



Final Engineering Report – Part B

**Bon Ton Cleaners
1932 Ralph Avenue
Brooklyn, New York**

May 2006

Prepared for:

**Ralph Associates
1133 Avenue of the Americas
New York, NY 10036-6799**

Prepared by:

**CA RICH CONSULTANTS, INC.
17 Dupont Street
Plainview, New York 11803**



May 11, 2006

NYSDEC
625 Broadway
Albany, NY 12233-7015

Attention: Joe Peck

Re: **Final Engineering Report – Part B**
Bon Ton Cleaners
1932 Ralph Avenue
Brooklyn, New York
Site Number V-00512-2
VCP Index Number W2-0916-02-03


Dear Mr. Peck:

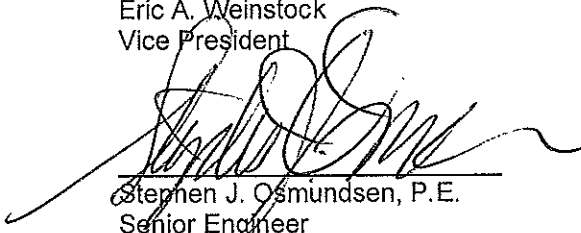
Attached is a copy of the Final Engineering Report – Part B for the above-referenced site.

If there are any questions regarding this document, please do not hesitate to call our office.

Sincerely,


Deborah Shapiro
Project Environmental Scientist


Eric A. Weinstock
Vice President


Stephen J. Osmundsen, P.E.
Senior Engineer

cc: Burt Lewis
Miriam Villani, Esq.
Rosalie Rusinko, Esq. (e-mail only)
Nathan Walz

Attachments

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**Final Engineering Report – Part B
Bon Ton Cleaners
1932 Ralph Avenue
Brooklyn, New York**

1.0 INTRODUCTION

The following Final Engineering Report – Part B has been prepared by CA RICH Consultants, Inc. (CA RICH) on behalf of Ralph Associates. This document was prepared in accordance with a Voluntary Cleanup Program (VCP) Agreement, Index Number W-20916-02-03 and the May 2002 VCP guidance document, and addresses “Part B” of the remediation of an area of the Site located in the central portion of the property below the present shopping center parking lot. For the purposes of this document, the contaminants of concern are perchloroethene (a.k.a. PCE or tetrachloroethene) and its degradation products.

ACT and CA RICH performed a series of previous investigations at this site for refinancing purposes. Copies of these reports, including the corresponding site maps and laboratory data, are appended to the Investigation Work Plan (Ref. 3).

During the winter of 2002 and spring of 2003, a supplemental subsurface investigation of the site was performed to determine the nature and extent of contamination at the Bon Ton Cleaners Site. Based on the results of this investigation, a remedy was designed consisting of two mechanical systems; the cleanout of one concrete sump, and chemical oxidation. The design and installation of the mechanical systems and the cleanout of the sump are described in the April 2005 Final Engineering Report – Part A, and Operations, Maintenance & Monitoring Plan. Implementation of the chemical oxidation program is described in this “Part B” Report.

Installation of the mechanical remediation systems began during August 2004 and consisted of the installation of Soil Vapor Extraction (SVE) wells and Air Sparging (AS) points. The one sump was cleaned out on October 15, 2004. The trenching for the underground air sparge piping was completed in November 2004. The installation of the SVE blower and the air sparging compressor was completed in March 2005. The AS/SVE system was started-up and remained in operation from March 29, 2005 through March 29, 2006. On March 29, 2006, the AS system was shutdown; however, the SVE system remains in operation.

The following documents prepared for this site should be reviewed for additional details:

<u>Document</u>	<u>Date</u>
Phase II Environmental Site Assessment, 1890-1960 Ralph Avenue, Brooklyn, New York	June 5, 2001
Phase II Environmental Site Assessment, 1890-1960 Ralph Avenue, Brooklyn, New York	July 23, 2001
Investigation Work Plan Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York	October 2002
Supplemental Investigation Work Plan Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York	May 2003
Investigation Report Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York	October 2003

Remediation Work Plan Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York	April 2004
Pilot Test and Final Design Report Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York	December 2004
Final Engineering Report – Part A, And Operations, Maintenance & Monitoring Plan 1932 Ralph Avenue, Brooklyn, New York	April 2005

2.0 PHYSICAL SITE CHARACTERISTICS

2.1 Site History

The Flatlands Shopping Center consists of a parcel approximately 900 feet by 200 feet in size. The property contains one strip shopping center constructed in 1960. The ground surface around the four sides of the building is improved with pavement. Paerdegat Basin, an inland extension of Jamaica Bay, is situated approximately 500 feet east of Bon Ton Cleaners. A Property Location Map is included as Figure 1.

Bon Ton Cleaners occupies a unit approximately 25 feet wide by 75 feet long in the central portion of the shopping center and has reportedly been a dry cleaner since 1960. The shopping center has always been serviced by public water and public sewers. The dry cleaning facility consists of a ground floor, which houses the dry cleaning machine and waste storage areas, and a basement area used to house the boiler, air compressor, vacuum unit, and clothing storage.

CA RICH inspected the dry cleaning facility on September 17, 2001. During that visit, we observed a facility that appeared to be operating in accordance with industry standards. The operator was using a fourth generation dry cleaning machine with a spill pan, and the machine was situated within a vapor barrier room. Bulk PCE was stored within the machine. Separator water and distillation bottoms were stored in dedicated, labeled containers. The operator had a waste disposal manifest from National Waste Clean, Inc. (NWC) on site dated August 30, 2001.

2.2 Geologic Setting

Bon Ton Cleaners is situated upon the Pleistocene aged glacial outwash soil deposits of Long Island at an elevation of approximately 20 feet above mean sea level. The depth of the water table occurring within the underlying Upper Glacial Formation is approximately 10 feet below land surface. The direction of groundwater flow is east, toward Paerdegat Basin as mapped in the Investigation Report (Ref. 5).

The Upper Glacial Formation is underlain at a depth of approximately 200 feet by the Pleistocene Gardiners Clay, a regional confining clay layer situated along the south shore of Long Island. This in turn is underlain by the Pleistocene Jameco Gravel, a moderately to highly permeable sand and gravel unit (Ref. 5).

The Cretaceous aged Magothy Formation, a moderately permeable unit composed of clay, silt, and sand underlies the Jameco Gravel. The Magothy Formation is, in turn, underlain by the Raritan Formation. The Raritan Formation is composed of the upper Raritan Clay, a regional confining layer, followed by the more permeable Lloyd Sand. The Lloyd Sand sits directly upon Precambrian crystalline bedrock.

Brooklyn is serviced by New York City Department of Environmental Protection (NYCDEP) public water that is derived from surface water reservoirs located in upstate New York. Saltwater encroachment issues caused cessation of groundwater pumping for public water supply purposes in Kings County during the 1940's (Ref. 5).

2.3 Summary of Environmental Conditions

Based on the initial and supplemental remedial investigations, PCE and its degradation products are determined to be the primary contaminants of concern at this site. A summary of the findings from the previous investigations is presented below.

2.3.1 Soil

Minor detections of PCE were detected in several of the soil samples collected at the Site. The results are summarized and the locations are illustrated in the Investigation Report (Ref.5). The highest detection, 259 ug/kg, was detected in VB-4, located in the basement. In each case, the detections were less than the NYSDEC TAGM (Ref. 5) guidance value of 1,400 ug/kg. The soil did not display any visual signs of staining indicative of a product release. As such, these detections are likely the results of PCE vapors trapped below the basement slab and pavement. Soil vapor analysis, however, has identified areas of elevated PCE below the basement floor. These readings are also presented in the Investigation Report (Ref. 5).

2.3.2 Soil Vapor

A total of 15 VMPs exist at the site. Points VMP-1 through 6 were sampled on June 17, 2003 as part of the Voluntary Investigation (Ref. 5). These results were submitted to the NYSDEC as part of the Voluntary Investigation Report. On November 10, 2004, VMP-7 through VMP-11 and E-1 through E-4 were sampled using the same procedures as the June 17, 2003 sampling. The results from both sampling events are summarized and are illustrated in the Pilot Test and Final Design Report (Ref. 7).

2.3.3 Sump Water

A sample of the standing water in a floor sump located in the basement of the Site was also collected. The water contained PCE, trichloroethene and elevated levels of cis-1,2 dichloroethene (1,2-DCE). Apparently, this water had been standing and degrading over time as demonstrated by the elevated levels of 1,2-DCE. It is important to note that the concrete lined sump contained standing water. At the time the soil samples were collected, the soil obtained along side of the sump was dry indicating the sump is likely watertight. The results are presented in the Investigation Report (Ref. 5).

2.3.4 Indoor Air

Indoor air samples were collected in the basement and ground floor portions of the neighboring units in the shopping center during the Remedial Investigation. The results from the Chinese Restaurant and Golden Krust Bakery collected prior to the March 2005 start-up of the SVE system exceeded the NYSDOH action level of 100 ug/m³ but were below the immediate action level of 1,000 ug/m³. The samples from the remaining units were below the NYSDOH action level of 100 ug/m³. The source of the detections in the Chinese restaurant and Golden Krust were believed to be from the subsurface vapors below the Dry Cleaning Facility. The results are presented in the Investigation Report (Ref. 5).

Since start-up of the AS/SVE system, indoor air samples have been collected on a monthly basis from Go Digital (basement only), Golden Krust (first floor and basement), Gourmet China (first floor and basement), and Telco (basement only) via Passive Diffusion or Perc badges. The badges were sent to Galson Laboratories and were analyzed for perchloroethylene using NYSDOH Method 311-9.

During the 3rd Quarter 2005 indoor air sampling, it was concluded that the exhaust from the vapor barrier room or the storage of waste drums in the common hallway were potential sources of the elevated readings at the Golden Krust Bakery. The tenant at Bon Ton Cleaners has removed the waste drums from the common hallway and is now storing the waste drums in the vapor barrier. In addition, on December 29, 2005, the tenant modified the exhaust stack so that it discharges upward instead of downward.

The concentration of PCE detected in the indoor air has significantly decreased since the remedial investigation and start-up of the SVE equipment was initiated as well as the exhaust stack modifications. The March 28, 2006 air sampling data showed PCE concentrations at all locations are below the NYSDOH action level of 100 ug/m³ and the New York State background level of 10 ug/m³.

2.3.5 Groundwater

The groundwater at the Site flows from west to the east and towards Paerdegat Basin. A total of two multi-depth cluster wells and three shallow groundwater monitoring wells exist at the Site. A table summarizing the construction details is attached as Appendix A. During the remedial investigation, the shallow upgradient well (VW-1) contained low levels of PCE, less than the groundwater standard of 5 ug/L. Well VW-2S located directly downgradient of the Facility contained 761 ug/L of PCE. The duplicate sample from this well contained 891 ug/L, the highest PCE concentration at the Site. Wells VW-3, 4 and 5 are all shallow wells downgradient of the Facility and contained PCE at concentrations ranging from 22 to 320 ug/L. The NYSDEC TOGS groundwater standard for PCE is 5 ug/l.

Wells VW-2I and 2D were screened at 45 to 50 feet and 61 to 71 feet below grade at the same location as VW-2S. These wells contained much lower levels of PCE, but elevated levels of other compounds including trichloroethene and 1,1,1-trichloroethane. It appears that contamination from another source is flowing onto the property at depth and traveling towards Paerdegat Basin, a regional discharge area. The results are summarized on Table 1 of this document.

At the request of the NYSDEC, a second phase of groundwater sampling was performed as a follow up to the initial well installation and sampling program using a Geoprobe sampling device. Groundwater samples taken from the up gradient location VGP-1 measured no detections of PCE. However, the groundwater samples taken from the same location VGP-1 at 50, 70 and 90 feet below grade all contained elevated levels of both trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) above the groundwater standard of 5 ug/L confirming that contamination from another source is flowing onto the property at depth and traveling towards Paerdegat Basin, a regional discharge area. Based on these results, the scope of Site remediation at this property was limited to PCE and it's degradation products to a depth of 35 feet below grade. These results are presented in the Investigation Report (Ref. 5).

On March 10, 2005, a round of "baseline" groundwater samples were obtained from all groundwater monitoring wells as per the Remedial Work Plan (Ref. 6). The "baseline" groundwater results (collected just before start up of the remediation system) showed that PCE levels significantly increased in VW-3 and significantly decreased in VW-4, VW-5, and VW-2S, the wells that historically contained the greatest concentration of PCE. The groundwater analytical results are presented in the Final Engineering Report – Part A, and Operations, Maintenance, Plan (Ref. 8).

As of the Fourth Quarter 2005, the only shallow monitoring well at the Site that exceeded groundwater standards was well VW-3. The application of permanganate around well VW-3 is the focus of this remedial effort.

2.4 Summary Of Remedy

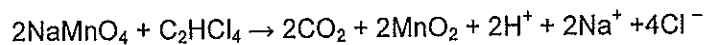
The remedy for this Facility consists of two mechanical systems, chemical oxidation, and the cleanout of one concrete sump.

- The Air Sparging (AS)/Soil Vapor Extraction (SVE) system was addressed in the Final Engineering Report and Operations, Maintenance, and Monitoring Plan - Part A.
- The cleanout of the sump in the basement of the shopping center was addressed in the Final Engineering Report and Operations, Maintenance, and Monitoring Plan - Part A.
- On March 7, 2006, the Chemical Oxidation program consisting of the injection of sodium permanganate was implemented and is summarized in this Part B Report.

3.0 CHEMICAL OXIDATION DESIGN

3.1 Design of Chemical Oxidation Injection Points

Permanganate is a strong oxidizer that has a long history of application for the control of odors at wastewater treatment plants. Recently, the application of permanganate directly to subsurface soils and groundwater has been proven successful for the remediation of PCE. Once in contact with PCE, the permanganate converts the contaminant to harmless by-products as shown below:



(Permanganate + Perchloroethene → Carbon Dioxide Gas + Manganese Dioxide + Hydrogen ions + Sodium ions + Chlorine ions)

Sodium permanganate was injected into the subsurface at the three locations shown on Figure 2 using a Geoprobe™ probing system. The permanganate was injected using a high-pressure pump through the Geoprobe™ macro-core sampling rod. The macro-core rods were driven to 23 feet below grade, where the first injection took place, then retracted at 4-foot intervals for additional applications of permanganate.

3.2 Design of Chemical Oxidation Injection System

Bulk sodium permanganate was purchased from the Carus Chemical Company at a concentration of 40% and in 5-gallon containers. Using a portable steel-mixing tank, 50-gallon doses of 5% sodium permanganate were prepared by mixing 5 gallons of 40% sodium permanganate with 45 gallons of tap water.

On March 7, 2006, 150 gallons of 5% sodium permanganate were applied to the three locations: The permanganate was applied at 4-foot intervals within each point from 8 to 23 feet below grade. After the permanganate was injected, monitoring well VW-3 was pumped using a whale™ submersible pump. During pumping, colorimeter readings were taken every five minutes. All colorimeter readings were 0.0 mg/L on the date of application.

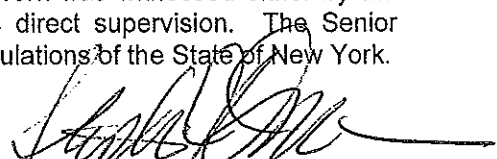
4.0 SUMMARY

This Final Engineering Report – Part B summarizes the history of the Bon Ton Cleaners Site and outlines the Chemical Oxidation program that injected a sodium permanganate solution into the groundwater. Since startup of the AS/SVE system, quarterly monitoring and sampling of the groundwater wells has occurred. During the past quarter, all of the compliance wells were within the NYSDEC groundwater standards for PCE. This included well VW-3, the well that was subject to this Chemical Oxidation program. During the First Quarter 2006 sampling round, the PCE concentration in this well decreased from 35.4 ug/l to 1.2 ug/l. The groundwater standard for PCE is 5 ug/l. A table of the results for this well is attached.

5.0 CERTIFICATION

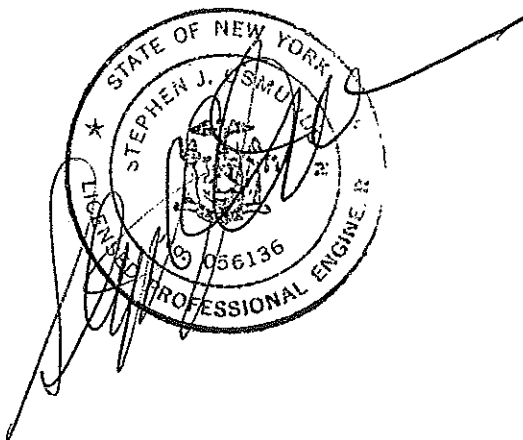
We hereby certify that the Chemical Oxidation Program was performed as specified in the Pilot Test and Final Design Report with the following modifications. The number of injection sites was decreased from 10 to three based on an evaluation of the quarterly groundwater data from the Site and discussions with NYSDEC. We also certify that all work was witnessed either by the Project's Senior Engineer or by a person working under his direct supervision. The Senior Engineer is a Registered Engineer as established under the regulations of the State of New York.

Seal:



Stephen J. Osmundsen, P.E.
Senior Engineer

5/17/06
Date

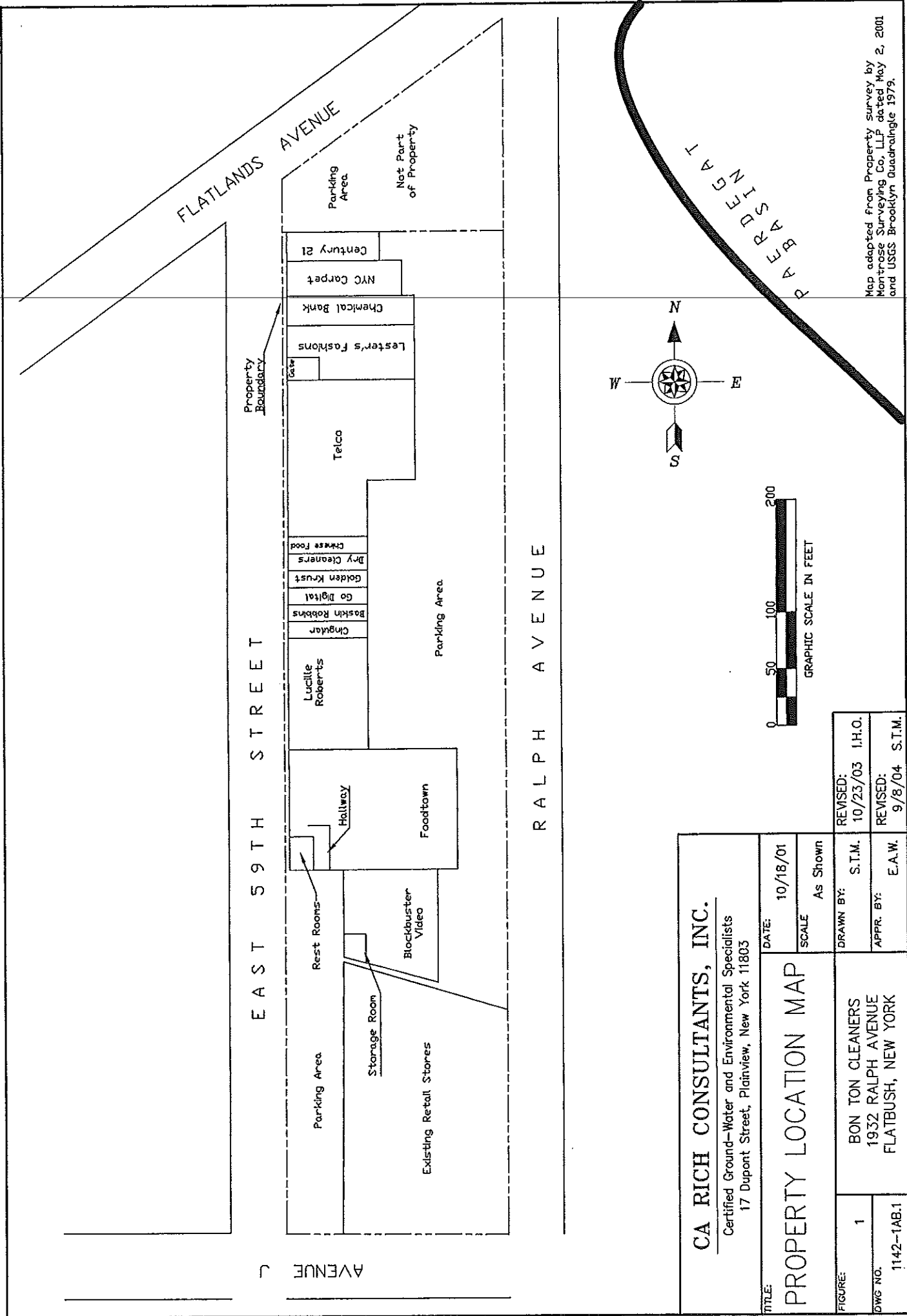


6.0 REFERENCES

1. ACT, (June 5, 2001) Phase II Environmental Site Assessment, 1890-1960 Ralph Avenue Brooklyn, New York.
2. ACT, (July 23, 2001) Phase II Environmental Site Assessment, 1890-1960 Ralph Avenue Brooklyn, New York.

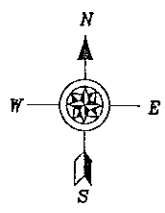
3. CA RICH (October 2002), Investigation Work Plan Bon Ton Cleaners 1932 Ralph Avenue Brooklyn, New York, Site Number V-00512-2.
4. CA RICH (May 2003), Supplemental Investigation Work Plan Bon Ton Cleaners 1932 Ralph Avenue Brooklyn, New York, Site Number V-00512-2.
5. CA RICH (October 2003), Investigation Report Bon Ton Cleaners 1932 Ralph Avenue Brooklyn, New York, Site Number V-00512-2.
6. CA RICH (April 2004) Remediation Work Plan Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York.
7. CA RICH (December 2004) Pilot Test and Final Design Report Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York.
8. CA RICH (April 2005) Final Engineering Report - Part A and Operations, Maintenance & Monitoring Plan Bon Ton Cleaners, 1932 Ralph Avenue, Brooklyn, New York.

Figures



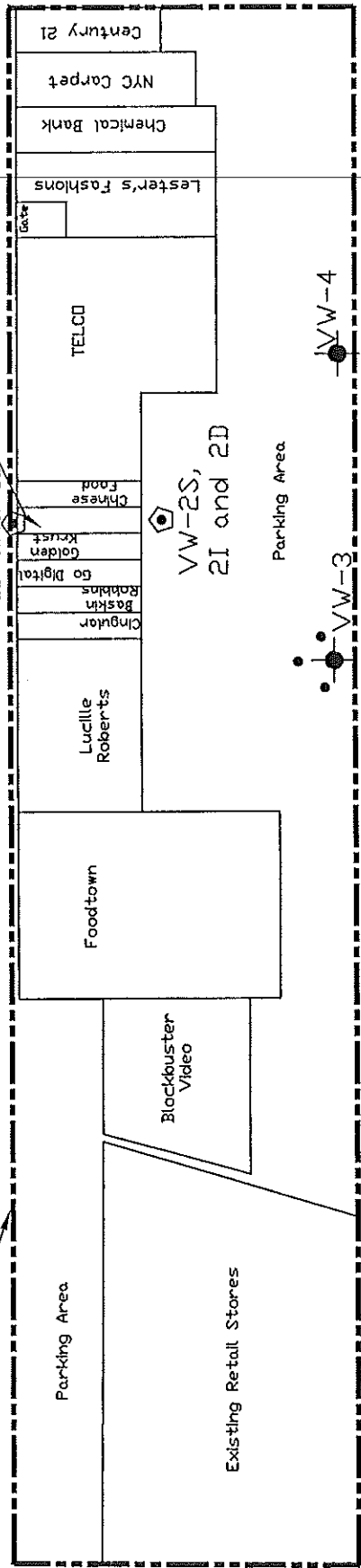
Map adapted from Property survey by
 Montrose Surveying Co. LLP dated May 2, 2001
 and USGS Brooklyn Quadrangle 1979.

CA RICH CONSULTANTS, INC. Certified Ground-Water and Environmental Specialists 17 Dupont Street, Plainview, New York 11803		DATE: 10/18/01 SCALE: As Shown	REVISED: 10/23/03 I.H.O. REVISED: 9/8/04 S.T.M.
PROPERTY LOCATION MAP		DRAWN BY: S.T.M. APPR. BY: E.A.W.	BON TON CLEANERS 1932 RALPH AVENUE FLATBUSH, NEW YORK
FIGURE: 1	DWG NO. 1142-1AB.1		



EAST 59TH STREET

Bon Ton Dry Cleaners
VW-1S, II and 1D



Legend

- On-Site Water Table Monitoring Well
- ⊕ On-Site Multi Depth Cluster Well
- Off-Site Water Table Monitoring Well
- Chemical Oxidation Point

Notes:

1. See Table 1 for results
2. Map adapted from Property survey by Montrose Surveying Co, LLP dated May 2, 2001 and USGS Brooklyn Quadrangle 1979.



Graphic Scale In Feet

CA RICH CONSULTANTS, INC.	
Certified Ground-Water and Environmental Specialists 17 Dupont Street, Plainview, New York 11803	
TITLE: GROUNDWATER MONITORING WELL LOCATION MAP	DATE: 8/2/2005
FIGURE: 2	SCALE: As Shown
DWG NO. 2005-7a.1	DRAWN BY: BON TON CLEANERS 1932 RALPH AVENUE BROOKLYN, NEW YORK
	APPR. BY: D.S. E.A.W.

Tables

Table 1
 Historical Groundwater Data for Well VW-3
 1932 Ralph Avenue, Brooklyn, New York

Well ID	VW-3	VW-3	VW-3	VW-3	VW-3	VW-3	VW-3	VW-3	VW-3	NYSDEC TOGS Standards and Guidelines
Comments	RI	Baseline	2Q2005	3Q2005	4Q2005	1Q2006				
Screened Interval (ft. below land surface)	8 to 23	8 to 23	8 to 23	8 to 23	8 to 23	8 to 23				
Date Sampled	12/23/2002	3/10/2005	6/30/2005	9/27/2005	12/28/2005	3/28/2006				
Days since system start up	-827	-19	93	182	274	364				
Days since initial sample	-808	0	112	1,009	1,101	1,191				
VOCs (Halogenated only) via EPA 8021	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>	<u>ug/L</u>
Tetrachloroethene (PCE)	90.2	628	97.5	109	35.4	1.2				5
Trichloroethene	ND	4.8	1.6	1.6	1.1	1.5				5
cis-1,2 Dichloroethene	ND	5.0	2.8	1.1	ND	1.3				5
1,1 Dichloroethane	ND	ND	ND	ND	ND	ND				5
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND				5
trans-1,2 Dichloroethene	ND	ND	ND	ND	ND	ND				5
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND				5

Notes:

Date of System Startup: 3/29/2005
 ND = Not Detected

Box indicates values exceeds NYSDEC TOGS.

