J	1,900	U
Di-n-octyl phthalate	500,000*	400	U	2,000	U	390	U	1,900	U
Fluoranthene	500,000	77	J	450	J	59	J	3,800	
Fluorene	500,000	400	U	2,000	U	390	U	250	J
Indeno(1,2,3-cd)pyrene	5,600	32	J	92	J	19	J	380	J
Naphthalene	500,000	12	J	58	J	39	J	1,900	U
Phenanthrene	500,000	70	J	370	J	390	U	2,800	
Phenol	500,000	35	J	50	J	390	U	93	J
Pyrene	500,000	68	J	290	J	56	J	1,900	
Total TICs	-	330		460		2,910		1,560	
Total SVOCs	**-**	**2,305**		**5,163**		**4,739**		**19,683**	
TCL Pesticides / Total PCBs (ug/Kg)									
4,4'-DDD	92,000	4	U	10		3.9	U	1.4	JN
4,4'-DDE	62,000	4	U	2	J	0.41	J	2.4	JN
4,4'-DDT	47,000	4	U	24	J	2.1	JP	2.6	J
alpha-BHC	3,400	2.1	U	0.45	JN	2	U	4	U
alpha-Chlordane	24,000	2.1	U	0.6	J	2	U	4	U
beta-BHC	3,000	2.1	U	7	JN	1.7	JP	44	
Dieldrin	1,400	4	U	1.1	J	3.9	U	7.7	U
Endosulfan I	200,000	2.1	U	0.62	J	2	U	4	U
Endosulfan II	200,000	4	U	1	J	0.63	JP	7.7	U
Endosulfan Sulfate	200,000	4	U	2.3	JN	3.9	U	7.7	U
Endrin	89,000	4	U	0.43	JN	3.9	U	7.7	U
Endrin aldehyde	500,000*	4	U	1.5	J	3.9	U	5.7	J
Endrin ketone	500,000*	4	U	2.4	J	0.73	JP	8.7	J
gamma-Chlordane	500,000*	2.1	U	1.7	JN	0.43	JP	4	U
Heptachlor	15,000	2.1	U	0.91	JN	0.76	JP	4	U
Methoxychlor	500,000*	0.93	JN	20	U	20	U	84	J

Notes:

1. Part 375 Soil Cleanup Objective source is NYSDEC 6NYCRR Part 375 Environmental Remediation Programs (Part 375) Determination of Soil Cleanup Objectives and Cleanup Levels for restricted commercial use (Part 375-6.8(b) effective December 14, 2006.
2. Shaded boxes represent exceedances of the regulatory value and/or highest listed background range.
3. (-) = No regulatory value is associated with this analyte.
4. mg/Kg = milligrams per Kilogram (equivalent to parts per million (ppm)).
5. Only analytes detected in one or more samples are shown.
6. Definitions of data qualifiers are presented in Table 9.

* Soil Cleanup Objectives for Individual Organic Volitiles and Semivolatiles were capped at 500,000 unless otherwise specified

Table 5
Former C&B Dry Cleaners Site RI/AA

Summary of Metals Analytical Results- Soil Samples

	PART 375 SOIL CLEANUP OBJECTIVES COMMERCIAL	EASTERN USA BACKGROUND VALUES	USGS BACKGROUND VALUES	SP-3		SP-11		SP-13		SP-15	
Interval Sampled (feet bgs):		**N/A**	**N/A**	**0-8**		**0-12**		**0-8.5**		**0-7**	
Date Sampled:		**N/A**	**N/A**	**5/13/2005**		**5/13/2005**		**5/13/2005**		**5/13/2005**	
TAL - Metals (mg/Kg)											
Aluminum	10,000*	33,000	-	9,660	J	8,440	J	4,740	J	6,520	J
Antimony	10,000*	-	<1 - 8.8	0.45	UJ	0.49	J	0.99	J	1	J
Arsenic	16	3 - 12	<0.1 - 73	7.8	J	7.1	J	109	J	85.7	J
Barium	400	15 - 600	10 - 1,500	108		99.4		95.5		178	
Beryllium	590	0 - 1.75	<1 - 7	0.29	J	0.29	J	0.24	J	0.25	J
Cadmium	9	0.1 - 1	-	0.09	J	0.18	J	0.04	J	0.03	UJ
Calcium	10,000*	130 - 35,000	-	4,620	J	1,810	J	1,940	J	3,290	J
Chromium	400	1.5 - 40	1 - 1,000	10.4	J	9.3	J	9.1	J	12.1	J
Cobalt	10,000*	2.5 - 60	<0.3 - 70	5.9	BJ	4.9	BJ	3.6	J	4.2	BJ
Copper	270	1 - 50	<1 - 700	19.8	J	16.8	J	41.7	J	27.8	J
Iron	10,000*	2,000 - 550,000	-	17,900	J	13,500	J	54,200	J	41,300	J
Lead	1,000	200 - 500	<10 - 300	25.5	J	26.4	J	84.2	J	143	J
Magnesium	10,000*	100 - 5,000	-	2,510	J	1,720	J	984	J	1,640	J
Manganese	10,000	50 - 5,000	<2 - 7,000	668	J	505	J	203	J	211	J
Mercury	2.8	0.001 - 0.2	0.01 - 3.4	0.011	U	0.034	J	0.063		0.287	J
Nickel	310	0.5 - 25	<5 - 700	14.2	J	11.7	J	8.1	J	10	J
Potassium	10,000*	8,500 - 43,000	-	719	J	543	J	985	J	983	J
Selenium	1,500	0.1 - 3.9	<0.1 - 3.9	0.75	UJ	0.86	J	4.7	J	8.5	J
Silver	1,500	-	-	0.14	UJ	0.16	UJ	0.23	J	0.28	J
Sodium	10,000*	6,000 - 8,000		144	J	75.4	J	800		329	J
Thallium	10,000*	-	-	0.56	UJ	0.6	UJ	1.5	J	0.98	J
Vanadium	10,000*	1 - 300	<7 - 300	14.5	J	12.6	J	13	J	16.5	J
Zinc	10,000	9 - 50	<5 - 2,900	53.2	J	63.6	J	39.3		43.7	J

Notes:

1. Part 375 Soil Cleanup Objective source is NYSDEC 6NYCRR Part 375 Environmental Remediation Programs (Part 375) Determination of Soil Cleanup Objectives and Cleanup Levels for restricted commercial use (Part 375-6.8(b) effective December 14, 2006.
2. Eastern USA Background values were obtained from TAGM 4046.
3. USGS Background values obtained from Table 1 in "Elemental Concentrations in Soils & Other Surficial Materials of the Conterminous United States" by Hansford T. Shacklette and Joesphine G. Boerngen for the USGS in 1984.
4. Shaded boxes represent exceedances of the regulatory value and/or highest listed background range.
5. (-) = No regulatory value is associated with this analyte.
6. mg/Kg = milligrams per Kilogram (equivalent to parts per million (ppm)).
7. SB stands for "Site Background" under the TAGM soil cleanup objectives column.
8. Only analytes detected in one or more samples are shown.
9. Definitions of data qualifiers are presented in Table 9.

* Soil Cleanup Objectives for Individual Metals were capped at 10,000 unless otherwise specified

Table 6
Former C&B Dry Cleaners Site RI/AA

Summary of Analytical Results- Waste Characterization Samples

Sample I.D.	Regulatory Value	SP-4		MW-5
Interval Sampled (feet bgs):	**-**	**2-3**		**4-6**
Date Sampled:	**-**	**5/13/2005**		**6/1/2005**
TCLP VOCs (mg/L)				
Benzene	0.5	0.016	J	0.029 J
Tetrachloroethene	0.7	2.7	D	45 D
Trichloroethene	0.5	0.05	U	0.023 J
TCLP Metals (mg/L)				
Barium	100	0.643		Not Analyzed
RCRA Characteristics				
Corrosivity (pH)	</= 2 or </= 12.5	7.4		Not Analyzed
Flashpoint (^{o}F)	< 140	>200		Not Analyzed
Reactive Sulfide (mg/Kg)	>500	<10		Not Analyzed
Reactive Cyanide (mg/Kg)	>250	<10		Not Analyzed

Notes:

1. 40 CRF Parts 261.21, 261.22 and 261.24 are the sources of the regulatory values, which list the maximum allowable levels for the ignitability, corrosivity and toxicity characteristics respectivly for deterimining if a solid waste is defined as ahazardous waste.
2. Shaded boxes represent exceedances of the regulatory value.
3. (-) = No regulatory value is associated with this analyte.
4. mg/L = micrograms per Liter (equivalent to parts per billion (ppb)).
5. Only analytes detected above test method detection limit are shown.
6. Definitions of data qualifiers are presented in Table 9.

Table 7
Former C&B Dry Cleaners Site RI/AA
Summary of VOC Analytical Results- Groundwater Samples

LOCATION		ON-SITE										OFF-SITE		
SAMPLE I.D.	NYSDEC CLASS GA GROUNDWATER STANDARD OR GUIDANCE VALUE	MW-1		MW-2		MW-3		MW-4		MW-5		SP-16	SP-19	SP-21	SP-23	SP-24
DATE SAMPLED		6/3/05	1/11/06	6/3/05	1/11/06	6/3/05	1/11/06	6/3/05	1/11/06	6/3/05	1/11/06	1/12/2006	1/12/2006			
TCL VOCs	CONCENTRATION (ug/L)	CONCENTRATION (ug/L)											CONCENTRATION (ug/L)			
1,1,2,2-Tetrachloroethane	5	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	7 J	10,000 U					
1,1-Dichloroethene	5	10 U	10 U	10 U	50 U	2 J	20 U	10 U	10 U	27	10,000 U	10 U	10 U	10 U	1 J	10 U
cis-1,2-Dichloroethene	5	10 U	10 U	10 U	50 U	73	230	10 U	2 J	250 J	1,100 J	11	10 U	10 U	100	14
Isopropylbenzene	5	10 U	10 U	10 U	50 U	6 J	20 U	10 U	10 U	10 U	10,000 U					
Tetrachloroethene (PCE)	5	7 J	10 U	1,200 D	740	300 D	180	290 D	76 D	110,000 D	1,000,000 D	730 D	230 D	14	9,200 D	850 D
Toluene	5	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	3 J	10,000 U					
Trichloroethene (TCE)	5	10 U	10 U	11	50 U	490 D	270	51	22	830 J	4,800 J	86	6 J	2 J	100	25
Vinyl chloride	2	10 U	10 U	10 U	50 U	11	20 U	10 U	10 U	3 J	10,000 U					

LOCATION		OFF-SITE								
SAMPLE I.D.	NYSDEC CLASS GA GROUNDWATER STANDARD OR GUIDANCE VALUE	SP-25	SP-26	SP-27	SP-28	SP-29	SP-30	SP-31	SWANSON BUILDING	SWAMP
DATE SAMPLED		4/12/2006								
TCL VOCs	CONCENTRATION (ug/L)	CONCENTRATION (ug/L)								
1,1-Dichloroethene	5	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U
Acetone	50	10 U	10 U	10 U	10 U	10 U	10 U	4 J	10 U	4 J
cis-1,2-Dichloroethene	5	10 U	10 U	10 U	310 D	4 J	2 J	14	34	10 U
Tetrachloroethene (PCE)	5	1 J	150	16	44	27	9 J	5,300 D	1,700 D	10 U
trans-1,2-Dichloroethene	5	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U
Trichloroethene (TCE)	5	10 U	10 U	10 U	6 J	4 J	4 J	23	33	10 U
Vinyl chloride	2	10 U	10 U	10 U	120 D	10 U	10 U	10 U	10 U	10 U

LOCATION		ON-SITE	OFF-SITE							
SAMPLE I.D.	NYSDEC CLASS GA GROUNDWATER STANDARD OR GUIDANCE VALUE	SP-35	SP-34	SP-36	SP-37	SP-38	SP-39	SP-40	SP-41	SP-42
DATE SAMPLED		3/12/2007								
TCL VOCs	CONCENTRATION (ug/L)	CONCENTRATION (ug/L)								
1,1,1-Trichloroethane	5	10 U	10 U	1 J	10 U	1 J	6 J	10 U	10 U	10 U
1,1-Dichloroethane	5	10 U	10 U	10 U	1 J	10 U	2 J	10 U	10 U	10 U
1,1-Dichloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	50	10 U	10 U	2 J	3 J	10 U	10 U	10 U	10 U	10 U
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	2600	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	5	10 U	10 U	130	500 D	97	180	3 J	3 J	74
Cyclohexane	-	10 U	10 U	10 U	10 U	10 U	10 U	10 U	6 J	10 U
Dichlorodifluoromethane	5	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U
Methylcyclohexane	-	10 U	10 U	10 U	10 U	10 U	10 U	10 U	28	10 U
Tetrachloroethene (PCE)	5	44	50	1 J	1 J	7600 D	10 U	4 J	6 J	1100 D
trans-1,2-Dichloroethene	5	10 U	10 U	2 J	1 J	10 U	10 U	10 U	10 U	1 J
Trichloroethene (TCE)	5	10 U	10 U	150	30	59	32	9 J	62	27
Vinyl chloride	2	10 U	10 U	10 U	53	3 J	1 J	10 U	10 U	12

Notes:
1. Class GA regulatory values are derived from NYS Ambient Water Quality Standards TOGS 1.1.1 (Source of Drinking Water, groundwater).
2. Guidance value was used when standard was not avilable.
3. Shaded boxes represent exceedances of the regulatory value.
4. (-) = No regulatory value is associated with this analyte.
5. ug/L = micrograms per Liter (equivalent to parts per billion (ppb)).
6. Only analytes detected in one or more samples are shown.
7. Definitions of data qualifiers are presented in Table 9.

Table 8
Former C&B Dry Cleaners Site RI/AA

Summary of SVOC and Metals Analytical Results

Groundwater Samples

Sample Id	NYSDEC Class GA Groundwater Standard or Guidance Value	MW-1		MW-2		MW-3		MW-4		MW-5	
Date Sampled:	**N/A**	**6/3/2005**		**6/3/2005**		**6/3/2005**		**6/7/2005**		**6/7/2005**	
TCL SVOCs (UG/L)											
2,4-Dimethylphenol	50	10	U	10	U	3	J	19	U	9	U
Acetophenone	N/A	10	U	10	U	10	U	19	U	0.3	J
Diethyl phthalate	50	10	U	10	U	10	U	19	U	1	J
Di-n-butyl phthalate	50	10	U	10	U	10	U	19	U	1	J
Fluoranthene	50	1	J	2	J	0.8	J	3	J	1	J
Naphthalene	10	10	U	10	U	2	J	19	U	9	U
Phenanthrene	50	1	J	2	J	0.7	J	3	J	1	J
Phenol	1	10	U	10	U	10	U	19	U	0.9	J
Pyrene	50	10	U	2	J	1	J	1	J	2	J
TOTAL METALS (UG/L)											
Aluminum	-	12,200	J	5,480	J	3,300	J	12,700		8,890	
Antimony	3	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U
Arsenic	25	10.7	J	6.4	J	3.6	J	15.3		10.8	
Barium	1,000	413		239		408		532	J	386	J
Beryllium	3	0.41	J	0.22	J	0.14	U	0.56	J	0.45	J
Cadmium	5	0.23	UJ	0.23	U	0.23	UJ	0.23	UJ	0.23	UJ
Calcium	-	103,000		91,200		99,700		92,500		89,700	
Chromium	50	12.4		5.8	J	3	J	15		10.5	
Cobalt	-	7.3	J	3	J	2.1	J	7.8	J	7.6	J
Copper	200	28.2	J	11.5	J	9.2	J	30.3	J	32	J
Iron	300	17,400		7,830		5,140		22,300		19,500	
Lead	25	14.2		5.5	J	8.9		25.5		23.3	
Magnesium	35,000	26,000		20,200		25,200		27,700		26,700	
Manganese	300	2,060		453		1,520		1,350		5,690	
Mercury	0.7	0.039	U	0.039	U	0.039	U	0.072	J	0.039	U
Nickel	100	17.8	J	9.1	J	6	J	17.9	J	17.3	J
Potassium	-	4,120	J	5,240		2,780	J	4,330	J	3,870	J
Selenium	10	3.6	U	3.6	U	3.6	U	3.6	J	3.6	U
Silver	50	0.66	U	0.66	U	0.66	U	0.66	U	0.66	U
Sodium	20,000	35,200		112,000		46,600		41,200		38,000	
Thallium	0.5	2.7	U	2.7	U	3.2	J	2.7	U	2.7	U
Vanadium	-	18.5	J	8.9	J	5	J	22.6	J	15.1	J
Zinc	2,000	50		31.5		16.7	J	61		63.2	

Notes:
1. Regulatory values are derived from NYS Ambient Water Quality Standards TOGS 1.1.1 (Source of Drinking Water, groundwater).
2. Guidance value was used when standard was not available.
3. (-) = No regulatory value is associated with this compound.
4. Shaded values represent exceedances of the regulatory value.
5. ug/L = micrograms per Liter (equivalent to parts per billion (ppb)).
6. Only compounds with one or more detections are shown.
7. Definitions of data qualifiers are presented in Table 8.

Table 9
Former C&B Dry Cleaners Site RI/AA

Summary of Pal Joey's Restaurant Air Sampling Results

COMPOUND	NYSDOH INDOOR AIR THRESHOLD	SAMPLE I.D.			
		PJ-Subslab	PJ-Base BG	PJ-Outside BG	PJ-Base BG
		4/12/2006			10/10/2006
		Pre-remedial			Post-remedial
	Concentration [ug/m^3]				
Dichlorodifluoromethane	Not Applicable	ND	ND	2.6	2
Chloromethane		ND	ND	1.4	ND
Trichlorofluoromethane		ND	ND	1.4	1.9
Benzene		ND	ND	1.2	3.6
Toluene		ND	ND	3.5	6.3
Ethylbenzene		ND	ND	ND	0.87
m,p-xylene		ND	ND	1.2	2.7
o-xylene		ND	ND	ND	1
1,2,4-Trimethybenzene		ND	ND	ND	1.1
Tetrachloroethene (PCE)	100	190,000	2,200	ND	20

Notes:
1. Shaded boxes represent exceedances of the regulatory value.
2. ND = Non Detected
3. ug/m3 = micrograms per cubic meter.

Table 10
Former C&B Cleaners Site RI/AA

Analytical Testing Data Qualifier Definitions

DATA QUALIFIER	DEFINITION
Organics	
U	Indicates compound was analyzed for, but not detected at or above the reporting limit.
J	Indicates an estimated value. This qualifier is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the data indicates the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
D	This qualifier identifies all compounds identified in an analysis at the secondary dilution factor.
P	This qualifier is used for a pesticide/Aroclor target analyte when there is greater than 25% differenced for detected concentrations between the two GC columns. The lower of the two values is reported on the data page and flagged with a "P".
Inorganics	
U	Indicates element was analyzed for, but not detected at or above the reporting limit.
J or B	Indicates a value greater than or equal to the instrument detection limit, but less than the quantitation limit.
N	Indicates spike sample recovery is not within the quality control limits.

Table 3
Former C&B Dry Cleaners Site RI/AA

Summary of VOC Analytical Results- Soil Samples

Sample I.D.	TAGM REC. SOIL CLEANUP OBJECTIVE				MW-4	MW-5	TB-1	TB-2	TB-3	TB-4	TB-5	TB-5	TB-6	TB-6	TB-7	TB-8	TB-9	TB-10	TB-10
Interval Sampled (ft bgs)	**N/A**				**4-6**	**4-6**	**2-4**	**1-4**	**2-4**	**2-4**	**0.5-2**	**4-6**	**2-3**	**4-6**	**0-2**	**2-4**	**2-4**	**2-4**	**4-6**
Date Sampled:	**N/A**				**6/1/2005 for each**		**05 for all samples**												
TCL VOCs (UG/KG)																			
Cyclohexane	-				1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	370 J	1,300 U	1,400 U	1,300 U	1,500 U	11 U	1,400 U	1,400 U	1,300 U
Ethylbenzene	5,500				1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	380 J	1,300 U	1,400 U	1,300 U	1,500 U	11 U	1,400 U	1,400 U	1,300 U
Methylcyclohexane	-				1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	8,400 DJ	1,300 U	1,400 U	1,300 U	1,500 U	11 U	1,400 U	1,400 U	1,300 U
Methylene chloride	100				1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	1,300 U	1,300 U	1,400 U	1,300 U	1,500 U	14 U	1,400 U	1,400 U	1,300 U
Tetrachloroethene	1,400				7,700	8,000,000 DJ	33	13	3,100	18,000	160,000 D	2,700	6,900	5,900	130,000 DJ	9 J	730 J	110,000 D	24,000
Total Xylenes	1,200				1,300 U	1,300 U	11 U	10 U	1,700 U	1,400 U	3,000	1,300 U	1,400 U	1,300 U	1,500 U	11 U	1,400 U	1,400 U	1,300 U
Trichloroethene	700				1,300 U	210 J	11 U	10 U	1,700 U	1,400 U	490 J	1,300 U	1,400 U	1,300 U	1,500 U	11 U	1,400 U	1,400 U	1,300 U
Total VOCs	**10,000**				**7,700**	**8,000,210**	**33**	**13**	**3,100**	**18,000**	**172,640**	**2,700**	**6,900**	**5,900**	**130,000**	**9**	**730**	**110,000**	**24,000**
Total TICs	-				0	1,400	10	None	None	None	11,990	None	None	None	None	None	None	None	None

Sample I.D.	TAGM REC. SOIL CLEANUP OBJECTIVE				SP-3	SP-4	SP-4	SP-4	SP-6	SP-9	SP-9	SP-9	SP-11	SP-12	SP-13	SP-14	SP-15		
Interval Sampled (ft bgs):					**0-8**	**2**	**4**	**7.5-10**	**8-10**	**13-14**	**6-7**	**8-10**	**0-12**	**8-9**	**0-8.5**	**12-15**	**0-7**		
Date Sampled:					**5/13/2005 for all samples**														
TCL VOCs (ug/Kg)																			
Acetone	200				11 U	1,300 U	11 U	11 U	4 J	1,500 U	11 UJ	5,600 U	1,300 U	2,800 U	1,400 UJ	12 UJ	12 U		
cis-1,2-Dichloroethene	-				11 U	1,300 U	11 U	2 J	14	1,500 U	11 UJ	5,600 U	1,300 U	2,800 U	1,400 UJ	12 UJ	12 U		
Methylcyclohexane	-				11 U	1,300 U	11 U	2 J	11 U	1,500 U	11 UJ	5,600 U	1,300 U	2,800 U	1,400 UJ	12 UJ	12 U		
Methylene chloride	100				12 U	1,300 U	11 U	11 U	8 J	1,500 U	11 UJ	5,600 U	1,300 U	2,800 U	1,400 UJ	12 UJ	21		
Tetrachloroethene	1,400				46	28,000 D		190	20	1,500 U	17 J	870 J	7,600	740 J	9,900 J	8 J	8 J		
Toluene	1,500				22	610 J	15	220	11 U	340 J	4 J	1,400 J	690 J	490 J	1,400 UJ	9 J	12 U		
Trichloroethene	700				11 U	1,300 U	2 J	28	12	1,500 U	11 UJ	5,600 U	1,300 U	2,800 U	1,400 UJ	12 UJ	12 U		
Total VOCs	**10,000**				**68**	**28,610**	**17**	**442**	**58**	**340**	**21**	**2,270**	**8,290**	**1,230**	**9,900**	**29**	**29**		
Total TICs	-				41	32,800	None	None	6,150	12,200	None	593,000	None	418,000	17,230	None	149		

LOCATION										**ON-SITE**			**OFF-SITE**			**OFF-SITE**			
SAMPLE I.D.	**TAGM REC. SOIL CLEANUP OBJECTIVE**									**SP-16**	**SP-18**	**SP-20**	**SP-19**	**SP-21**	**SP-23**				
Interval Sampled (ft bgs)	**N/A**									**6**	**5**	**4**	**4**	**3**	**3**				
DATE SAMPLED	**N/A**									**12/20/2006**			**12/20/2006**						
TCL VOCs	**CONCENTRATION (ug/Kg)**									**CONCENTRATION (ug/Kg)**			**CONCENTRATION (ug/Kg)**						
Acetone	200									12 U	11 U	21	11 U	13 U	11 U				
Carbon Disulfide	2,700									12 U	11 U	2 J	11 U	13 U	11 U				
cis-1,2-Dichoroethene	-									12 U	11 U	13 U	11 U	13 U	7 J				
Methylene chloride	100									6 J	10 BJ	8 J	6 J	13 U	8 J				
Tetrachloroethene	1,400									5 J	300 D	13 U	480 D	13 U	160				
Total VOCs	**10,000**									**11**	**310**	**31**	**486**	**-**	**175**				
Total TICs	-									7	94	7	6	-	-				

Notes:
1. TAGM Recommended Soil Cleanup Objective source is NYSDEC Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels (HWR-92-4046) revised January 24, 1994.
2. Shaded boxes represent exceedances of the regulatory value.
3. (-) = No regulatory value is associated with this analyte.
4. ug/Kg = micrograms per Kilogram (equivalent to parts per billion (ppb)).
5. Only analytes detected in one or more samples are shown.
6. Definitions of data qualifiers are presented in Table 8.