Laurel
ENVIRONMENTAL
ASSOCIATES, LTD.

September 9, 2004

Ms. Tara King
NYSDEC
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 11th Floor
Albany, NY 12233-7015

Re: Addendum to the August 28, 2002 (revised January 7, 2003) Workplan for Villa Cleaners, 1885-1899 Deer Park Ave., Deer Park, New York
Order on Consent # W1-00996-04-04.
Site Code # 1-52-188
Laurel Reference Number: 03-230.

Dear Ms. King:

This addendum to the Voluntary Cleanup Investigation Workplan completed by Fenley & Nicol dated, August 28, 2002 and revised January 7, 2003 serves as the Remedial Investigation Workplan as required by the Order on Consent with an effective date of June 16, 2004.

The underlying groundwater at the site is impacted with tetrachloroethene (PCE) and its daughter products from prior discharge of same into on-site sanitary leaching pools. Sediments from the structures have been properly remediated with confirmatory endpoint samples, under the supervision of the Suffolk County Department of Health Services.

To effectively delineate the plume of impacted groundwater in a most expeditious and cost efficient manner, ***LEA*** proposes the following adjustments to the F & N Workplan:

1. All groundwater and soil laboratory analysis will utilize Using Method 624/8260 for volatile organic compounds, NYS Category B. No additional parameters will be analyzed.
2. Soil-gas samples will be collected at six locations. One through the slab Villa Cleaner's building (samples collected at ten feet and five feet below grade) one through the parking lot near the High School property line (samples collected at ten and five feet below grade) and one within the source area (sample collected at 16 feet below grade). Soil-gas samples will be collected from three additional locations along the west side of the commercial buildings in the parking lot, at five feet below grade where building on slab and at ten feet below grade where building has a basement. Soil-gas samples will be collected using Suma canisters and analyzed for VOCs using USEPA Method TO-14/15.

3. All temporary and permanent wells will be installed using a GeoProbe® using direct push technology, thereby eliminating drumming and disposal of drill cuttings.
4. Groundwater cluster wells are prone to cross contamination from various points within the vertical dimension; therefore no cluster wells will be installed.
5. One soil boring will be advanced two feet into the soil/water interface, at continuous four-foot intervals, at a location between leaching pools RM-2, RM-3, and RM-4. Each four foot interval will be field screen using a Photoionization Detector (PID) equipped with an 11.7 eV bulb. Any sample with a PID reading of greater than 10 parts per million (ppm) will be submitted for confirmatory analysis using Method 8260 for volatile organic compounds. If none of samples exhibit signs of contamination, the deepest sample (16 to 18 feet below grade) will be analyzed.
6. Groundwater samples will be collected from seven pre-determined and approved locations to a maximum depth of 70 feet below grade, hydraulically down-gradient from the source area. Three samples from varying depths will be collected from each well location; shallow (soil/water interface), mid-zone (approximately 34 to 36 feet below grade) and in the deeper zone (68 to 70 feet below grade).
7. A qualitative exposure assessment will be completed for both on-site and off-site receptors. No off-site data will be collected.

Standard Operating Procedures:

a. All sampling equipment, not considered disposable will be decontaminated using *Alconox*, a laboratory grade detergent, and rinsed with water before and after each use to ensure that cross-contamination of samples is eliminated.
b. All groundwater samples will be collected from the predetermined locations, using a vehicle-mounted, hydraulically driven GeoProbe®, a direct push technology. This system involves driving a GeoProbe® screen point sampler into the subsurface. The stainless steel screen remains retracted within the probe rods until it is driven to the desired sampling depth. The screen is held in place by an expendable point fitted with a watertight "O" ring. Once the desired depth is reached, the probe assembly is retracted and chase rods are then inserted down the inside of the probe rod to push the screen out of the protective sheath into the resulting void. The rod is then allowed to fill with formation water. After the screen has been exposed, an unused, clean section of 3/8" polyethylene tubing is fitted with a stainless steel check valve and inserted down the probe rod to the desired sampling depth. The poly tubing is then oscillated up and down to drive a column of water to the surface. Alternatively, purging will be completed with a peristaltic pump.
c. All groundwater samples will be collected after purging the temporary wells, pumped using a check valve and ball system directly into appropriate laboratory containers and stored on ice. Alternatively, sampling will be completed with a peristaltic pump. The samples will be delivered, under strict chain of custody procedures to a NYSDOH approved laboratory and analyzed using USEPA Method 8260 for volatile organic compounds.

d. By utilizing direct push technology, air monitoring of the work zone should not be necessary as elevated levels of VOCs in the atmosphere are not anticipated during on-site activities. However, the presence of VOCs will be evaluated using a PID equipped with a 11.7 eV bulb. Air monitoring for VOCs will monitored at the downwind perimeter of the work area on a continuous basis. If total VOC vapor levels exceed 5 parts per million (ppm) above background, work will be halted and the actions contained in the Vapor Emission Response Plan followed. Particulate will be monitored upwind, downwind, and within the work are. If downwind concentrations exceed 150 micrograms per cubic meter over that of the upwind concentrations, action will be taken to reduce particulates. Prior to undertaking field activities, ***LEA*** will complete monitoring of air quality at the site. After the completion of the air monitoring survey and the assessment of air quality indicates work can proceed in Level D personnel protection, the investigation will continue. During all sampling and drilling operations, ***LEA*** personnel will monitor the working area, i.e. within the area of the drill rig, using the MicroTip^{tm}, HNU^{tm} and/or MSA 261^{tm} (or equivalent) to ensure that air quality within the working area does not pose a hazard. If the air monitoring indicates a hazard, the area will be immediately evacuated.

e. The scope of work establishes the minimum level of personnel protection. Additional measures will be implemented if necessary to protect personnel involved in the work and the public at large.

f. Conditions at the site are not expected to warrant either Level B or Level C protection during the investigation based on known site conditions. Regardless, all workers present on site will be familiar with proper protection procedures.

g. Given the nature of this investigation, as well as the nature of the contaminants which have the potential of being on-site, there is very little, if any, potential of the surrounding community being negatively impacted by activities which will be conducted during this investigation. However, ***Laurel Environmental Associates, Ltd.*** will take every possible step to avoid any type of negative impact.

h. Drill cuttings, if generated, that exhibit no obvious sign of contamination will be placed under plastic tarps after being screened with a Photoionization Detector to determine the presence of organic contamination. Drill Cuttings that appear to be contaminated, discolored, chemical odor etc., will be stored on-site in 55-gallon drums. If an emergency occurs during the investigation, which in any event may impact the surrounding community, all appropriate emergency resources listed under the Emergency Contingency Plan will be immediately notified.

Should you have any questions, or if I may be of further service, please do not hesitate to contact me.

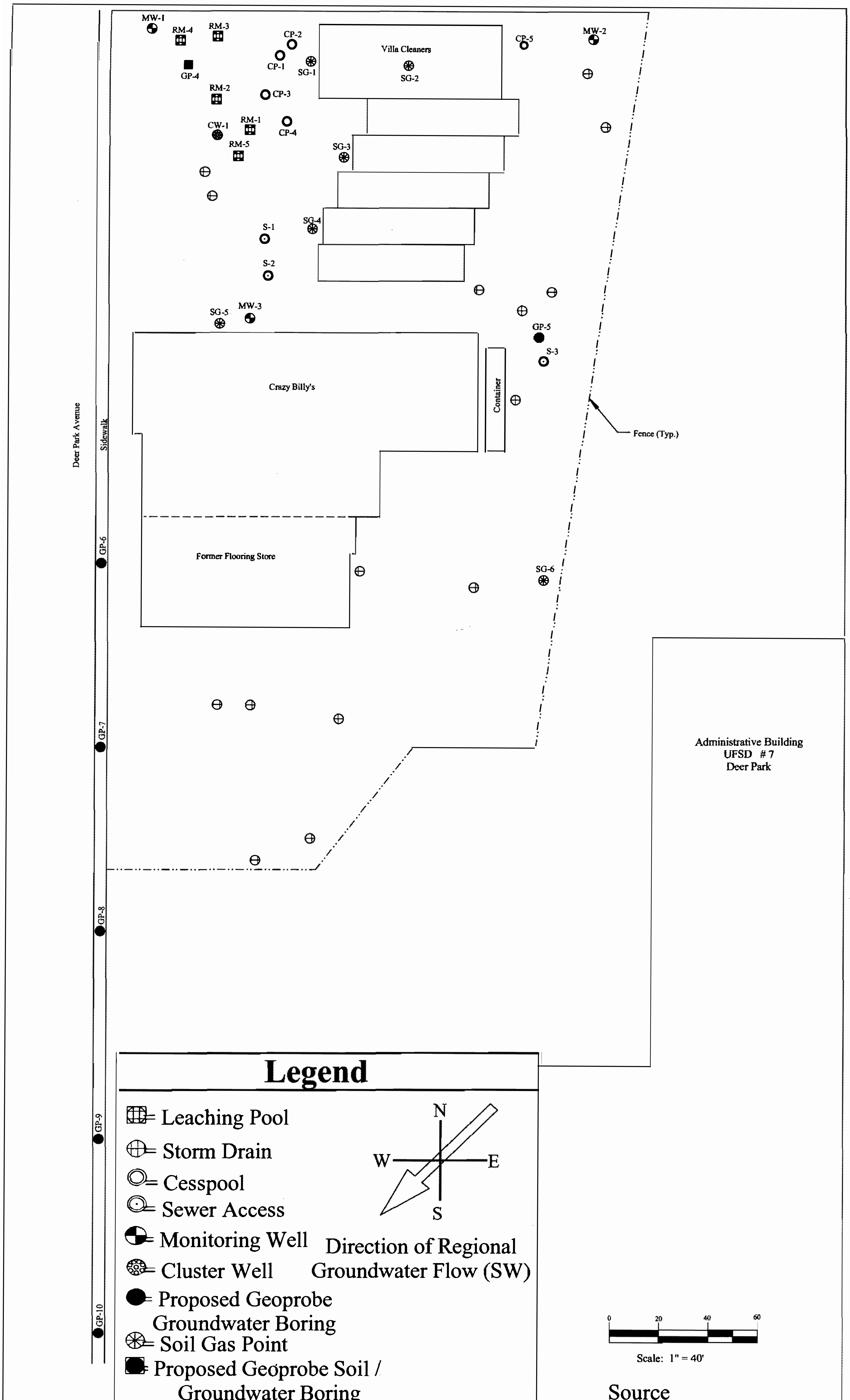
Respectfully yours,
LAUREL Environmental Associates, Ltd.

Scott A. Yanuck
Principal Hydrogeologist

Attachments: Proposed Sampling Location Diagram

Appendix A: Previous RI Workplan and documentation

cc: Mr. John Gennaro, w/o Appendix A
Mr. John Soderberg, P.E., Esq, w/o Appendix A
NYSDOH, Gary Litwin (2 copies)
NYSDEC, Guy Bobersky
NYSDEC, Alali M. Tamuno



Laurel ENVIRONMENTAL ASSOCIATES, LTD	**Laurel Environmental Associates, Ltd.**	Source F &N Environmental, Inc. Villa Cleaners Map 8/02
	52 Elm Street Huntington, NY 11743 631-673-0612	Proposed Sampling Location Diagram
	Drawn By: ZHB 11/12/03, Rev By: SAY 09/08/04	1899 Deer Park Avenue Babylon, New York
	Scale: 1" = 40'	

APPENDIX A

Villa Cleaners Site
Code 1-52-188
Order #W1-0996-04-04

Previous RI Workplan and documentation

Fenley & Nicol Environmental Inc.

"SOLUTIONS AT WORK"®

445 Brook Avenue, Deer Park, NY 11729 (631) 586-4900 • NYC (718) 204-4993 FAX (631) 586-4920

Revised Voluntary Cleanup Investigation Work Plan

V-00335-1
Villa Cleaners
1899 Deer Park Avenue
Deer Park, New York

Prepared For: New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Attention: Kevin Carpenter, P.E.
Senior Environmental Engineer

Prepared By: Fenley and Nicol Environmental, Inc.
445 Brook Avenue
Deer Park, NY 11729

Brian McCabe
Assistant Director, Professional Services

David Oloke
Project Geologist

Prepared On: August 28, 2002
Revised On January 7, 2003

F&N Job No. 0201927

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Fenley & Nicol Environmental Inc.

1.0 INTRODUCTION

Fenley and Nicol Environmental, Inc. (F&N) has been retained to prepare a Voluntary Cleanup Investigation Work Plan for the property located at 1899 Deer Park Avenue in Deer Park, New York *(hereinafter referred to as "the property" or the "site").*

The purpose of the Investigation Work Plan (IWP) is to provide a scope of work for the subsurface investigation of the property to the New York State Department of Environmental Conservation (NYSDEC or Department). The scope of work for the IWP is based upon a March 29, 2000 correspondence from the NYSDEC and an April 24, 2000 meeting between representatives of F&N, the NYSDEC at the property, and the July 12, 2001 letter from the NYSDEC.

The IWP Report dated August 28, 2002 was submitted to the NYSDEC and the New York State Department of Health (NYSDOH) for review and comments. A list of deficiencies based on the IWP Report dated November 20, 2002 was received from the NYSDEC and NYSDOH. This report is intended to address the deficiencies and a copy will be resubmitted to the NYSDEC and the NYSDOH for their review and comments.

1.1 Site Description

The subject property consists of a 1-story multi-tenant commercial building, which was built in 1965. Villa Cleaners is located in the northern portion of the building and has been historically operated as a dry cleaners from the 1960s. The property is located along the east side of Deer Park Avenue. An asphalt parking area is located in the western and southern portions of the property. There are five (5) sanitary leaching pool structures located at the western portion of the property and are designated as RM-1 through RM-5. Cesspools CP-1 through CP-4 are located along the western portion of the building. Cesspool CP-5 is located northeast of the subject property. A total of eight (8) storm drains and three (3) septic tanks are located at the site. The septic tanks have been designated as S-1 through S-3. According to information received from the client, Mr. John Gennaro, the building is not connected to the public sanitary sewer system. The building utilizes the onsite septic tanks and sanitary leaching pools for its sanitary purposes.

The vicinity of the property consists of industrial and commercial properties. The Long Island Railroad is located to the north of the property on a berm approximately twelve (12) feet above the property grade. The adjacent properties to the south consist of a 1-story commercial establishment and an asphalt parking lot for another 1-story commercial establishment, followed by the front lawn of a public school administration building.

Figure 1 provides a Site Location Map.
Figure 2 provides a Site Plan.

2.0 SITE HISTORY

During a routine inspection of the property on May 5, 1997, the Suffolk County Department of Health Services (SCDHS) obtained sediment samples from the five- (5) on-site sanitary leaching pools. Four (4) of these samples were found to contain elevated levels of volatile organic compounds (VOCs). Another consultant later removed the sediment from the on-site sanitary leaching pools during October 1997. According to the consultant's report, approximately 18,000 gallons of liquid was disposed of and approximately 12 to 15 cubic yards of sediment were removed from each structure. The end point samples from each structure were found to contain no levels of VOCs at concentrations exceeding SCDHS standards. Currently, the structures are active and are still in use.

Appendix A provides copies of previous environmental reports.

The consultant also performed a groundwater sampling exercise associated with the cleanout of the structures. The results of the groundwater sampling, identified chlorinated solvents in the groundwater beneath the site.

F&N installed three (3) monitoring wells and one (1) cluster well during 1998. This work was performed under the guidance of the SCDHS. Monitoring well MW-1 was installed in the northwest portion of the site. Monitoring well MW-2 was installed in the northeast portion of the site. Monitoring well MW-3 was installed in the south central portion of the site and cluster well CW-1 was installed to the southeast of sanitary pool RM-2. Each monitoring well is screened at the water table, which is located at approximately sixteen (16) feet below ground surface (bgs). The cluster well is screened at two (2) foot intervals from the depths of 20 to 22 feet, 40 to 42 feet, 60 to 62 feet, 80 to 82 feet and 98 to 100 feet bgs.

F&N performed a groundwater sampling event on June 16, 1998. During this exercise, the groundwater flow direction beneath the site was determined and groundwater samples were obtained from monitoring wells MW-1 through MW-3 and cluster well CW-1. The groundwater flow direction beneath the site was found to be toward the south-southwest. The results of the groundwater sampling event indicated that monitoring well MW-3 was found to contain elevated levels of Tetrachloroethene (PCE), Trichloroethene (TCE) and cis-1,2-Dichloroethene (cis-1,2-DCE). The cluster well at the water table was found to contain trace levels of PCE. The cluster well from 40 feet and 60 feet were found to contain trace levels of cis-1,2-DCE.

F&N submitted a remedial plan to the SCDHS on December 17, 1998. This remedial plan outlined the remediation of the chlorinated solvents in groundwater through the injection of Hydrogen-Releasing Compounds (HRCs). The SCDHS responded to the remedial plan by requesting that the horizontal and vertical extent of the chlorinated solvents identified in MW-3 be further defined.

F&N installed and sampled three (3) temporary groundwater sampling points in the vicinity of monitoring well MW-3 during October 1999. The results of this investigation identified PCE and its degradation products at the water table and below the water table along the southern property boundary, with the highest concentration being detected on the western side of the property. This ground water investigation was not able to delineate the horizontal extent of the contamination and therefore not establish the vertical profile.

3.0 Regional Geology & Hydrogeology

Long Island consists of a wedge-shaped mass of unconsolidated deposits that overlie ancient basement rock. The thickness of these deposits ranges from approximately 100 feet on the Island's north shore, to approximately 2,000 feet in some portions of the south shore. These deposits contain groundwater that is the sole source of drinking water for the Island's residents. The 1990 U.S. census indicates that Nassau and Suffolk Counties have a combined population of approximately 2.6 million residents.

The major landforms of Long Island of importance to the hydrologic system are the moraines and outwash plains, which originated from glacial activity. The moraines represent the farthest extent of the glacial advances and consists of till, which is a poorly sorted mixture of sand, silt, clay, gravel and boulders. The till is poorly to moderately permeable in most areas. Outwash plains are located to the south of the moraines. The outwash plains were formed by the action of glacial meltwater streams, which eroded the headland material of the moraines and laid down deposits of well-sorted sands, silts and gravels. These outwash deposits are moderately to highly permeable.

The **Upper Glacial Aquifer** is the uppermost hydrogeologic unit. This aquifer encompasses the moraine and outwash deposits, in addition to some localized lacustrine, marine and reworked materials. A relatively high horizontal hydraulic conductivity and a low vertical hydraulic conductivity characterize the outwash plain portion of this unit. Since the water table is situated in the Upper Glacial Aquifer, the water quality has been degraded in many areas due to industrial activities.

The **Magothy Formation** directly underlies the Upper Glacial Aquifer in the vicinity of the site. This formation is a Cretaceous coastal-shelf deposit, which consists principally of layers of sand and gravel with some interbedded clay. This formation ranges from poorly to highly permeable. A clay layer in some parts of Long Island confines the uppermost portion of the aquifer. The Magothy is Long Island's principal aquifer for public water supply. In the vicinity of the site, the estimated depth to the top of the Magothy Formation is

175 feet below ground surface (minus 100 feet mean sea level). The United States Environmental Protection Agency has classified the Long Island aquifer system as a sole source aquifer.

The **Raritan Formation** is the deepest unit and rests directly above the bedrock units. This formation is comprised of a sand member (**Lloyd Aquifer**) and a clay member (**Raritan Clay**). The Lloyd Aquifer extends southward from Flushing Bay to the Atlantic Ocean. The thickness of the sand member increases toward the southeast and its upper surface ranges in depth from 200 to 800 feet below sea level (from northwest to southeast). In the vicinity of the site, the depth to the top of the Lloyd Aquifer is approximately 1,075 feet (minus 1,000 feet mean sea level). The Raritan Clay acts as an aquitard confining the lower Lloyd aquifer between the clay and the underlying bedrock.

The topographic elevation of the site is approximately 75 feet above sea level *(USGS 7½ Minute Topographic Map, Greenlawn, New York Quadrangle, 1967, Photorevised 1979)*. The depth to groundwater beneath the site is approximately 16 feet below ground surface. The groundwater flow direction beneath the site, as determined from previous on-site investigations, is toward the south-southeast.

4.0 SCOPE OF WORK

4.1 Introduction

The scope of work described in this Voluntary Cleanup Investigation Work Plan has been prepared based upon the March 29, 2000 NYSDEC correspondence, the April 24, 2000 site meeting, the July 12, 2001 and November 20, 2002 NYSDEC Letter to F&N. The scope of work for the investigation includes the performance of the following tasks:

1. The delineation of the horizontal and vertical extent of chlorinated solvents in groundwater downgradient of monitoring well MW-3.
2. The determination of the current on site groundwater quality in the vicinity of the former sanitary pools through the sampling of the monitoring wells and cluster well.
3. The investigation of soil quality in the vicinity of the previous discharge structures.
4. The installation of a downgradient cluster well CW-2 following the receipt of laboratory analyticals.
5. The installation of soil gas points at select locations along the building and downgradient of the site along the southern property boundary.
6. Conduct an on and off-site qualitative exposure assessment.
7. The preparation of a Voluntary Cleanup Investigation Report.

Tasks #1 will be accomplished through the installation and sampling of groundwater Earthprobe borings. The Earthprobe borings will be installed at specific locations downgradient of the subject property utilizing direct-push technology.

Task #2 will be accomplished through the collection of groundwater samples from the on-site groundwater monitoring wells and cluster well CW-1. The groundwater flow direction beneath the site will be confirmed.

Task #3 will be accomplished through the use of direct push technology. An Earthprobe will be utilized to collect soil samples on the westside of the former discharge structures.

Task #4 will be performed at a point when all of the analytical results from the investigation have been received and evaluated. The well will be installed at a downgradient location for the purpose of monitoring the effectiveness of the selected remediation technique.

Task #5 will be performed through the use of the direct-push method. An Earthprobe will be utilized to collect the soil gas samples at select locations along the building and along the southern property boundary at the downgradient portion of the site.

Task #6 will be to conduct and on and off-site qualitative exposure assessment. The exposure assessment will initially provide background information pertaining to the site and the source area. Following this background information, each exposure pathway at the site will then be evaluated.

Tasks #1 through #6 will be documented in Task #7 above, the Voluntary Cleanup Investigation Report.

The NYSDEC Project Manager will be given a minimum of one-week notice before fieldwork begins. The on-site Department representative shall be offered split samples for all samples obtained.

The following sections provide the details of the scope of work.

4.2 Earthprobe Groundwater Sampling

F&N will be installing approximately seven (7) Earthprobe groundwater borings. One (1) Earthprobe groundwater boring, identified as GP-4, will be installed in the vicinity of the previous discharge structures, on-site. Six (6) Geoprobe groundwater borings, identified as GP-5 through GP-10, will be installed to the south of monitoring well MW-3. One (1) point will be installed in the back parking area behind Crazy Billy's liquor store the remaining five (5) will be installed along the eastern right of way of route 231 (Deer Park Avenue). Prior to the commencement of fieldwork, access will be arranged with the owner of the asphalt parking and the Town of Babylon where the fieldwork will be performed.

Each direct push temporary groundwater point will be installed utilizing a Simco Earthprobe® 200 and will consist of a 4-foot long, ¾ inch diameter stainless steel screen. The stainless steel screen has a screen width of 0.020 inches and will be decontaminated between each sampling location.

Figure 3 provides a Proposed Groundwater Sampling Location Diagram.

In order to delineate the vertical extent of chlorinated solvents at each sampling location, the Earthprobe groundwater borings will be sampled from the bottom up. The initial sampling depth will be 66 to 70 feet. Groundwater samples will then be obtained at ten (10) foot intervals until the water table is encountered. The water table sample (16 to 20 feet) will be the final groundwater sample collected in each Earthprobe groundwater boring location. Each groundwater sample will be collected utilizing clean polyethylene tubing.

Each Earthprobe temporary groundwater well will be purged of approximately five (5) well volumes utilizing a foot check valve and disposable polyethylene tubing. The purged groundwater will be placed in a 55-gallon DOT drum for later disposal. Representative groundwater samples will then be collected from each Earthprobe groundwater sampling point utilizing a low-flow - minimal drawdown bladder pump. The location of each Earthprobe groundwater sampling point will be surveyed following its completion.

4.3 On-site Groundwater Monitoring Well Sampling

In order to establish the current onsite groundwater condition groundwater monitoring wells MW-1 through MW-3 will be monitored and sampled. In addition to the sampling of the monitoring wells the cluster well will be located and uncovered. If the well can be located and is in good condition it will also be sampled. A drawing of the existing cluster well is presented in one of the previous reports dated July 17.

Each monitoring well and sampling port of the cluster well will be purged of approximately five (5) well volumes utilizing a foot check valve and disposable polyethylene tubing. The purged groundwater will be placed in a 55-gallon DOT drum for later disposal. Representative groundwater samples will then be collected from each groundwater monitoring well utilizing a new disposable polyethylene bailer. Groundwater samples will be collected from each sampling port of Cluster well CW-1 utilizing either disposable polyethylene bailers or a low flow – minimal drawdown bladder pump.

4.4 Earthprobe Soil Investigation

The potential for residual soil contamination in the source area will be investigated by installing a soil probe in the same location as temporary groundwater sampling well GP-4, located immediately adjacent to the exterior of the discharge structures. The soil sampling will consist of the collection of soil samples utilizing a two (2) foot long discrete soil sampler that will be driven down to the desired sampling depths then opened. F&N anticipates the collection of four (4) core samples each two (2) feet in length over the depth intervals from 5-7 feet, 10-12 feet, 15-17 feet and 20-22 feet. The soil samples will be collected and characterized in the field. A homogeneous portion of each core sample will be retained for laboratory analysis. To avoid cross contamination between samples each sample will be collected with an unused disposable acetate liner. All of the soil sampling components of the Earthprobe will be decontaminated between each sampling event.

4.5 Cluster Well Installation

Based upon the sampling results from Geoprobe groundwater borings GP-5 through GP-10, cluster well CW-2 will be installed. The purpose of the cluster well is two-fold: to provide a permanent location for the determination of downgradient groundwater quality over time and to serve as a sentry well for the remedial action. The specific location of cluster well CW-2 will be positioned with the NYSDEC Project Manager.

Cluster well CW-2 will consist of five (5) PVC monitoring wells and will be installed in a similar manner as the previous cluster well CW-1. Initially, a drill rig equipped with 6 $^5/_8$-inch diameter hollow-stem augers will advance a boring to a depth of 100 feet. At this depth a 2-inch diameter, 98 feet long section of solid PVC will be connected to a 2-foot section of 2-inch diameter screened PVC. The screened portions of the Polyethylene monitoring wells will be 0.020 inches. F&N anticipates placing the screens over the following depth intervals:

- 95 to 100 feet
- 75 to 80 feet
- 55 to 60 feet
- 35 to 40 feet
- 15 to 20 feet

However, the result of the prior field investigation will determine the exact location of the screen. The screened section of each portion of the cluster well will be filled with #1 Morie Sand and the cluster well will be finished at grade with a flush-mounted manhole cover.

An F&N geologist will be on-site during the installation and construction of the cluster well to create a boring log and well construction log. The soil cuttings will be screened for the evidence of organic vapors utilizing a Photoionization Detector (PID). The PID has a minimum detection limit of 0.1 parts per million.

All soil cuttings will be placed in a 55-gallon drum and then sampled for waste disposal purposes. Following the completion of the construction of the cluster well, it will developed in accordance with NYSDEC protocols. The development water will be placed in a 55-gallon drum for later disposal.

4.6 Soil Gas Survey

A soil gas survey will be conducted in the vicinity of the site to evaluate the potential impacts to indoor air quality. Soil gas points SG-1 through SG-3 will be installed along the western portion of the building located on the subject property. Soil gas SG-4 through SG-6 will be installed along the southern property boundary. Each point will be installed at discrete intervals beginning at the top of the water table approximately at 14 feet then at 10 feet, and 5 feet below grade, utilizing a 1¼ -inch diameter steel probe rod fitted with an expendable point system. Once the probe rod is advanced to the desired depth, the probe rod is then retracted slightly. A ¾-inch diameter polyethylene tubing is then inserted through the probe rod to the desired depth. Each soil gas will then be collected utilizing a Gillian Personal Pump and collected onto a charcoal gas sampling tube. The soil gas sampling tubes will be placed in appropriate containers to be analyzed for VOCs.

4.7 Qualitative Exposure Assessment

A qualitative on and off-site exposure assessment will be conducted. The purpose of the exposure assessment (as culled from the NYSDEC Voluntary Cleanup Program Guide) is to qualitatively determine the route, intensity, frequency, and duration of actual or potential exposures of humans to chemicals. It also describes the nature and size of the population exposed to the contamination that are present at or migrating from a site. The exposure assessment will initially provide background information pertaining to the site and the source area. The background information will consist of the history of the source area and the ensuing remedial efforts, the regional geology and hydrogeology and the chemical and physical properties and the fate and transport of the hydrocarbons in question. Following this background information, each exposure pathway at the site will be evaluated. Finally, conclusions and recommendations will be provided based upon the results of the evaluation of each exposure pathway.

4.8 Sample Collection/Equipment Decontamination

In order to ensure that cross-contamination between samples does not occur, all probe rods and sampling equipment will be decontaminated using a regular pressure washer. The sampling equipment is then subjected to an Alconox solution for further cleaning and rinsed again with high-pressure washer. Only potable water is used during the decontamination procedures.

All decontamination procedures will be performed in a segregated area from any area of installation. All wash and rinse fluids generated from the decontamination process will be contained and removed from the site and disposed of at a licensed waste disposal facility.

Each groundwater sample obtained from the Earthprobe groundwater investigation, the monitoring wells and the cluster wells will be placed directly into pre-cleaned 40-milliliter (ml) vials.

Each soil sample obtained form the Earthprobe soil investigation will be placed into a pre-cleaned 8-ounce jar.

In addition to the collection of the groundwater samples the following Quality Assurance/Quality Control QA/QC samples will be collected. One (1) field blank, one (1) trip blank, one (1) matrix spike and one (1) matrix spike duplicate will be prepared for 10% of the samples collected or each day's fieldwork.

The sampling containers will be placed into a cooler filled with ice and their temperature maintained at 4 degrees Celsius. A supporting chain of custody will then be prepared and accompany the samples to Chemtech; a NYS ELAP/CLP certified laboratory.

4.9 Laboratory Analyses

Each of the groundwater and soil samples will be analyzed at a New York State ELAP-certified laboratory that is also certified to perform Analytical Services Protocol (ASP) analyses. Each groundwater and soil sample will be analyzed for VOCs in accordance with EPA Method 624 and in accordance with NYSDEC ASP Method 95-1 category B deliverables. In addition all of the groundwater samples will also be analyzed for Dissolved Oxygen (DO) Sulfate, Nitrate, Sulfide and Nitrite. The analysis for these perameters will act as an indicator of the bio-degradation of the chlorinated solvents.

5.0 Report of Findings

A Voluntary Cleanup Investigation Report will be prepared following the completion of the fieldwork and the laboratory analyses. This report will contain the findings and conclusions of the investigation and will include appropriate maps and diagrams and tabulations of all analytical data. The analytical data will be discussed in both a total VOC manner and an individual VOC manner. The report will also include a qualitative on and off-site exposure assessment and a Data Usability Summary Report.

A Voluntary Cleanup Remediation Work Plan will be submitted within 45 days of the Department's approval of the Voluntary Cleanup Investigation Report. This report will be submitted to the NYSDEC for review, comment and approval.

6.0 HEALTH & SAFETY PLAN

All work at the subject site will be performed in accordance with a site-specific Health and Safety Plan.

> ***Appendix B provides a copy of the site specific Health & Safety Plan.***

7.0 PROJECT SCHEDULE & PERSONNEL

A proposed project schedule has been prepared for the investigation. In addition, the resumes of the project personnel have been included with this Work Plan.

Appendix C contains the proposed project schedule.

Appendix D provides the resumes of all project personnel.

Date of Preparation: January 7, 2003

Prepared By:

X David Oloke

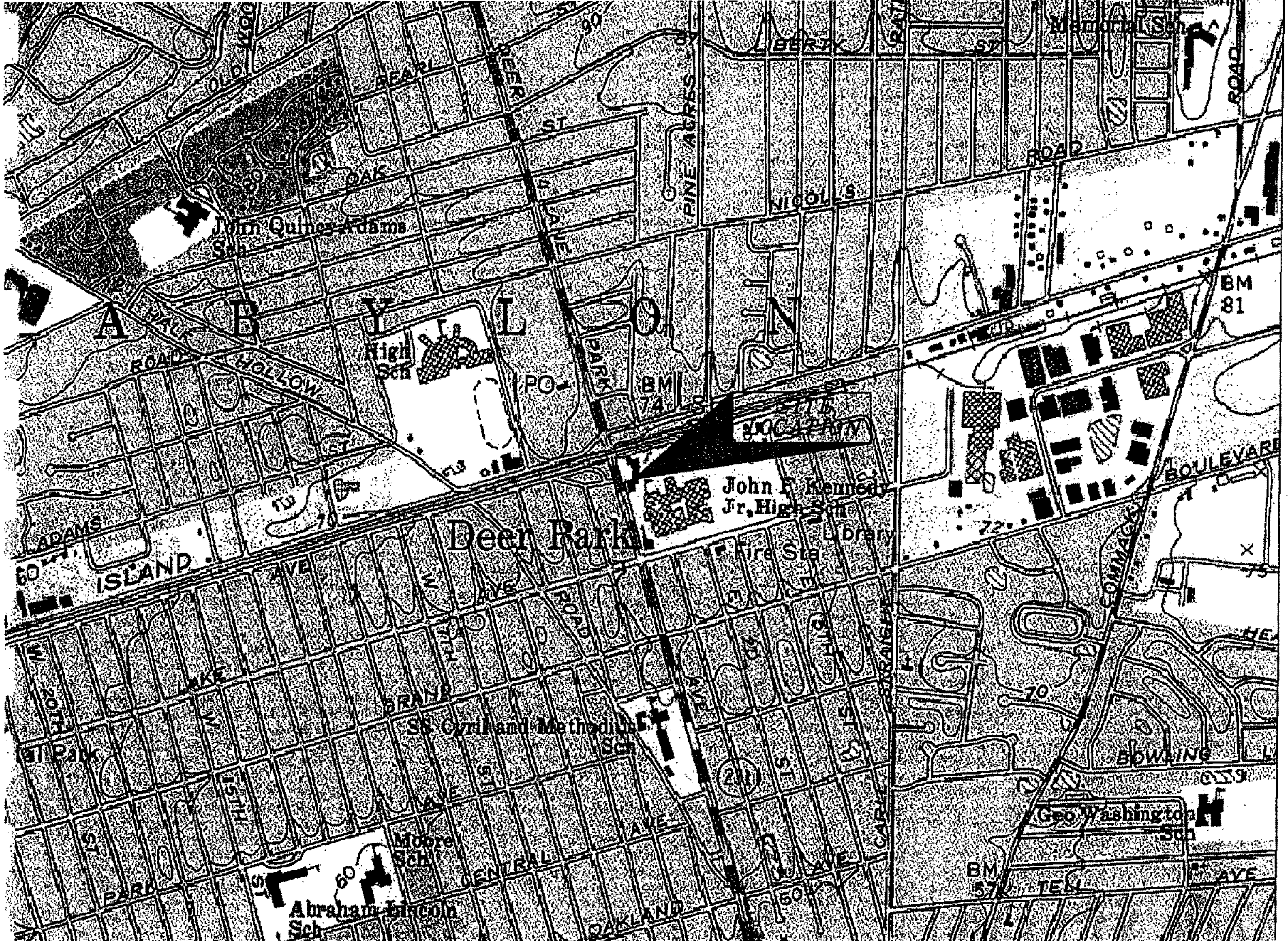
David Oloke
Project Geologist

Reviewed By:

X Brian McCabe

Brian McCabe
Assistant Director, Professional Services

Figure 1
Site Location Map



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Site Location Map

1899 Deer Park Avenue
Babylon, New York

N

SCALE 1:12000

500 0 500 1000 1500 2000 2500 3000 3500 FEET

Reproduced from USGS Greenlawn, New York Quadrangle
1967 Photorevised 1979

Fenley & Nicol

Professional Services Division
445 Brook Ave.
Deer Park, N.Y. 11729

Figure 2
Site Plan

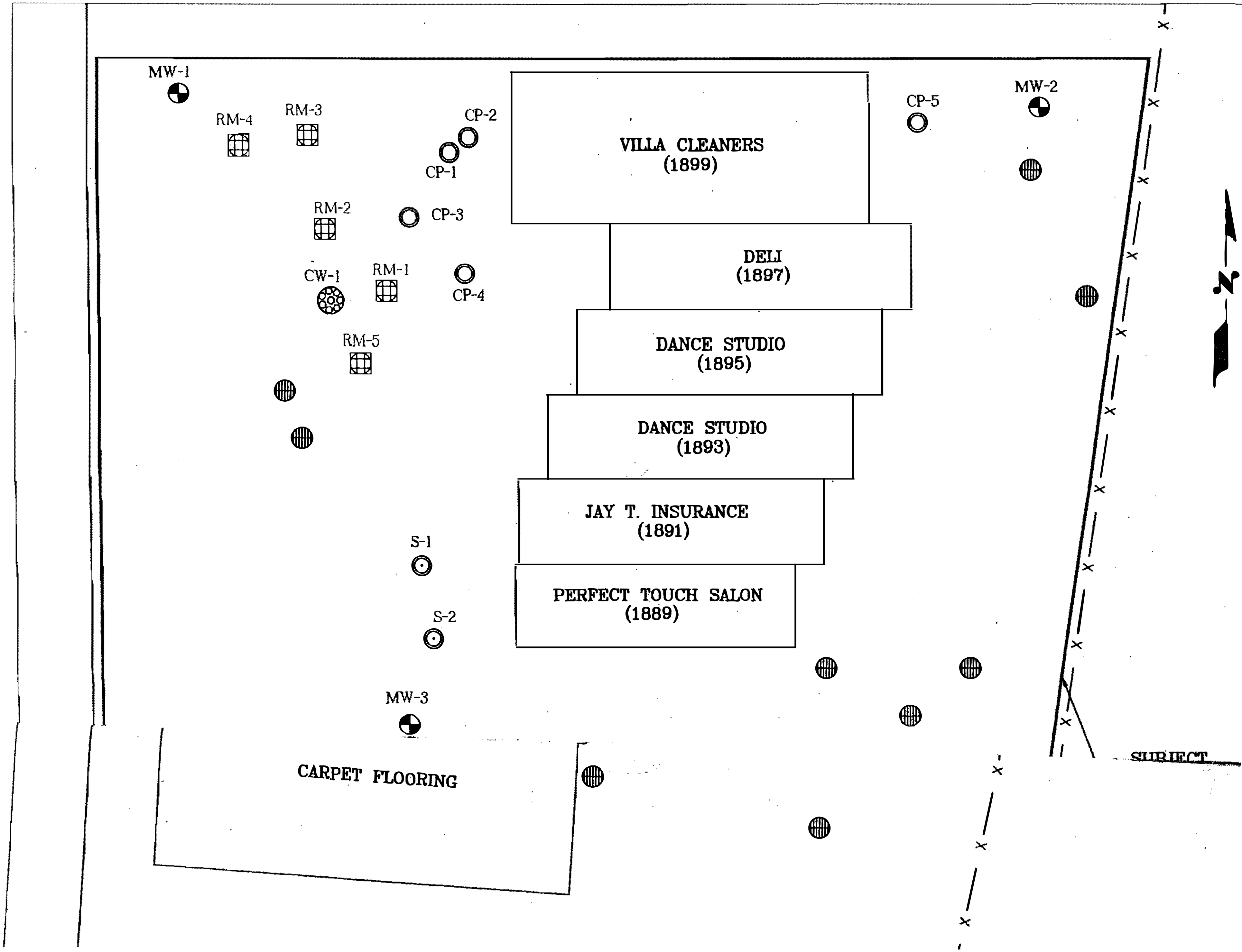
MW-1
RM-4
RM-3
CP-2
CP-1
VILLA CLEANERS
(1899)
CP-5
MW-2
RM-2
CP-3
DELI
(1897)
CW-1
RM-1
CP-4
DANCE STUDIO
(1895)
RM-5
DANCE STUDIO
(1893)
JAY T. INSURANCE
(1891)
S-1
PERFECT TOUCH SALON
(1889)
S-2
MW-3
CARPET FLOORING

Figure 3
Proposed Sampling Location Map

Appendix A
Previous Report

Fenley & Nicol Environmental Inc.

"SOLUTIONS AT WORK"®

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Voluntary Cleanup Investigation Work Plan

V-00335-1
Villa Cleaners
1899 Deer Park Avenue
Deer Park, New York

Prepared For: New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Environmental Remediation
50 Wolf Road
Albany, New York 12233-7010

Attention: George Heitzman, P.E.
Senior Environmental Engineer

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Prepared On: May 8, 2000

F&N Job No. 9802957

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Fenley & Nicol Environmental

1.0 INTRODUCTION

Fenley and Nicol Environmental, Inc. (F&N) has been retained to prepare a Voluntary Cleanup Investigation Work Plan for the property located at 1899 Deer Park Avenue in Deer Park, New York ***(hereinafter referred to as "the property" or the "site").*** The purpose of the Investigation Work Plan is to provide a scope of work for the subsurface investigation of the property to the New York State Department of Environmental Conservation (NYSDEC or Department). The scope of work for the Investigation Work Plan is based upon a March 29, 2000 correspondence from the NYSDEC and an April 24, 2000 meeting between representatives of F&N, the NYSDEC and the property.

The subject property consists of a 1-story multi-tenant commercial building. Villa Cleaners is located in the northern portion of the building. The property is located along the east side of Deer Park Avenue. An asphalt parking area is located in the western and southern portions of the property.

The vicinity of the property consists of industrial and commercial properties. The Long Island Railroad is located to the north of the property. The adjacent properties to the south consist of a 1-story commercial establishment and an asphalt parking lot for another 1-story commercial establishment. A portion of the fieldwork will be performed in the asphalt parking lot.

Figure 1 provides a Site Location Map.
Figure 2 provides a Site Plan.

2.0 SITE BACKGROUND

During a routine inspection of the property on May 5, 1997, the Suffolk County Department of Health Services (SCDHS) obtained sediment samples from five (5) on-site sanitary leaching pools. Four (4) of these samples were found to contain elevated levels of volatile organic compounds (VOCs). Another consultant later removed the sediment from the on-site sanitary leaching pools during October 1997. According to the consultant's report, approximately 18,000 gallons of liquid was disposed of and approximately 12 to 15 cubic yards of sediment were removed from each structure. The end point samples from each structure were found to contain no levels of volatile organic compounds at concentrations exceeding SCDHS standards.

Appendix A provides copies of previous environmental reports.

The consultant also performed a groundwater sampling exercise associated with the cleanout of the structures. The results of the groundwater sampling exercise identified chlorinated solvents in the groundwater beneath the site.

F&N installed three (3) monitoring wells and one (1) cluster well during 1998. This work was performed under the guidance of the SCDHS. Monitoring well MW-1 was installed in the northwest portion of the site. Monitoring well MW-2 was installed in the northeast portion of the site. Monitoring well MW-3 was installed in the south central portion of the site and cluster well CW-1 was installed to the southeast of sanitary pool RM-2. Each monitoring well is screened at the water table, which is located at approximately sixteen (16) feet below ground surface. The cluster well is screened at two (2) foot intervals from the depths of 20 to 22 feet, 40 to 42 feet, 60 to 62 feet, 80 to 82 feet and 98 to 100 feet below ground surface.

F&N performed a groundwater sampling exercise on June 16, 1998. During this exercise, the groundwater flow direction beneath the site was determined and groundwater samples were obtained from monitoring wells MW-1 through MW-3 and cluster well CW-1. The groundwater flow direction beneath the site was found to be toward the south-southwest. The results of the groundwater sampling exercise indicated that monitoring well MW-3 was found to contain elevated levels of Tetrachloroethene (PCE), Trichloroethene (TCE) and cis-1,2-Dichloroethene (cis-1,2-DCE). The cluster well at the water table was found to contain trace levels of PCE. The cluster well from 40 feet and 60 feet were found to contain trace levels of cis-1,2-DCE.

F&N submitted a remedial plan to the SCDHS on December 17, 1998. This remedial plan outlined the remediation of the chlorinated solvents in groundwater through the injection of Hydrogen-Releasing Compounds (HRCs). The SCDHS responded to the remedial plan by that requesting the horizontal and vertical extent of the chlorinated solvents identified in MW-3 be further defined.

F&N installed and sampled three (3) temporary groundwater sampling points in the vicinity of monitoring well MW-3 during October 1999. The results of this investigation identified PCE and its degradation products at the water table and below the water table along the southern property boundary.

3.0 Regional Geology & Hydrogeology

Long Island consists of a wedge-shaped mass of unconsolidated deposits that overlie ancient basement rock. The thickness of these deposits ranges from approximately 100 feet on the Island's north shore, to approximately 2,000 feet in some portions of the south shore. These deposits contain groundwater that is the sole source of drinking water for the Island's residents. The 1990 U.S. census indicates that Nassau and Suffolk Counties have a combined population of approximately 2.6 million residents.

The major landforms of Long Island of importance to the hydrologic system are the moraines and outwash plains, which originated from glacial activity. The moraines represent the farthest extent of the glacial advances and consists of till, which is a poorly sorted mixture of sand, silt, clay, gravel and boulders. The till is poorly to moderately permeable in most areas. Outwash plains are located to the south of the moraines. The outwash plains were formed by the action of glacial meltwater streams, which eroded the headland material of the moraines and laid down deposits of well-sorted sands, silts and gravels. These outwash deposits are moderately to highly permeable.

The **Upper Glacial Aquifer** is the uppermost hydrogeologic unit. This aquifer encompasses the moraine and outwash deposits, in addition to some localized lacustrine, marine and reworked materials. A relatively high horizontal hydraulic conductivity and a low vertical hydraulic conductivity characterize the outwash plain portion of this unit. Since the water table is situated in the Upper Glacial Aquifer, the water quality has been degraded in many areas due to industrial activities.

The **Magothy Formation** directly underlies the Upper Glacial Aquifer in the vicinity of the site. This formation is a Cretaceous coastal-shelf deposit, which consists principally of layers of sand and gravel with some interbedded clay. This formation ranges from poorly to highly permeable. A clay layer in some parts of Long Island confines the uppermost portion of the aquifer. The Magothy is Long Island's principal aquifer for public water supply. In the vicinity of the site, the estimated depth to the top of the Magothy Formation is

175 feet below ground surface (minus 100 feet mean sea level). The United States Environmental Protection Agency has classified the Long Island aquifer system as a sole source aquifer.

The **Raritan Formation** is the deepest unit and rests directly above the bedrock units. This formation is comprised of a sand member (**Lloyd Aquifer**) and a clay member (**Raritan Clay**). The Lloyd Aquifer extends southward from Flushing Bay to the Atlantic Ocean. The thickness of the sand member increases toward the southeast and its upper surface ranges in depth from 200 to 800 feet below sea level (from northwest to southeast). In the vicinity of the site, the depth to the top of the Lloyd Aquifer is approximately 1,075 feet (minus 1,000 feet mean sea level). The Raritan Clay acts as an aquitard confining the lower Lloyd aquifer between the clay and the underlying bedrock.

The topographic elevation of the site is approximately 75 feet above sea level *(USGS 7½ Minute Topographic Map, Greenlawn, New York Quadrangle, 1967, Photorevised 1979)*. The depth to groundwater beneath the site is approximately 16 feet below ground surface. The groundwater flow direction beneath the site, as determined from previous on-site investigations, is toward the south-southeast.

4.0 Scope of Work

4.1 Introduction

The scope of work described in this Voluntary Cleanup Investigation Work Plan has been prepared based upon the March 29, 2000 NYSDEC correspondence and the April 24, 2000 site meeting. The scope of work for the investigation includes the performance of the following tasks:

1. The delineation of the horizontal and vertical extent of chlorinated solvents in groundwater downgradient of monitoring well MW-3.
2. The determination of the current groundwater quality in the vicinity of the former sanitary pools.
3. The preparation of a Voluntary Cleanup Investigation Report.

Tasks #1 and #2 above will be accomplished through the installation and sampling of groundwater Geoprobe borings and a permanent cluster well. The Geoprobe borings will be installed at specific locations downgradient of the subject property utilizing direct-push technology. In addition, groundwater samples will be collected from the on-site groundwater monitoring wells and the groundwater flow direction beneath the site will be determined. Tasks #1 and #2 will be documented in Task #3 above, the Voluntary Cleanup Investigation Report.

The NYSDEC Project Manager will be given a minimum of one-week notice before fieldwork begins. The on-site Department representative shall be offered split samples for all samples obtained.

The following sections provide the details of the scope of work.

4.2 Geoprobe Groundwater Sampling

F&N will be installing approximately six (6) Geoprobe groundwater borings. One (1) Geoprobe groundwater boring, identified as GP-4, will be installed downgradient of the sanitary structures on-site. Five (5) Geoprobe groundwater borings, identified as GP-5 through GP-9, will be installed to the south of monitoring well MW-3 in the adjacent asphalt parking lot.[1] Prior to the commencement of fieldwork, access will be arranged with the owner of the asphalt parking lot where the fieldwork will be performed.

Each Geoprobe groundwater boring will be installed utilizing a Simco Earthprobe® 200 and will consist of a 4-foot long, ¾ inch diameter stainless steel screen. The stainless steel screen has a screen width of 0.020 inches and will be decontaminated between each sampling location.

Figure 3 provides a Proposed Groundwater Sampling Location Diagram.

In order to delineate the vertical extent of chlorinated solvents at each sampling location, the Geoprobe groundwater borings will be sampled from the bottom up. The initial sampling depth will be 66 to 70 feet. Groundwater samples will then be obtained at ten (10) foot intervals until the water table is encountered. The water table sample (16 to 20 feet) will be the final groundwater sample collected in each Geoprobe groundwater boring.

Each Geoprobe groundwater boring will be purged of approximately 3 to 4 well volumes prior to sampling. The purged groundwater will be placed in a 55-gallon DOT drum for later disposal. Representative groundwater samples will then be collected from each Geoprobe groundwater boring utilizing an inertial pump consisting of a foot check valve and dedicated polyethylene tubing. The location of each Geoprobe boring will be surveyed following its completion.

[1] Sampling designations GP-1 through GP-3 were utilized in F&N's October 1999 investigation.

4.3 Cluster Well Installation

Based upon the sampling results from Geoprobe groundwater borings GP-5 through GP-9, cluster well CW-2 will be installed. The purpose of the cluster well is twofold: to provide a permanent location for the determination of downgradient groundwater quality over time and to serve as a sentry well for the remedial action. The specific location of cluster well CW-2 will be positioned with the NYSDEC Project Manager.

Cluster well CW-2 will be installed in a similar manner as previous cluster well CW-1. Initially, a drill rig equipped with 6 $^5/_8$-inch diameter hollow-stem augers will advance a boring to a depth of 100 feet. PVC monitoring wells will then be constructed within the boring. The screened section of each portion of the cluster well will be filled with #1 Morie Sand and the cluster well will be finished at grade with a flush-mounted manhole cover. The screened portions of the PVC monitoring wells will be 0.020 inches and will be placed at the following depth intervals:

[illegible] change

- 95 to 100 feet
- 75 to 80 feet
- 55 to 60 feet
- 35 to 40 feet
- 15 to 20 feet

5x1 1/2, with wells.

An F&N geologist will be on-site during the installation and construction of the cluster well to create a boring log and well construction log. The soil cuttings will be screened for the evidence of organic vapors utilizing a

Photoionization Detector (PID). The PID has a minimum detection limit of 0.1 parts per million.

Any soil cuttings that are found to contain detectable levels of organic vapors will be placed in a 55-gallon drum for later disposal. Following the completion of the construction of the cluster well, it will developed in accordance with NYSDEC protocols. The development water will be placed in a 55-gallon drum for later disposal.

4.4 Monitoring Well Sampling

Following the development of cluster well CW-2, groundwater samples will be collected from monitoring wells MW-1 through MW-3 and cluster wells CW-1 and CW-2. The purpose for this groundwater sampling exercise is to obtain the current groundwater quality throughout the site. Each monitoring well will be purged of 3 to 4 well volumes prior to sampling. The purged groundwater will be placed in a 55-gallon DOT drum. Representative groundwater samples will then be obtained utilizing dedicated disposable polyethylene bailers.

4.5 Sample Collection

Each groundwater sample obtained from the Geoprobe groundwater borings, the monitoring wells and the cluster wells will be placed directly into pre-cleaned 40-milliliter (ml) vials. One field blank and one trip blank will be prepared for each day's fieldwork.

The sampling containers will be placed into a cooler filled with ice and their temperature maintained at 4 degrees Celsius. A supporting chain of custody will then be prepared and accompany the samples to the outside laboratory. Matrix spike/matrix spike duplicates will be prepared for 10 percent of the samples that are collected.

4.6 Laboratory Analyses

Each of the groundwater samples will be analyzed at a New York State ELAP-certified laboratory that is also certified to perform Analytical Services Protocol (ASP) analyses. Each groundwater sample will be analyzed for volatile organic compounds in accordance with EPA Method 624 and in accordance with NYSDEC ASP Method 95-1.

5.0 Report of Findings

A Voluntary Cleanup Investigation Report will be prepared following the completion of the fieldwork and the laboratory analyses. This report will contain the findings and conclusions of the investigation and will include appropriate maps and diagrams and tabulations of all analytical data. The analytical data will be discussed in both a total VOC manner and an individual VOC manner. The report will also include a Data Usability Summary Report.

A Voluntary Cleanup Remediation Work Plan will be submitted within 45 days of the Department's approval of the Voluntary Cleanup Investigation Report. This report will be submitted to the NYSDEC for review, comment and approval.

6.0 Health & Safety Plan

All work at the subject site will be performed in accordance with a site-specific Health and Safety Plan.

Appendix B provides a copy of the site specific Health & Safety Plan.

7.0 Project Schedule & Personnel

A proposed project schedule has been prepared for the investigation. In addition, the resumes of the project personnel have been included with this Work Plan.

Appendix C contains the proposed project schedule.
Appendix D provides the resumes of all project personnel.

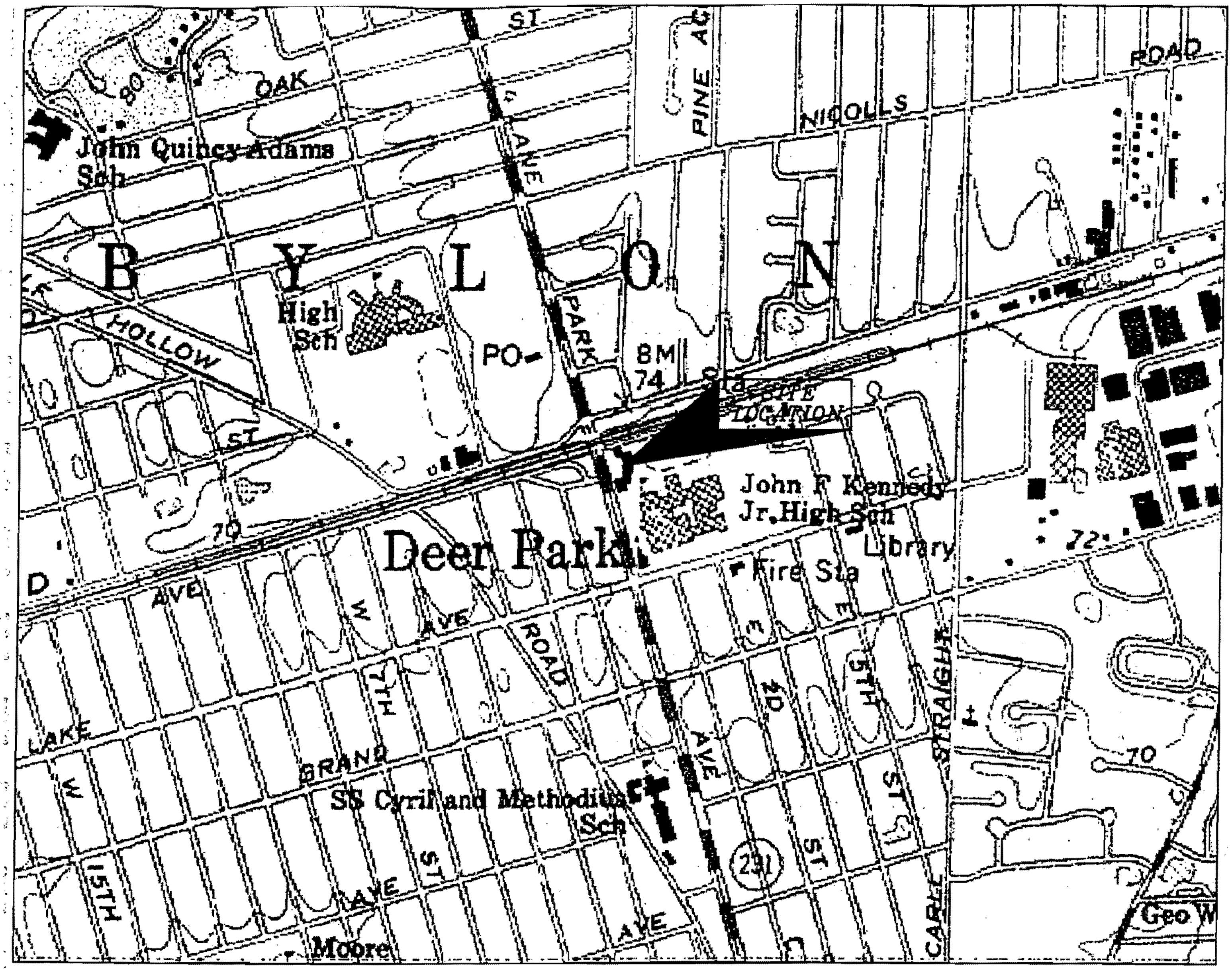
Date of Preparation: May 8, 2000

Prepared By:

X ______________________________
Mark E. Robbins
Senior Geologist

Reviewed By:

X ______________________________
Mostafa El Sehamy, C.P.G., C.G.W.P.
Director, Professional Services



Site Location Map

SCALE 1:12000

500 0 500 1000 1500 2000 2500 3000 3500 FEET

N

Reproduced from USGS Bay Shore West, New York Quadrangle

Fenley & Nicol

[illegible]

[illegible]

Deer Park [illegible] 11729

Figure 3: Total VOCs - GP-1

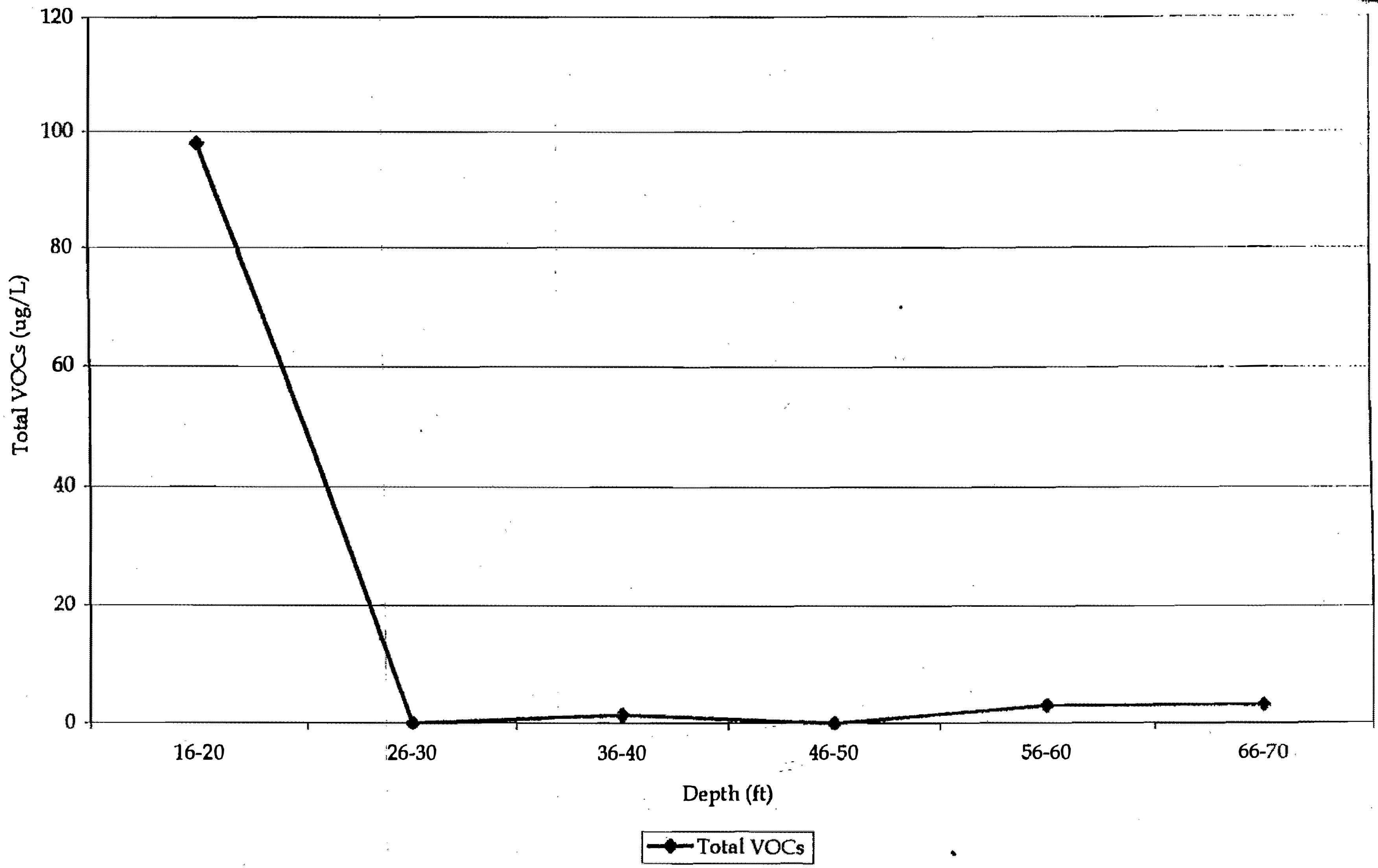


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Figure 4: Total VOCs - GP-2

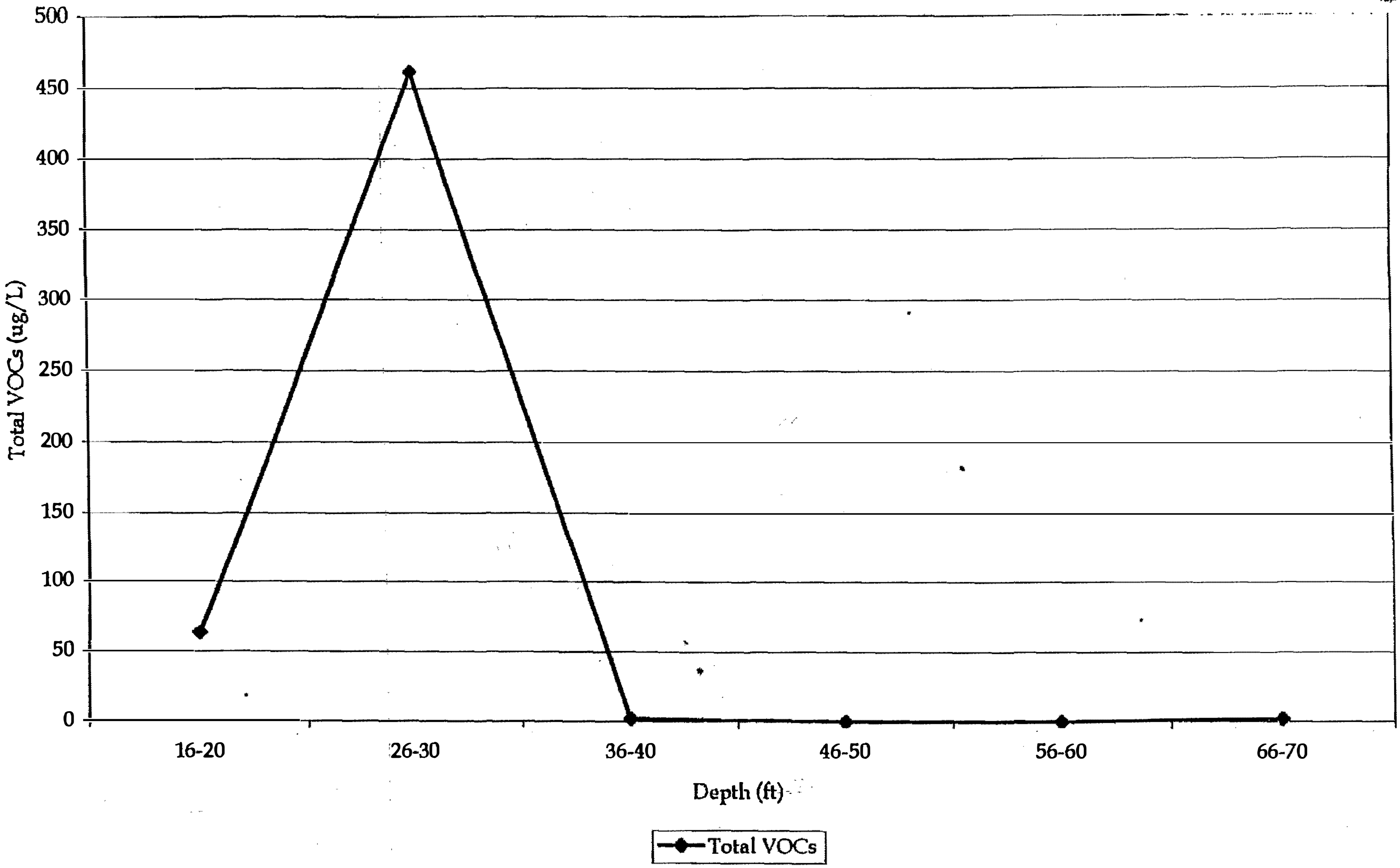

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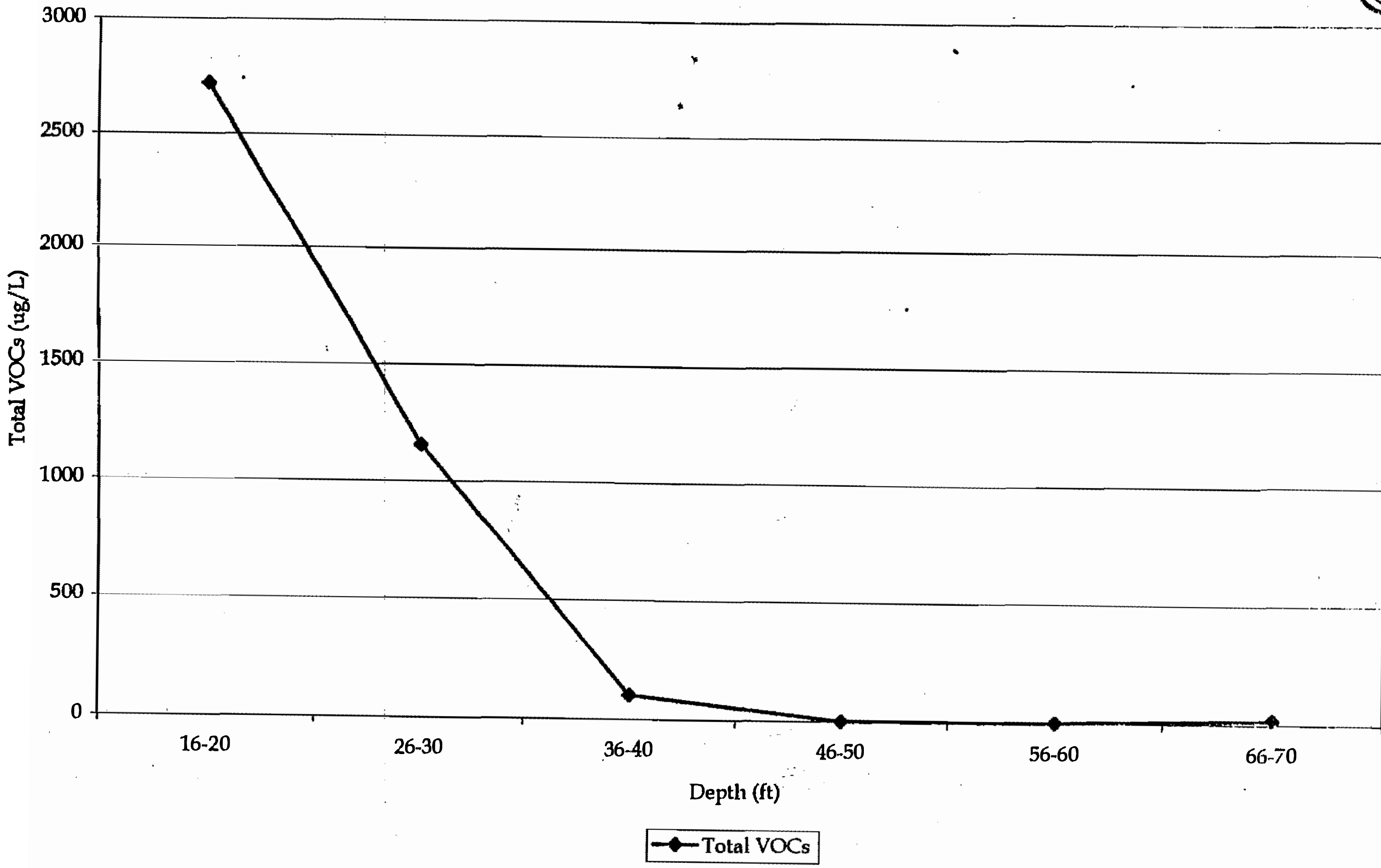
Figure 5: Total VOCs - GP-3



Groundwater Investigation & Remedial Work Plan Report
Villa Cleaners
1899 Deer Park Avenue
Deer Park, New York

Prepared For:	Villa Cleaners 1899 Deer Park Avenue Deer Park, New York 11729
Attention:	Mr. John Gennaro
Prepared By:	Fenley & Nicol Environmental, Inc. 445 Brook Avenue Deer Park, New York 11729
Senior Geologist:	Mark E. Robbins
Date:	November 24, 1999
F&N Job #	9802957

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APPENDICES

1.0 INTRODUCTION

Fenley & Nicol Environmental, Inc. (F&N) has been retained by Villa Cleaners to perform a Groundwater Investigation and prepare a Remedial Work Plan for the property located at 1899 Deer Park Avenue in Deer Park, New York (herein after referred to as ***"the site"***). The site consists of a dry cleaning establishment and other commercial businesses and is located along the east side of Deer Park Avenue.

The groundwater investigation was performed to identify the vertical and horizontal extent of chlorinated solvents in groundwater beneath the southern portion of the site. The purpose of this report is to summarize the results of the groundwater investigation and to outline an appropriate remedial action.

The vicinity of the site consists of commercial and public properties. Athletic playing fields of John F. Kennedy Jr. High School are located immediately to the east of the site. An auto body shop is located immediately to the north of the site. One story commercial businesses are located across Deer Park Avenue to the west of the site. A liquor store is located immediately to the south of the site.

Figure 1 provides a Site Location Map.

2.0 REGIONAL GEOLOGY & HYDROGEOLOGY

Long Island consists of a wedge-shaped mass of unconsolidated deposits that overlie ancient basement rock. The thickness of these deposits ranges from approximately 100 feet on the Island's north shore, to approximately 2,000 feet in some portions of the south shore. These deposits contain ground water which is the sole source of drinking water for the Island's over 3.1 million residents.

The **Upper Glacial Aquifer** is the uppermost hydrogeologic unit. This aquifer encompasses the moraine and outwash deposits, in addition to some localized lacustrine, marine, and reworked materials. The outwash plain portion of this unit is characterized by high horizontal hydraulic conductivity and a low vertical hydraulic conductivity. Because the water table is situated in the Upper Glacial Aquifer, the water quality has been degraded in many areas due to industrial activities.

The **Magothy Formation** directly underlies the Upper Glacial Aquifer in the vicinity of the site. This formation is a Cretaceous coastal-shelf deposit, which consists principally of layers of sand and gravel with some interbedded clay. This formation ranges from poorly to moderately or highly permeable. The uppermost portion of the aquifer is confined by a clay layer in some parts of Long Island. The Magothy is Long Island's principal aquifer for public water supply. The Long Island aquifer system has been classified as a sole source aquifer by the United States Environmental Protection Agency (USEPA).

The topographic elevation of the site is approximately 75 feet above sea level (USGS 7½ Minute Topographic Map, Greenlawn, New York Quadrangle, 1967, Photorevised 1979). The depth to groundwater beneath the site is approximately 15 feet below ground surface. The regional groundwater flow direction, as determined from the Suffolk County Department of Health Services (SCDHS) Groundwater Gradient Map (March 1997) and prior site investigations, is toward the south-southwest.

3.0 GROUNDWATER INVESTIGATION

3.1 Groundwater Sampling Point Installation

The scope of work for the field portion of the investigation consisted of the installation and sampling of three groundwater sampling points. The groundwater sampling points were installed on October 20 & 21, 1999.

Each groundwater sampling point was installed utilizing direct push technology. Representatives of the SCDHS agreed upon the locations of the groundwater sampling points prior to their installation and were present during their installation. Groundwater sampling point GP-1 was installed 30 feet to the east of monitoring well MW-3. Groundwater sampling point GP-2 was installed 30 feet to the west of monitoring well MW-3. Groundwater sampling point GP-3 was installed 30 feet to the north of monitoring well MW-3.

Figure 2 provides a Site Plan.

Each groundwater sampling point consisted of a 4-foot long, ¾-inch diameter retractable metal screen with a slot size of 0.020 inches. In order to characterize the vertical groundwater quality, the metal screen was installed and sampled at the following depth intervals:

- 66 to 70 feet
- 56 to 60 feet
- 46 to 50 feet
- 36 to 40 feet
- 26 to 30 feet
- 16 to 20 feet

The metal screen was installed to the 66 to 70 foot depth and sampled. The metal screen was then lifted and sampled at 10-foot intervals until the water table was encountered.

3.2 Sampling Protocol

Prior to the collection of the representative samples at each depth interval, groundwater was removed from each groundwater sampling point until it was free of turbidity. The development was performed utilizing $^3/_8$-inch diameter dedicated polyethylene tubing and a bottom check valve.

Representative groundwater samples were then obtained from each sampling depth utilizing $^3/_8$-inch diameter dedicated polyethylene tubing and a bottom check valve. The SCDHS was present and obtained split samples during the collection of the 16 to 20 feet from groundwater sampling point GP-2. Each groundwater sample was placed into 40-milliliter vials and packed in a cooler filled with ice. The groundwater samples were transported under chain of custody to a State-certified laboratory and analyzed for volatile organic compounds in accordance with EPA Method 8260.

3.3 Discussion of Results

Table 1 provides the results of the EPA Method 8260 analyses from groundwater sampling point GP-1. As Table 1 indicates, the groundwater sample from the 16 to 20 foot depth was found to contain the greatest levels of VOCs. The compounds cis-1,2-Dichloroethene (cis-DCE) and Tetrachloroethene (PCE) were found at concentrations in excess of their respective New York State Department of Environmental Conservation (NYSDEC) Groundwater Quality Standards. The remaining depth intervals from GP-1 were found to contain trace levels of VOCs. However, the trace levels of VOCs were identified at concentrations below their respective NYSDEC Groundwater Quality Standards. The Methylene Chloride identified in the 16 to 20 foot sample is likely a laboratory contaminant and is not indicative of true groundwater quality.

Appendix A provides copies of the laboratory reports.

The total VOC concentrations from each depth interval were graphed in order to evaluate the vertical migration of the groundwater plume. An evaluation of the graph from sampling point GP-1 indicates that the greatest total VOC concentration is present at the water table (16 to 20 foot depth interval). The total VOC concentrations then sharply decrease to trace to no detectable levels with an increase in depth.

Figure 3 provides the total VOC graph for GP-1.

Table 2 provides the results of the EPA Method 8260 analyses from groundwater sampling point GP-2. As Table 2 indicates, the greatest levels of VOCs were identified in the 26 to 30 foot sample. PCE was identified at a concentration of 214 micrograms per liter (µg/L) and cis-DCE was identified at a concentration of 228 µg/L. These levels are greater than their respective NYSDEC Groundwater Quality Standard. The 16 to 20 foot sample also contained levels of VOCs at concentrations greater than their respective NYSDEC Groundwater Quality Standards. The Methylene Chloride and Chloroform identified in the groundwater samples from GP-2 are likely laboratory contaminants and are not indicative of true groundwater quality.

The graph of total VOCs with depth from GP-2 indicates that the greatest total VOCs were identified at the 26 to 30 foot depth interval. This depth interval is 10 feet below the water table and indicates that the groundwater plume has migrated below the water table in the southwest portion of the site. The total VOCs in GP-2 then decrease to trace to no detectable levels below the 26 to 30 foot depth interval.

Figure 4 provides the total VOC graph for GP-2.

Table 3 provides the results of the EPA Method 8260 analyses from groundwater sampling point GP-3. As Table 3 indicates, the greatest overall concentrations of VOCs

Table 1
EPA Method 8620 Results - GP-1 (ug/L)
Vilis Cleaners
Deer Park, New York

Analyte	16-20 feet	26-30 feet	36-40 feet	46-50 feet	56-60 feet	66-70 feet	NYSDEC Groundwater Quality Standard*
Dichlorodifluoromethane	nd	nd	nd	nd	nd	nd	5
Chloromethane	nd	nd	nd	nd	nd	nd	ns
Vinyl Chloride	nd	nd	nd	nd	nd	nd	2
Bromomethane	nd	nd	nd	nd	nd	nd	5
Chloroethane	nd	nd	nd	nd	nd	nd	5
Trichlorofluoromethane	nd	nd	nd	nd	nd	nd	5
1,1-Dichloroethene	nd	nd	nd	nd	nd	nd	5
Acetone	nd	nd	nd	nd	nd	nd	50
Carbon Disulfide	nd	nd	nd	nd	nd	nd	ns
Methylene Chloride	**8.24**	nd	nd	nd	nd	nd	5
trans-1,2-Dichloroethene	nd	nd	nd	nd	nd	nd	5
Vinyl Acetate	nd	nd	nd	nd	nd	nd	ns
1,1-Dichloroethane	nd	nd	nd	nd	nd	nd	5
2-Butanone	nd	nd	nd	nd	nd	nd	ns
2,2-Dichloropropane	nd	nd	nd	nd	nd	nd	5
cis-1,2-Dichloroethene	**19.2**	nd	nd	nd	nd	nd	5
Bromochloromethane	nd	nd	nd	nd	nd	nd	5
Chloroform	nd	nd	1.30	1.44	nd	nd	7
1,1,1-Trichloroethane	nd	nd	nd	nd	nd	nd	5
1,1-Dichloropropene	nd	nd	nd	nd	nd	nd	5
Carbon Tetrachloride	nd	nd	nd	nd	nd	nd	5
Benzene	nd	nd	nd	nd	nd	nd	1
1,2-Dichloroethane	nd	nd	nd	nd	nd	nd	0.6
Trichloroethene	4.36	nd	nd	nd	nd	nd	5
1,2-Dichloropropane	nd	nd	nd	nd	nd	nd	1
Dibromomethane	nd	nd	nd	nd	nd	nd	5
Bromodichloromethane	nd	nd	nd	nd	nd	nd	ns

Table 1 (cont.)

Analyte	16-20 feet	26-30 feet	36-40 feet	46-50 feet	56-60 feet	66-70 feet	NYSDEC Groundwater Quality Standard*
4-Methyl-2-Pentanone	nd	nd	nd	nd	nd	nd	ns
Toluene	nd	nd	nd	nd	nd	nd	5
trans-1,3-Dichloropropene	nd	nd	nd	nd	nd	nd	5
cis-1,3-Dichloropropene	nd	nd	nd	nd	nd	nd	5
1,1,2-Trichloroethane	nd	nd	nd	nd	nd	nd	1
1,3-Dichloropropane	nd	nd	nd	nd	nd	nd	5
2-Chloroethyl vinyl ether	nd	nd	nd	nd	nd	nd	ns
2-Hexanone	nd	nd	nd	nd	nd	nd	ns
Dibromochloromethane	nd	nd	nd	nd	nd	nd	ns
1,2-Dibromoethane	nd	nd	nd	nd	nd	nd	5
Tetrachloroethene	**74.5**	nd	1.45	nd	1.61	1.86	5
Chlorobenzene	nd	nd	nd	nd	nd	nd	5
1,1,1,2-Tetrachloroethane	nd	nd	nd	nd	nd	nd	5
Ethylbenzene	nd	nd	nd	nd	nd	nd	5
m & p-Xylenes	nd	nd	nd	nd	1.40	1.19	5
o-Xylene	nd	nd	nd	nd	nd	nd	5
Styrene	nd	nd	nd	nd	nd	nd	5
Bromoform	nd	nd	nd	nd	nd	nd	ns
Isopropylbenzene	nd	nd	nd	nd	nd	nd	5
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd	nd	nd	5
1,2,3-Trichloropropane	nd	nd	nd	nd	nd	nd	0.04
Bromobenzene	nd	nd	nd	nd	nd	nd	5
n-Propylbenzene	nd	nd	nd	nd	nd	nd	5
2-Chlorotoluene	nd	nd	nd	nd	nd	nd	5
1,3,5-Trimethylbenzene	nd	nd	nd	nd	nd	nd	5
4-Chlorotoluene	nd	nd	nd	nd	nd	nd	5
tert-Butylbenzene	nd	nd	nd	nd	nd	nd	5
1,2,4-Trimethylbenzene	nd	nd	nd	nd	nd	nd	5
sec-Butylbenzene	nd	nd	nd	nd	nd	nd	5
p-Isopropyltoluene	nd	nd	nd	nd	nd	nd	5
1,3-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
1,4-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
n-Butylbenzene	nd	nd	nd	nd	nd	nd	5
1,2-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
1,2-Dibromo-3-Chloropropane	nd	nd	nd	nd	nd	nd	0.04
1,2,4-Trichlorobenzene	nd	nd	nd	nd	nd	nd	5
Hexachlorobutadiene	nd	nd	nd	nd	nd	nd	0.5
Naphthalene	nd	nd	nd	nd	nd	nd	10
1,2,3-Trichlorobenzene	nd	nd	nd	nd	nd	nd	5

ns ... No Standard
Bold value represents concentration exceeding Groundwater Quality Standard
nd ... None Detected

Table 2
EPA Method 8620 Results - GP-2 (ug/L)
Villa Cleaners
Deer Park, New York

Analyte	16-20 feet	26-30 feet	36-40 feet	46-50 feet	56-60 feet	66-70 feet	NYSDEC Groundwater Quality Standard*
Dichlorodifluoromethane	nd	nd	nd	nd	nd	nd	5
Chloromethane	nd	nd	nd	nd	nd	nd	ns
Vinyl Chloride	nd	nd	nd	nd	nd	nd	2
Bromomethane	nd	nd	nd	nd	nd	nd	5
Chloroethane	nd	nd	nd	nd	nd	nd	5
Trichlorofluoromethane	nd	nd	nd	nd	nd	nd	5
1,1-Dichloroethene	nd	nd	nd	nd	nd	nd	5
Acetone	nd	nd	nd	nd	nd	nd	50
Carbon Disulfide	nd	nd	nd	nd	nd	nd	ns
Methylene Chloride	nd	nd	4.26	2.16	**8.29**	**12.2**	5
trans-1,2-Dichloroethene	nd	nd	nd	nd	nd	nd	5
Vinyl Acetate	nd	nd	nd	nd	nd	nd	ns
1,1-Dichloroethane	nd	nd	nd	nd	nd	nd	5
2-Butanone	nd	nd	nd	nd	nd	nd	ns
2,2-Dichloropropane	nd	nd	nd	nd	nd	nd	5
cis-1,2-Dichloroethene	**30.3**	**228**	nd	nd	nd	nd	5
Bromochloromethane	nd	nd	nd	nd	nd	nd	5
Chloroform	nd	nd	nd	1.42	1.37	1.71	7
1,1,1-Trichloroethane	nd	nd	nd	nd	nd	nd	5
1,1-Dichloropropene	nd	nd	nd	nd	nd	nd	5
Carbon Tetrachloride	nd	nd	nd	nd	nd	nd	5
Benzene	nd	nd	nd	nd	nd	nd	1
1,2-Dichloroethane	nd	nd	nd	nd	nd	nd	0.6
Trichloroethene	**9.34**	**19.7**	nd	nd	nd	nd	5
1,2-Dichloropropane	nd	nd	nd	nd	nd	nd	1
Dibromomethane	nd	nd	nd	nd	nd	nd	5
Bromodichloromethane	nd	nd	nd	nd	nd	nd	ns

Table 2 (cont.)

Analyte	16-20 feet	26-30 feet	36-40 feet	46-50 feet	56-60 feet	66-70 feet	NYSDEC Groundwater Quality Standard*
4-Methyl-2-Pentanone	nd	nd	nd	nd	nd	nd	ns
Toluene	nd	nd	nd	nd	nd	nd	5
trans-1,3-Dichloropropene	nd	nd	nd	nd	nd	nd	5
cis-1,3-Dichloropropene	nd	nd	nd	nd	nd	nd	5
1,1,2-Trichloroethane	nd	nd	nd	nd	nd	nd	1
1,3-Dichloropropane	nd	nd	nd	nd	nd	nd	5
2-Chloroethyl vinyl ether	nd	nd	nd	nd	nd	nd	ns
2-Hexanone	nd	nd	nd	nd	nd	nd	ns
Dibromochloromethane	nd	nd	nd	nd	nd	nd	ns
1,2-Dibromoethane	nd	nd	nd	nd	nd	nd	5
Tetrachloroethene	**23.8**	**214**	2.21	nd	nd	2.05	5
Chlorobenzene	nd	nd	nd	nd	nd	nd	5
1,1,1,2-Tetrachloroethane	nd	nd	nd	nd	nd	nd	5
Ethylbenzene	nd	nd	nd	nd	nd	nd	5
m & p-Xylenes	nd	nd	nd	nd	nd	nd	5
o-Xylene	nd	nd	nd	nd	nd	nd	5
Styrene	nd	nd	nd	nd	nd	nd	5
Bromoform	nd	nd	nd	nd	nd	nd	ns
Isopropylbenzene	nd	nd	nd	nd	nd	nd	5
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd	nd	nd	5
1,2,3-Trichloropropane	nd	nd	nd	nd	nd	nd	0.04
Bromobenzene	nd	nd	nd	nd	nd	nd	5
n-Propylbenzene	nd	nd	nd	nd	nd	nd	5
2-Chlorotoluene	nd	nd	nd	nd	nd	nd	5
1,3,5-Trimethylbenzene	nd	nd	nd	nd	nd	nd	5
4-Chlorotoluene	nd	nd	nd	nd	nd	nd	5
tert-Butylbenzene	nd	nd	nd	nd	nd	nd	5
1,2,4-Trimethylbenzene	nd	nd	nd	nd	nd	nd	5
sec-Butylbenzene	nd	nd	nd	nd	nd	nd	5
p-Isopropyltoluene	nd	nd	nd	nd	nd	nd	5
1,3-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
1,4-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
n-Butylbenzene	nd	nd	nd	nd	nd	nd	5
1,2-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
1,2-Dibromo-3-Chloropropane	nd	nd	nd	nd	nd	nd	0.04
1,2,4-Trichlorobenzene	nd	nd	nd	nd	nd	nd	5
Hexachlorobutadiene	nd	nd	nd	nd	nd	nd	0.5
Naphthalene	nd	nd	nd	nd	nd	nd	10
1,2,3-Trichlorobenzene	nd	nd	nd	nd	nd	nd	5

ns . . . No Standard
Bold value represents concentration exceeding Groundwater Quality Standard
nd . . . None Detected

Table 3
EPA Method 8620 Results - GP-3 (ug/L)
Villa Cleaners
Deer Park, New York

Analyte	16-20 feet	26-30 feet	36-40 feet	46-50 feet	56-60 feet	66-70 feet	NYSDEC Groundwater Quality Standard*
Dichlorodifluoromethane	nd	nd	nd	nd	nd	nd	5
Chloromethane	nd	nd	nd	nd	nd	nd	ns
Vinyl Chloride	**8.68**	**5.29**	nd	nd	nd	nd	2
Bromomethane	nd	nd	nd	nd	nd	nd	5
Chloroethane	nd	nd	nd	nd	nd	nd	5
Trichlorofluoromethane	nd	nd	nd	nd	nd	nd	5
1,1-Dichloroethene	nd	nd	nd	nd	nd	nd	5
Acetone	nd	nd	nd	nd	nd	nd	50
Carbon Disulfide	nd	nd	nd	nd	nd	nd	ns
Methylene Chloride	**5.82**	3.14	3.42	3.92	3.41	**6.45**	5
trans-1,2-Dichloroethene	**6.87**	nd	nd	nd	nd	nd	5
Vinyl Acetate	nd	nd	nd	nd	nd	nd	ns
1,1-Dichloroethane	nd	nd	nd	nd	nd	nd	5
2-Butanone	nd	nd	nd	nd	nd	nd	ns
2,2-Dichloropropane	nd	nd	nd	nd	nd	nd	5
cis-1,2-Dichloroethene	**626**	**528**	**28**	nd	nd	nd	5
Bromochloromethane	nd	nd	nd	nd	nd	nd	5
Chloroform	nd	nd	nd	nd	nd	nd	7
1,1,1-Trichloroethane	nd	nd	nd	nd	nd	nd	5
1,1-Dichloropropene	nd	nd	nd	nd	nd	nd	5
Carbon Tetrachloride	nd	nd	nd	nd	nd	nd	5
Benzene	nd	nd	nd	nd	nd	nd	1
1,2-Dichloroethane	nd	nd	nd	nd	nd	nd	0.6
Trichloroethene	**168**	**61.7**	3.61	nd	nd	nd	5
1,2-Dichloropropane	nd	nd	nd	nd	nd	nd	1
Dibromomethane	nd	nd	nd	nd	nd	nd	5
Bromodichloromethane	nd	nd	nd	nd	nd	nd	ns

Table 3 (cont.)

Analyte	16-20 feet	26-30 feet	36-40 feet	46-50 feet	56-60 feet	66-70 feet	NYSDEC Groundwater Quality Standard*
4-Methyl-2-Pentanone	nd	nd	nd	nd	nd	nd	ns
Toluene	nd	nd	nd	nd	nd	nd	5
trans-1,3-Dichloropropene	nd	nd	nd	nd	nd	nd	5
cis-1,3-Dichloropropene	nd	nd	nd	nd	nd	nd	5
1,1,2-Trichloroethane	nd	nd	nd	nd	nd	nd	1
1,3-Dichloropropane	nd	nd	nd	nd	nd	nd	5
2-Chloroethyl vinyl ether	nd	nd	nd	nd	nd	nd	ns
2-Hexanone	nd	nd	nd	nd	nd	nd	ns
Dibromochloromethane	nd	nd	nd	nd	nd	nd	ns
1,2-Dibromoethane	nd	nd	nd	nd	nd	nd	5
Tetrachloroethene	**1,720**	**558**	**72.6**	**5.29**	**5.23**	**19.2**	5
Chlorobenzene	nd	nd	nd	nd	nd	nd	5
1,1,1,2-Tetrachloroethane	nd	nd	nd	nd	nd	nd	5
Ethylbenzene	nd	nd	nd	nd	nd	nd	5
m & p-Xylenes	nd	nd	nd	nd	nd	nd	5
o-Xylene	nd	nd	nd	nd	nd	nd	5
Styrene	nd	nd	nd	nd	nd	nd	5
Bromoform	nd	nd	nd	nd	nd	nd	ns
Isopropylbenzene	nd	nd	nd	nd	nd	nd	5
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd	nd	nd	5
1,2,3-Trichloropropane	nd	nd	nd	nd	nd	nd	0.04
Bromobenzene	nd	nd	nd	nd	nd	nd	5
n-Propylbenzene	nd	nd	nd	nd	nd	nd	5
2-Chlorotoluene	nd	nd	nd	nd	nd	nd	5
1,3,5-Trimethylbenzene	nd	nd	nd	nd	nd	nd	5
4-Chlorotoluene	nd	nd	nd	nd	nd	nd	5
tert-Butylbenzene	nd	nd	nd	nd	nd	nd	5
1,2,4-Trimethylbenzene	nd	nd	nd	nd	nd	nd	5
sec-Butylbenzene	nd	nd	nd	nd	nd	nd	5
p-Isopropyltoluene	nd	nd	nd	nd	nd	nd	5
1,3-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
1,4-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
n-Butylbenzene	nd	nd	nd	nd	nd	nd	5
1,2-Dichlorobenzene	nd	nd	nd	nd	nd	nd	3
1,2-Dibromo-3-Chloropropane	nd	nd	nd	nd	nd	nd	0.04
1,2,4-Trichlorobenzene	nd	nd	nd	nd	nd	nd	5
Hexachlorobutadiene	nd	nd	nd	nd	nd	nd	0.5
Naphthalene	nd	nd	nd	nd	nd	nd	10
1,2,3-Trichlorobenzene	nd	nd	nd	nd	nd	nd	5

ns . . . No Standard
Bold value represents concentration exceeding Groundwater Quality Standard
nd . . . None Detected

were identified in GP-3. The greatest individual VOC concentration identified during the investigation was 1,720 μg/L of PCE in the 16 to 20 foot interval. The PCE concentrations throughout the entire sampling interval of GP-3 were found to exceed the NYSDEC Groundwater Quality Standard for PCE of 5 μg/L. Vinyl Chloride was identified in the 16 to 20 and 26 to 30 foot intervals at concentrations exceeding the NYSDEC Groundwater Quality Standard for Vinyl Chloride of 2 μg/L. The detection of Vinyl Chloride indicates that the groundwater plume has undergone significant degradation and weathering. The Methylene Chloride identified in the groundwater samples from GP-3 is likely a laboratory contaminant and is not indicative of true groundwater quality.

The graph of total VOCs with depth from GP-3 indicates that the greatest total VOC concentration is present at the water table. The total VOC concentrations then decrease to moderate levels in the 26 to 30 foot depth interval and low levels in the remaining depth intervals.

Figure 5 provides the total VOC graph for GP-3.

The overall results of the groundwater investigation indicate that the groundwater plume has migrated toward the southern portion of the property, as evidenced by the results of groundwater sampling points GP-1 and GP-2. The greatest overall concentrations of VOCs were identified in the south central portion of the site, as evidenced by the results of groundwater sampling point GP-3.

The overall results of the groundwater investigation also indicate that groundwater plume has migrated vertically below the water table. The greatest concentrations of VOCs below the water table were identified in the 26 to 30 foot depth interval, as evidenced from the results of groundwater sampling points GP-2 and GP-3. In addition, concentrations of PCE, the primary contaminant identified during the investigation, were greater than the NYSDEC Groundwater Quality Standard for PCE in the 36 to 40 foot, 46 to 50 foot, 56 to 60 foot and the 66 to 70 foot depth intervals. However, the deepest significant concentration of PCE was identified in the 36 to 40 foot depth interval (72.6 μg/L).

4.0 REMEDIAL ACTION

Based upon the results of the groundwater investigation, the appropriate remedial technology that should be applied to the groundwater plume is the injection of Hydrogen-Releasing Compounds (HRCs). The reason that an HRCs were selected over other remedial technologies, such as an Air Sparge/Vapor Extraction System, was that the extent of the groundwater plume, both vertically and horizontally, is not large enough to warrant its installation and operation. Therefore, the injection of HRCs is the most appropriate remedial action.

Appendix B provides documentation pertaining to HRCs.

The HRCs will promote the degradation of the Tetrachloroethene, and its degradation products, through molecular breakdown. This molecular breakdown is best achieved in anaerobic conditions, which are promoted through the use of HRCs.

The HRCs will be injected utilizing pressure grout techniques through small diameter injection wells that will be installed on a 10-foot by 10-foot grid pattern. A total of twenty-four (24) injection wells will be installed. Each injection well will be installed to a depth of 36 feet to insure that the HRCs are placed to the bottom of the groundwater plume. Therefore, a total of 864 feet of injection wells will be installed. This will require a total volume of 3,542.4 pounds (4.1 pounds per foot) of HRC.

Figure 6 provides the locations of the HRC injection points.

In order to monitor the biodegradation of the groundwater plume, two (2) cluster wells will be installed at the site. These monitoring wells will be installed at the locations of groundwater sampling points GP-1 and GP-2. The cluster wells will be screened at the water table and 10 feet below the water table. These two cluster wells, along with monitoring well MW-3, will be sampled for VOCs in order to monitor the biodegradation of the groundwater plume over time.

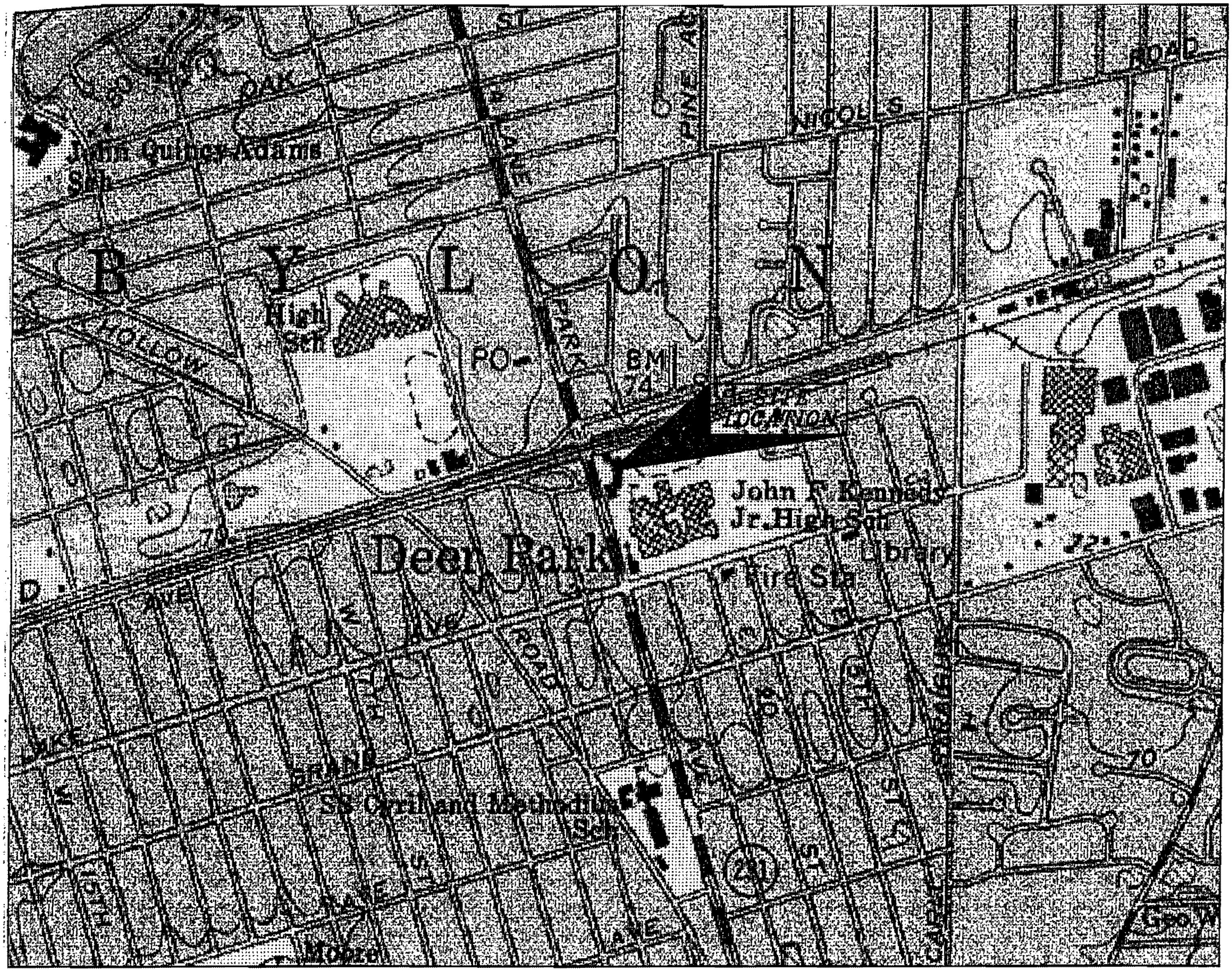
The groundwater quality will be monitored for the period of one (1) year. Initially, groundwater samples will be obtained on a weekly basis for the period of four (4) weeks. Groundwater samples will then be obtained on a monthly basis for the period of three (3) months and then on a quarterly basis for the period of nine (9) months.

Signed: November 24, 1999

X___________________________
Mark E. Robbins
Senior Geologist

X___________________________
Mostafa El Sehamy, P.G., C.G.W.P.
Director, Professional Services

Figure 1
Site Location Map



Site Location Map

SCALE 1:12000

500 0 500 1000 1500 2000 2500 3000 3500 FEET

Reproduced from USGS Bay Shore West, New York Quadrangle

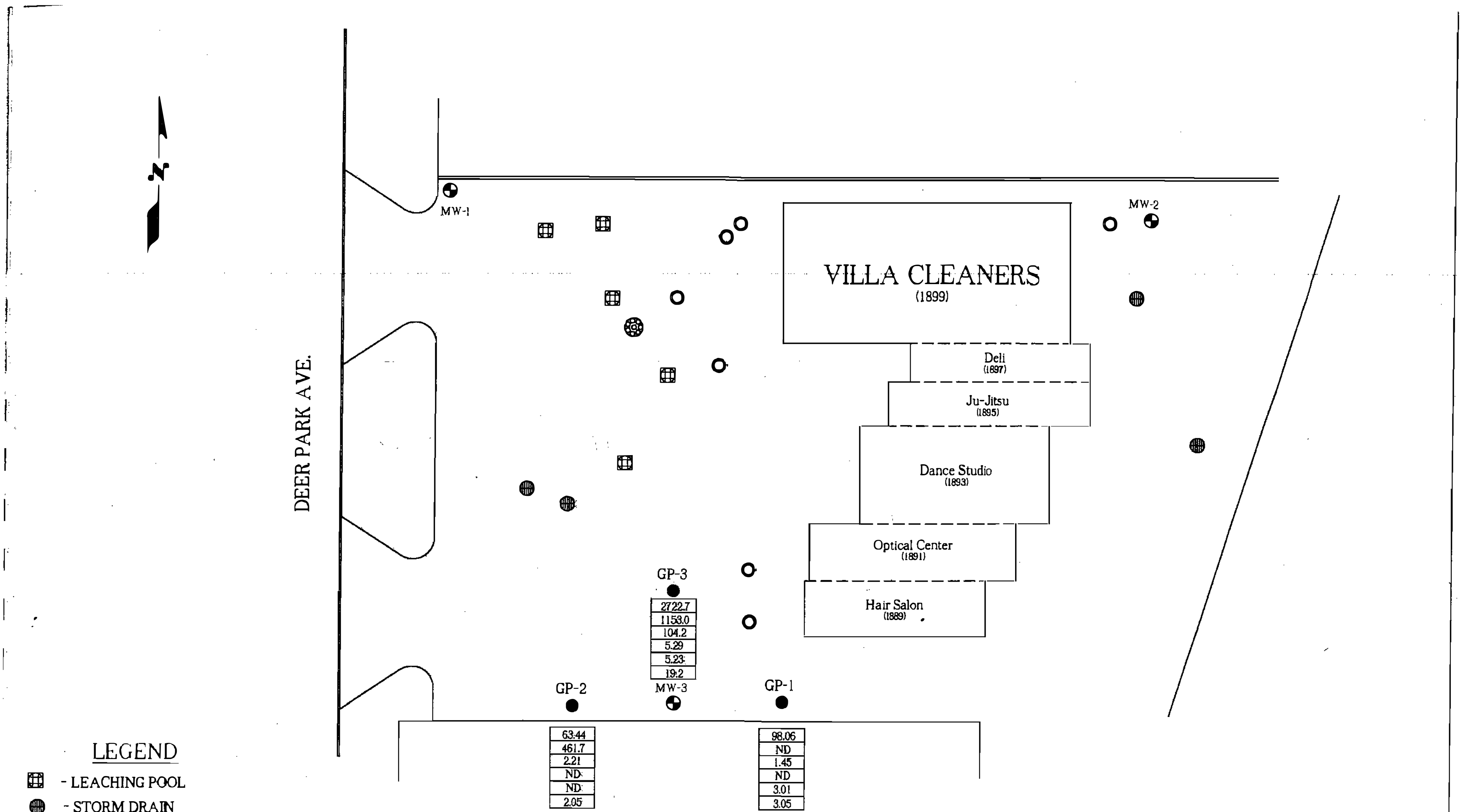
Fenley & Nicol

Professional Services Division

445 Brook Ave.

Deer Park. N.Y. 11729

Figure 2
Site Plan



	GP-3	GP-2	GP-1
16-20 FT	2722.7	63.44	98.06
26-30 FT	1153.0	461.7	ND
36-40 FT	104.2	2.21	1.45
46-50 FT	5.29	ND	ND
56-60 FT	5.23	ND	3.01
66-70 FT	19.2	2.05	3.05

LEGEND

- LEACHING POOL
- STORM DRAIN
- SOLID MANHOLE
- MONITORING WELL
- CLUSTER WELL
- GROUNDWATER SAMPLING LOCATION

ALL CONCENTRATIONS IN UG/L.
ND... NONE DETECTED

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Professional Services Division
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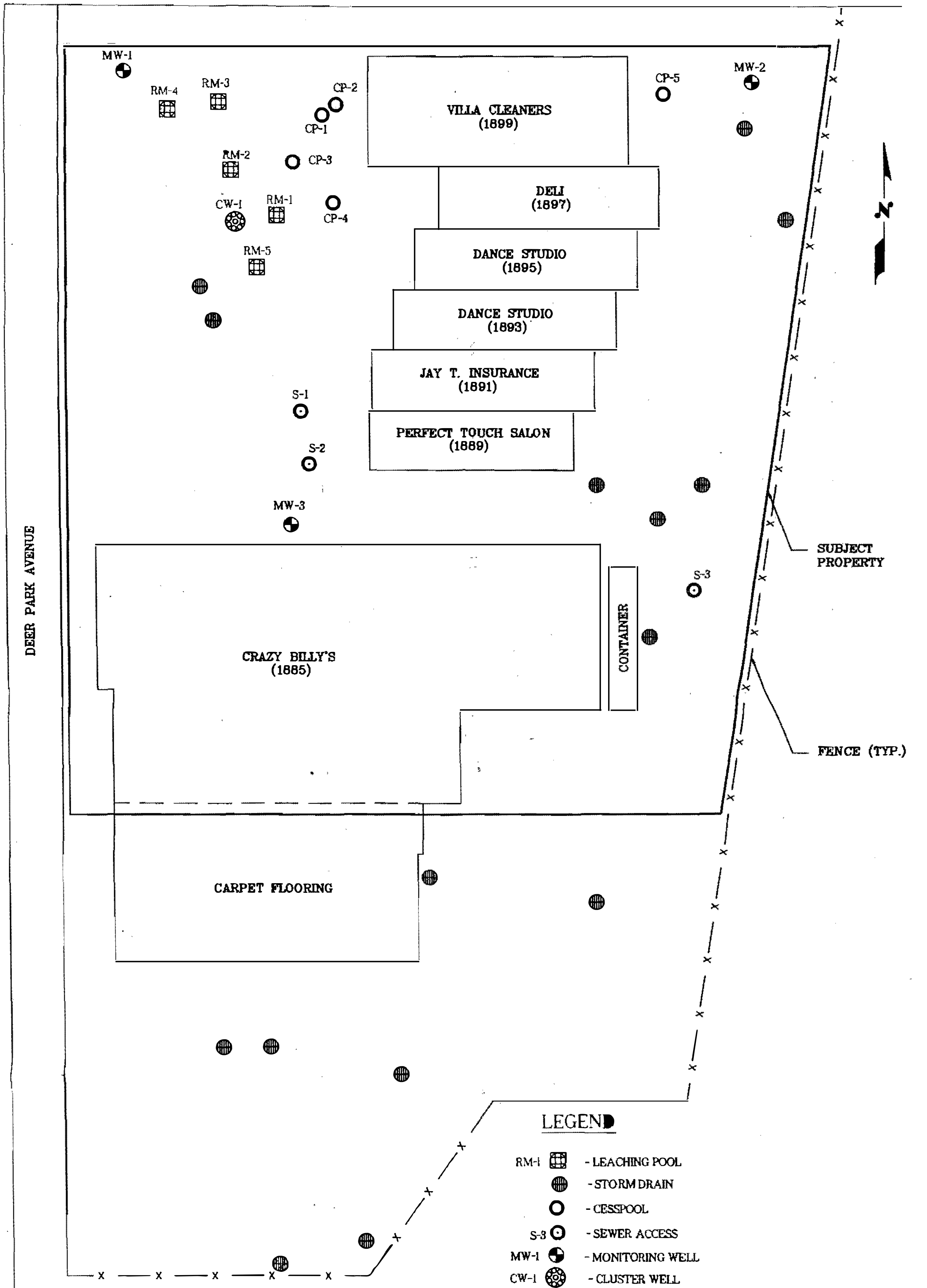
NEW YORK 11729 (516)586-4900

SCALE: N.T.S.	GEOLOGIST M.R.	JOB # 9802967
DATE: 11/99	DRAWN BY: A.E.	CUSTOMER PRIVATE

GROUNDWATER SAMPLING RESULTS

VILLA CLEANERS
1899 DEER PARK AVE.
BABYLON, NEW YORK



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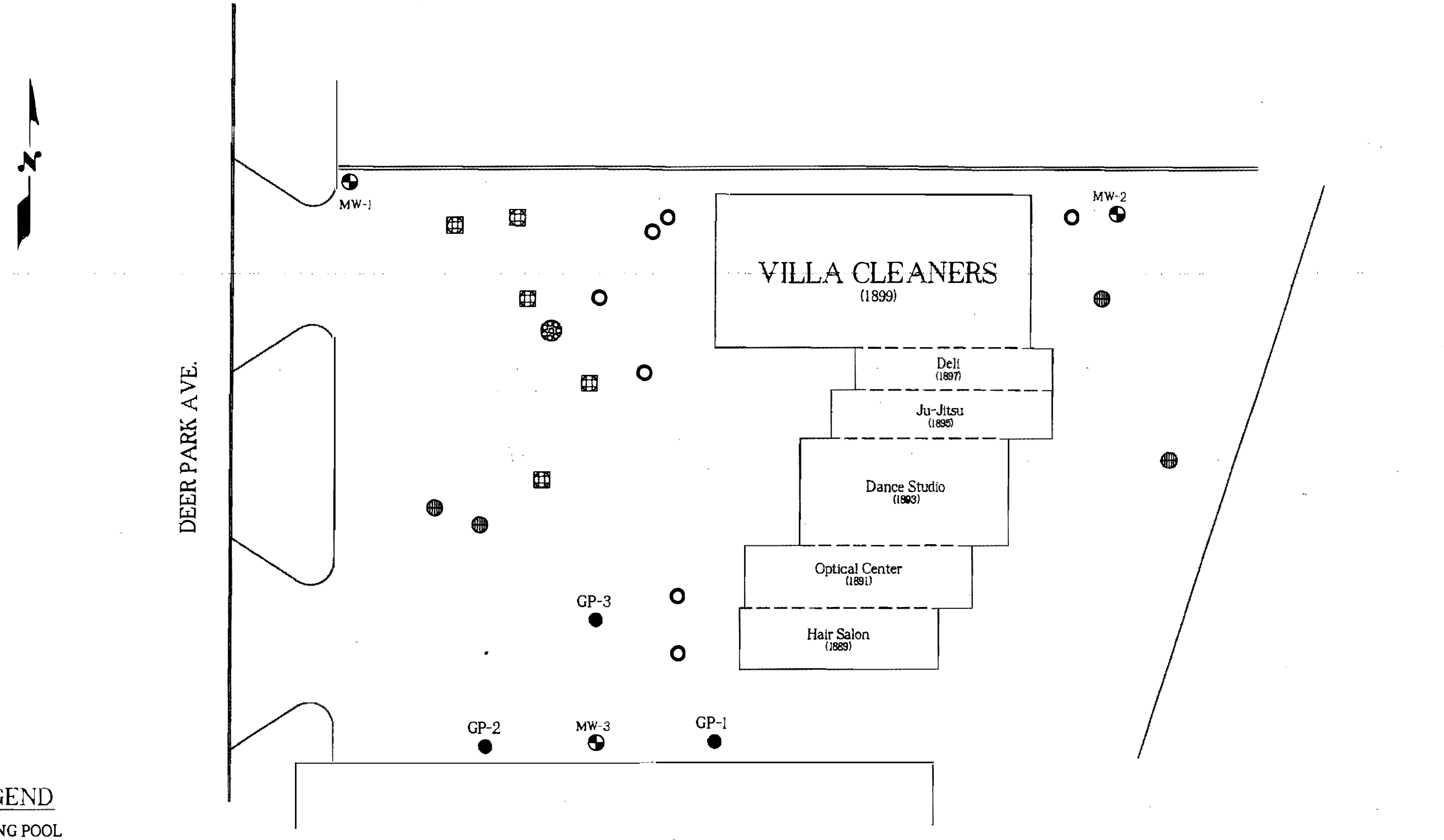
SITE PLAN

1885-1899 DEER PARK AVE
BABYLON, NEW YORK

SCALE: 1"=25'-0"	GEOLOGIST D. O.	JOB # 0201927
DATE: 5/01	DRAWN BY: A. E.	FILE NAME: SP5200.DWG

Figure 3
Proposed Sampling Location Map



LEGEND

- LEACHING POOL
- STORM DRAIN
- SOLID MANHOLE
- MONITORING WELL
- CLUSTER WELL
- GROUNDWATER SAMPLING LOCATION

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445 BROOK AVENUE, DEER PARK,
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SCALE: N.T.S.	GEOLOGIST M.R.	JOB # 9802957
DATE: 10/99	DRAWN BY: A.G.	CUSTOMER PRIVATE

GROUNDWATER SAMPLING LOCATIONS

VILLA CLEANERS
1899 DEER PARK AVE.
BABYLON, NEW YORK

Figure 3
Total VOCs – GP-1

Figure 3: Total VOCs - GP-1

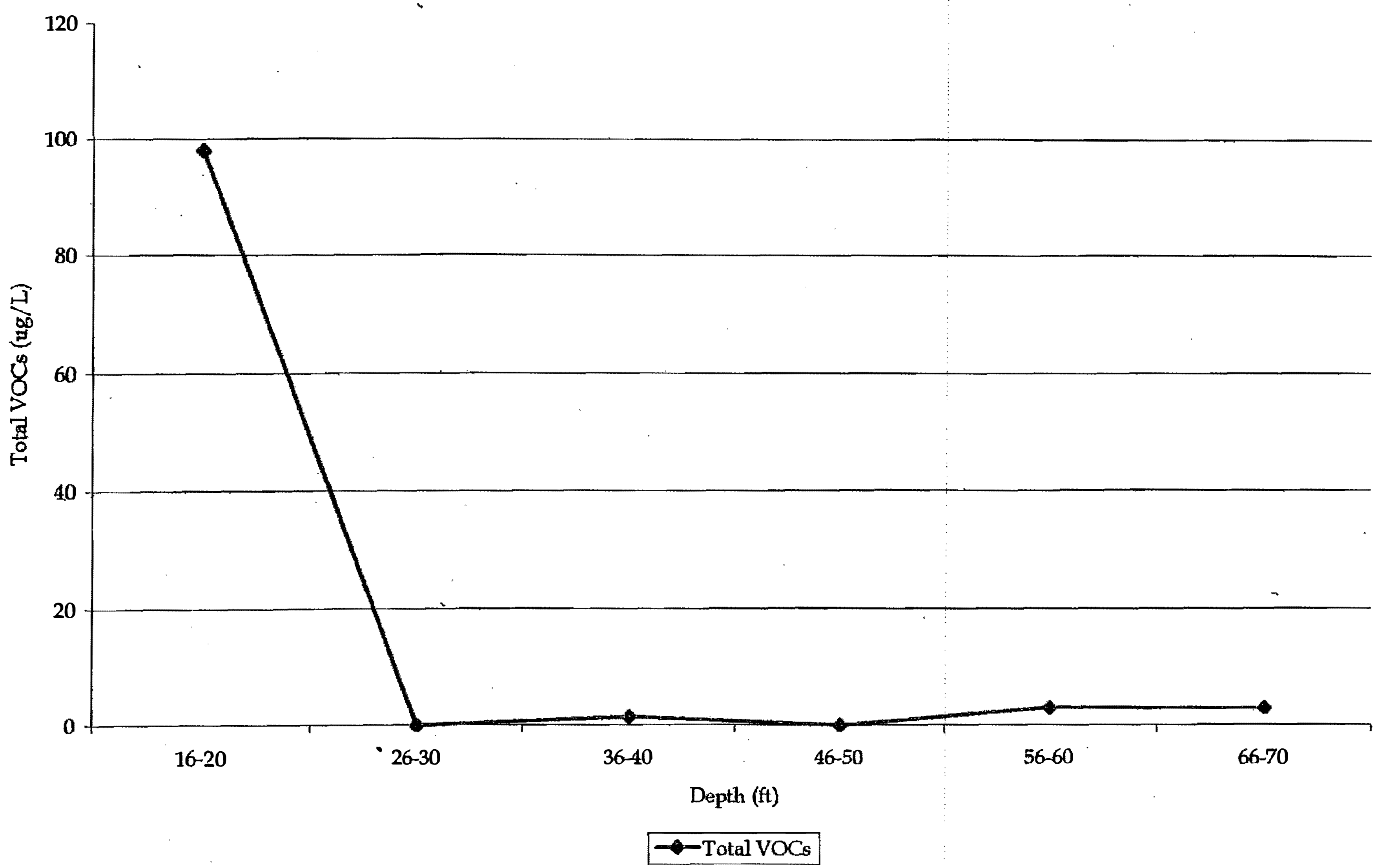


Figure 4
Total VOCs – GP-2

Figure 4: Total VOCs - GP-2

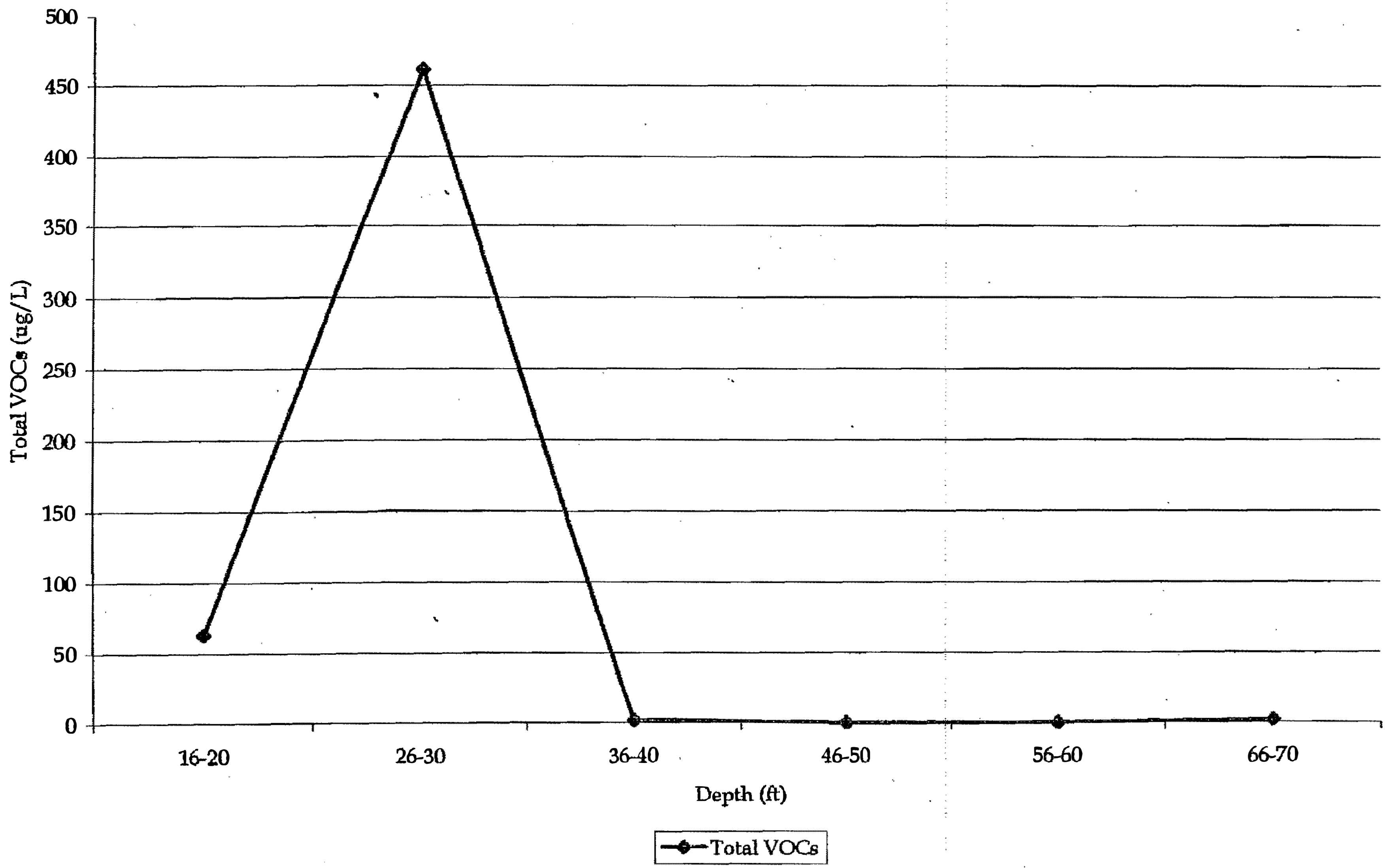


Figure 5
Total VOCs – GP-3

Figure 5: Total VOCs - GP-3

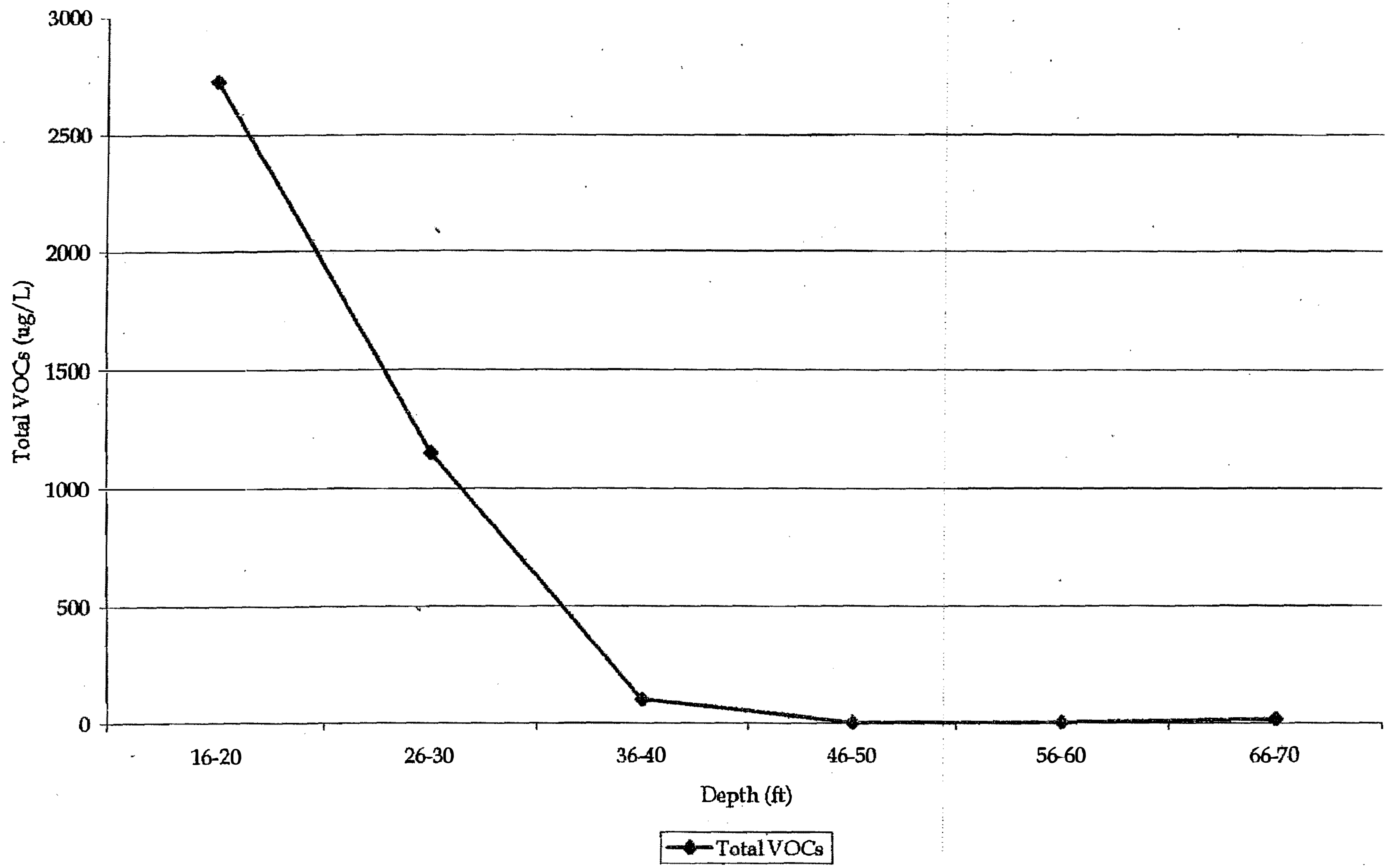
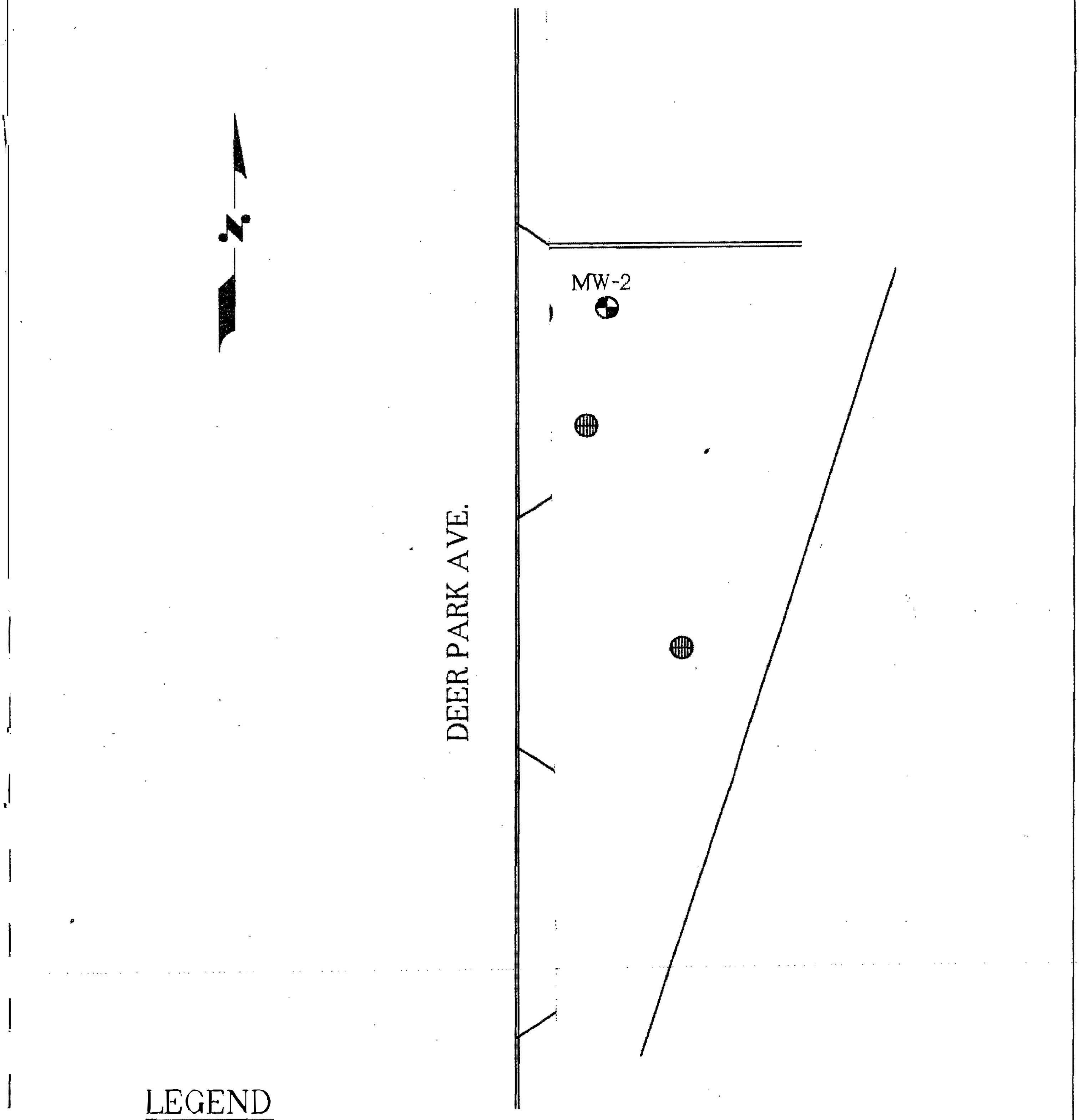


Figure 6
HRC Injection Points



LEGEND

- LEACHING POOL
- STORM DRAIN
- SOLID MANHOLE
- MONITORING WELL
- CLUSTER WELL
- HRC INJECTION LOCATION

PROPOSED HRC INJECTION LOCATIONS

VILLA CLEANERS
1899 DEER PARK AVE.
BABYLON, NEW YORK

Appendix A
Laboratory Reports

SOUTH MALL ANALYTICAL LABS, INC.™

26 NORTH MALL • PLAINVIEW, NY 11803
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E-Mail: info@SouthMallLabs.com
www.SouthMallLabs.com

November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-1 - 66-70
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101110

Analyte	Results	Method
Dichlorodifluoromethane, μg/l	<1.00	8260[1]
Chloromethane, μg/l	<5.00	8260[1]
Vinyl chloride, μg/l	<5.00	8260[1]
Bromomethane, μg/l	<5.00	8260[1]
Chloroethane, μg/l	<5.00	8260[1]
Trichlorofluoromethane, μg/l	<1.00	8260[1]
1,1-Dichloroethene, μg/l	<1.00	8260[1]
Methylene chloride, μg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, μg/l	<5.00	8260[1]
1,1-Dichloroethane, μg/l	<1.00	8260[1]
2,2-Dichloropropane, μg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, μg/l	<5.00	8260[1]
Bromochloromethane, μg/l	<1.00	8260[1]
Chloroform, μg/l	<1.00	8260[1]
1,1,1-Trichloroethane, μg/l	<1.00	8260[1]
Carbon tetrachloride, μg/l	<5.00	8260[1]
1,1-Dichloropropene, μg/l	<1.00	8260[1]
Benzene, μg/l	<1.00	8260[1]
1,2-Dichloroethane, μg/l	<1.00	8260[1]
Trichloroethene, μg/l	<1.00	8260[1]
1,2-Dichloropropane, μg/l	<1.00	8260[1]
Dibromomethane, μg/l	<1.00	8260[1]
Bromodichloromethane, μg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, μg/l	<1.00	8260[1]
Toluene, μg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, μg/l	<1.00	8260[1]
1,1,2-Trichloroethane, μg/l	<5.00	8260[1]
Tetrachloroethene, μg/l	1.86	8260[1]

SOUTH MALL
ANALYTICAL LABS, INC.

Ref. 101110

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	1.19	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

SOUTH MALL ANALYTICAL LABS, INC.™

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www.SouthMallLabs.com

November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-1 - 56-60
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101111

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	1.61	8260[1]

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Ref. 101111

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	1.40	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-1 - 46-50
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101112

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	1.44	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	<1.00	8260[1]

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Ref. 101112

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-1 - 36-40
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101113

Analyte	Results	Method
Dichlorodifluoromethane, μg/l	<1.00	8260[1]
Chloromethane, μg/l	<5.00	8260[1]
Vinyl chloride, μg/l	<5.00	8260[1]
Bromomethane, μg/l	<5.00	8260[1]
Chloroethane, μg/l	<5.00	8260[1]
Trichlorofluoromethane, μg/l	<1.00	8260[1]
1,1-Dichloroethene, μg/l	<1.00	8260[1]
Methylene chloride, μg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, μg/l	<5.00	8260[1]
1,1-Dichloroethane, μg/l	<1.00	8260[1]
2,2-Dichloropropane, μg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, μg/l	<5.00	8260[1]
Bromochloromethane, μg/l	<1.00	8260[1]
Chloroform, μg/l	1.30	8260[1]
1,1,1-Trichloroethane, μg/l	<1.00	8260[1]
Carbon tetrachloride, μg/l	<5.00	8260[1]
1,1-Dichloropropene, μg/l	<1.00	8260[1]
Benzene, μg/l	<1.00	8260[1]
1,2-Dichloroethane, μg/l	<1.00	8260[1]
Trichloroethene, μg/l	<1.00	8260[1]
1,2-Dichloropropane, μg/l	<1.00	8260[1]
Dibromomethane, μg/l	<1.00	8260[1]
Bromodichloromethane, μg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, μg/l	<1.00	8260[1]
Toluene, μg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, μg/l	<1.00	8260[1]
1,1,2-Trichloroethane, μg/l	<5.00	8260[1]
Tetrachloroethene, μg/l	1.45	8260[1]

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Ref. 101113

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-1 - 26-30
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101114

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1*]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	<1.00	8260[1]

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Ref. 101114

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-1 - 16-20
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101115

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	3.24	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	19.2	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	4.36	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	74.5	8260[1]

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Ref. 101115

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-2 - 66-70
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101116

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	12.2	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	1.71	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	2.05	8260[1]

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Ref. 101116

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-2 - 56-60
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101117

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	8.29	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	1.37	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	<1.00	8260[1]

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Ref. 101117

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-2 - 46-50
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101118

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	2.16	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	1.42	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	<1.00	8260[1]

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Ref. 101118

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-2 - 36-40
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101119

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	4.26	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<5.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	2.21	8260[1]

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Ref. 101119

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-2 - 26-30
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101120

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	228.	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	19.7	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	214.	8260[1]

Ref. 101120

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-2 - 16-20
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/20/99
Analysis Number:	101121

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	<1.00	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	30.3	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	9.34	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	23.8	8260[1]

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Ref. 101121

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-3 - 66-70
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/21/99
Analysis Number:	101163

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	6.45	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<1.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	19.2	8260[1]

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Ref. 101163

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-3 - 56-60
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/21/99
Analysis Number:	101164

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	3.41	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<1.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	5.23	8260[1]

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Ref. 101164

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1] *Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-3 - 46-50
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/21/99
Analysis Number:	101165

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	3.92	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	<1.00	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	<1.00	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	5.29	8260[1]

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Ref. 101165

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-3 - 36-40
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/21/99
Analysis Number:	101166

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	<5.00	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	3.42	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	28.0	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	3.61	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	72.6	8260[1]

SOUTH MALL
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Ref. 101166

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-3 - 26-30
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/21/99
Analysis Number:	101167

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	5.29	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	3.14	8260[1]
trans-1,2-Dichloroethene, µg/l	<5.00	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	528.	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	61.7	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	558.	8260[1]

Ref. 101167

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: ______________________
Joseph P. Shaulys

JPS:po

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November 8, 1999

Fenley & Nicol Environmental
445 Brook Avenue
Deer Park, NY 11704

Att.: Mr. Mark Robbins

Sample Description:	Wastewater - GP-3 - 16-20
Sample Collected By:	Fenley & Nicol Environmental
Purchase Order Number:	Villa Cleaners
Date Samples Received:	10/21/99
Analysis Number:	101168

Analyte	Results	Method
Dichlorodifluoromethane, µg/l	<1.00	8260[1]
Chloromethane, µg/l	<5.00	8260[1]
Vinyl chloride, µg/l	8.68	8260[1]
Bromomethane, µg/l	<5.00	8260[1]
Chloroethane, µg/l	<5.00	8260[1]
Trichlorofluoromethane, µg/l	<1.00	8260[1]
1,1-Dichloroethene, µg/l	<1.00	8260[1]
Methylene chloride, µg/l	5.82	8260[1]
trans-1,2-Dichloroethene, µg/l	6.87	8260[1]
1,1-Dichloroethane, µg/l	<1.00	8260[1]
2,2-Dichloropropane, µg/l	<5.00	8260[1]
cis-1,2-Dichloroethene, µg/l	826.	8260[1]
Bromochloromethane, µg/l	<1.00	8260[1]
Chloroform, µg/l	<1.00	8260[1]
1,1,1-Trichloroethane, µg/l	<1.00	8260[1]
Carbon tetrachloride, µg/l	<5.00	8260[1]
1,1-Dichloropropene, µg/l	<1.00	8260[1]
Benzene, µg/l	<1.00	8260[1]
1,2-Dichloroethane, µg/l	<1.00	8260[1]
Trichloroethene, µg/l	168.	8260[1]
1,2-Dichloropropane, µg/l	<1.00	8260[1]
Dibromomethane, µg/l	<1.00	8260[1]
Bromodichloromethane, µg/l	<1.00	8260[1]
cis-1,3-Dichloropropene, µg/l	<1.00	8260[1]
Toluene, µg/l	<1.00	8260[1]
trans-1,3-Dichloropropene, µg/l	<1.00	8260[1]
1,1,2-Trichloroethane, µg/l	<5.00	8260[1]
Tetrachloroethene, µg/l	1,720.	8260[1]

SOUTH MALL
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Ref. 101168

Analyte	Results	Method
1,3-Dichloropropane, µg/l	<1.00	8260[1]
Dibromochloromethane, µg/l	<1.00	8260[1]
1,2-Dibromoethane, µg/l	<1.00	8260[1]
Chlorobenzene, µg/l	<1.00	8260[1]
1,1,1,2-Tetrachloroethane, µg/l	<1.00	8260[1]
Ethylbenzene, µg/l	<1.00	8260[1]
o-Xylene, µg/l	<1.00	8260[1]
m,p-Xylene, µg/l	<1.00	8260[1]
Styrene, µg/l	<1.00	8260[1]
Bromoform, µg/l	<1.00	8260[1]
Isopropylbenzene, µg/l	<1.00	8260[1]
Bromobenzene, µg/l	<1.00	8260[1]
1,1,2,2-Tetrachloroethane, µg/l	<1.00	8260[1]
1,2,3-Trichloropropane, µg/l	<5.00	8260[1]
n-Propylbenzene, µg/l	<1.00	8260[1]
2-Chlorotoluene, µg/l	<1.00	8260[1]
4-Chlorotoluene, µg/l	<5.00	8260[1]
1,3,5-Trimethylbenzene	<5.00	8260[1]
tert-Butylbenzene, µg/l	<5.00	8260[1]
1,2,4-Trimethylbenzene, µg/l	<1.00	8260[1]
sec-Butylbenzene, µg/l	<1.00	8260[1]
1,3-Dichlorobenzene, µg/l	<1.00	8260[1]
4-Isopropyltoluene, µg/l	<1.00	8260[1]
1,4-Dichlorobenzene, µg/l	<1.00	8260[1]
1,2-Dichlorobenzene, µg/l	<1.00	8260[1]
n-Butylbenzene, µg/l	<1.00	8260[1]
1,2-Dibromo-3-chloropropane, µg/l	<5.00	8260[1]
1,2,4-Trichlorobenzene, µg/l	<5.00	8260[1]
Hexachlorobutadiene, µg/l	<1.00	8260[1]
Naphthalene, µg/l	<5.00	8260[1]
1,2,3-Trichlorobenzene, µg/l	<5.00	8260[1]

[1]*Federal Register*, Vol. 49, No. 209

New York State ELAP Laboratory ID #10950

Laboratory Director: Joseph P. Shaulys

Joseph P. Shaulys

JPS:po

Page 1 of 2

CHAIN OF CUSTODY RECORD

SOUTH MALL ANALYTICAL LABS, INC.™
26 NORTH MALL • PLAINVIEW, NY 11803
(516) 293-2191 • FAX (516) 293-3152

Client:	Fealey & Nicol Environmental	Report to:	Mark Robbins
Address:	445 Brook Avenue	Lab ID #:	10950
	Deer Park, NY 11729	Cooler No.:	
Telephone:	586-4900 / Fax: 586-4920	Analysis Nos.:	10110-10119

SHADED AREAS FOR LABORATORY USE ONLY!

	Y	N		Y	N	N/A		Y	N
Samples received in good condition?	✓		COC tape present?		✓		Rush T/A required?		✓
Samples properly preserved?	✓		COC tape unbroken?			✓	Notes (including P.O. #):		
Samples ambient?	✓		Non-compliance report needed?		✓				
Samples chilled?		✓	Cooler returned?			✓			

No.	Matrix L	S	G	Sample Origin	Containers #	Type	Date	Comp.	Grab	Time	Analysis Required	NaOH + Ascorbic Acid	HNO_3	H_2SO_4	Other	None
	✓			GP-1 66-70	2	VOA	10/20/99				EPA 8260					X
	X			GP-1 56-60	2	VOA	10/20/99				EPA 8260					X
	✓			GP-1 46-50	2	VOA	10/20/99				EPA 8260					X
	X			GP-1 36-40	2	VOA	10/20/99				EPA 8260					X
	X			GP-1 26-30	2	VOA	10/20/99				EPA 8260					X
	X			GP-1 16-20	2	VOA	10/20/99				EPA 8260					X
	X			GP-2 66-70	2	VOA	10/20/99				EPA 8260					X
	X			GP-2 56-60	2	VOA	10/20/99				EPA 8260					X
	X			GP-2 46-50	2	VOA	10/20/99				EPA 8260					X
0	X			GP-2 36-40	2	VOA	10/20/99				EPA 8260					X

COLLECTED BY:	Mark E. Robbins	PROJECT NAME/SPECIAL INSTRUCTIONS:	VILLA CLEANERS				
RELINQUISHED BY:	Mark E. R	RECEIVED BY:	Susan Arten	DATE:	10/20/99	TIME:	2:00 PM
RELINQUISHED BY:		RECEIVED BY:		DATE:		TIME:	
RELINQUISHED BY:	Susan Arten	RECEIVED BY LAB:	Michael E. Miller	DATE:	10/20/99	TIME:	2:15 PM

SOUTH MALL ANALYTICAL LABS, INC.™
26 NORTH MALL • PLAINVIEW, NY 11803
(516) 293-2191 • FAX (516) 293-3152

CHAIN OF CUSTODY RECORD

Client: Fenley & Nicol Environmental	Report to: Mark Robbins
Address: 445 Brook Avenue	Lab ID #: 10950
Deer Park, NY 11729	Cooler No.:
Telephone: 586-4900 / Fax: 586-4920	Analysis Nos.: 101120 - 101121

SHADED AREAS FOR LABORATORY USE ONLY!

	Y	N		Y	N	N/A		Y	N
Samples received in good condition?	✓		COC tape present?		✓		Rush T/A required?		✓
Samples properly preserved?	✓		COC tape unbroken?			✓	Notes (including P.O. #):		
Samples ambient?	✓		Non-compliance report needed?		✓				
Samples chilled?		✓	Cooler returned?			✓			

No.	Matrix L	S	G	Sample Origin	Containers #	Type	Date	Comp.	Grab	Time	Analysis Required	NaOH + Ascorbic Acid	HNO_3	H_2SO_4	Other	None
	X			GP-2 26-30	2	VOA	10/20/99				EPA 8260					X
	X			GP-2 16-20	2	VOA	10/20/99				EPA 8260					X
0																

COLLECTED BY: Mark E. Robbins	PROJECT NAME/SPECIAL INSTRUCTIONS: VILLA CLEANERS		
RELINQUISHED BY: Mark E. R	RECEIVED BY: Susan Cohen	DATE: 10/20/99	TIME: 2:00 PM
RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME: AM PM
RELINQUISHED BY: Susan Cohen	RECEIVED BY LAB: Michael E. Miller	DATE: 10/20/99	TIME: 2:15 PM

SOUTH MALL ANALYTICAL LABS, INC.™

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(516) 293-2191 • FAX (516) 293-3152

CHAIN OF CUSTODY RECORD

Client:	Fenley & Nicol Environmental, Inc.	Report to:	Mark E. Robbins
Address:	445 Brook Avenue	Lab ID #:	10950
	Deer Park, NY 11729	Cooler No.:	
Telephone:	(516) 586-4900	Analysis Nos.:	101163-101168

SHADED AREAS FOR LABORATORY USE ONLY!

	Y	N		Y	N	N/A		Y	N
amples received in good condition?	✓		COC tape present?				Rush T/A required?		
amples properly preserved?	✓		COC tape unbroken?			✓	Notes (including P.O. #):		
amples ambient?	✓		Non-compliance report needed?						
amples chilled?		✓	Cooler returned?						

o.	Matrix L	Matrix S	Matrix G	Sample Origin	Containers #	Containers Type	Sample Information Date	Comp.	Grab	Time	Analysis Required	NaOH + Ascorbic Acid	HNO_3	H_2SO_4	Other	None
	X			GP-3 66-70	2	VOA	10/21/99				EPA 8260					X
	X			GP-3 56-60	2	VOA	10/21/99				EPA 8260					X
	X			GP-3 46-50	2	VOA	10/21/99				EPA 8260					X
	X			GP-3 36-40	2	VOA	10/21/99				EPA 8260					X
	X			GP-3 26-30	2	VOA	10/21/99				EPA 8260					X
	X			GP-3 16-20	2	VOA	10/21/99				EPA 8260					X
0																

OLLECTED BY: DAVID OLOTCE	PROJECT NAME/SPECIAL INSTRUCTIONS: VILLA CLEANERS			
ELINQUISHED BY: David Olotce	RECEIVED BY: David Olotce	DATE: 10/21/99	TIME: PM	AM PM
ELINQUISHED BY: David Olotce	RECEIVED BY: B. Stanley	DATE: 10-21-99	TIME: 12:30	AM PM
ELINQUISHED BY: B. Stanley	RECEIVED BY LAB: Michael E. Miller	DATE: 10-21-99	TIME: 1:40	AM PM

Appendix B
HRC Documentation

Appendix B
HRC Documentation

REGENESIS

Hydrogen Release Compound HRC™

HRC: A Cost-Effective Innovation in Enhanced Anaerobic Bioremediation

Hydrogen Release Compound (HRC™) offers a passive, low-cost treatment option for in-situ anaerobic bioremediation of chlorinated aliphatic hydrocarbons (CAHs). HRC is a proprietary, environmentally safe, food quality, polylactate ester specially formulated for slow release of lactic acid upon hydration. Bioremediation with HRC is a multi-step process. Indigenous anaerobic microbes (such as acetogens) metabolize the lactic acid released by HRC, and produce hydrogen. The resulting hydrogen can be used by reductive dehalogenators which are capable of dechlorinating CAHs. Major target compounds in this group include PCE, TCE, TCA as well as their daughter products.

By providing a long-lasting, time-released hydrogen source, Hydrogen Release Compound can enhance anaerobic reductive dechlorination of chlorinated aliphatic hydrocarbons.

The Key Advantages of HRC

Challenges specific to CAH remediation include the following: (1) As DNAPLs, CAH plumes sink into the aquifer in complex, heterogeneous patterns, rendering them difficult to locate and remediate mechanically; (2) CAHs present a significant health hazard; (3) alternatives for CAH remediation are limited and expensive.

Enhanced anaerobic natural attenuation with HRC presents an innovative solution to CAH remediation. HRC has several advantages over other remedial options:

1. **Low maintenance and low cost:** Unlike actively engineered systems, continuous mechanical operation and maintenance is eliminated, dramatically reducing overall O&M costs.

2. **Time release provides a constant and persistent hydrogen source.**
   - HRC is a semi-solid material that remains in place and generates highly diffusible hydrogen slowly over time.
   - Since CAH plumes are difficult to locate, a continuous, highly diffusible hydrogen source increases the effectiveness of contact, containment, and remediation.
   - The constant hydrogen source eliminates introduction of oxygen which can occur with repeated alternative mechanical methods.

3. **HRC promotes desorption of CAHs.** The continuous hydrogen source provided by HRC can reduce dissolved phase CAH concentrations. This creates a larger concentration gradient which in turn facilitates desorption of CAHs from the soil matrix. In addition to source treatment, HRC reduces time to site closure by increasing the rate of CAH desorption and remediation.

4. **HRC may favor reductive dechlorination over possible competing methanogenic activity.**
   Results from university studies suggest that there is competition for hydrogen between the reductive dechlorinators and methanogens (Fennell, et.al., 1997). High hydrogen concentrations favor methanogenic activity, whereas reductive dechlorinators are best supported in conditions of more moderate hydrogen concentration. Thus, since HRC's long-lasting time-release feature facilitates controlled hydrogen concentrations, it is an ideal approach for optimizing reductive dechlorination.

Other Benefits

- **HRC offers a simple and effective approach to the remediation of CAHs:** Other remediation methods maysimply transfer contaminants to another medium or location, requiring permits, removal, transportation, and ongoing liability. However, bioremediation with HRC allows microbes to dechlorinate these contaminants in-situ.

- **HRC has potential effectiveness on other chlorinated contaminants or co-contaminants, such as pentachlorophenol (PCP) and hexachlorocyclohexane (lindane).**

- **Minimal Site Disturbance:** Treatment with HRC is in-situ; thus, above ground disturbance is minimized.

Site Objectives Addressed With HRC

HRC is a high viscosity liquid that can be injected into the aquifer using direct-push technologies to address a wide range of remedial objectives, as follows:

<u>Containment</u>: HRC may be strategically applied along the downgradient edge of a plume to form a barrier to off-site migration.

<u>Saturated Zone Application</u> – HRC application in or near the source area can:

- Contract the dissolved phase plume, shrinking it back toward the source area
- Increase the desorption rate in the source area to accelerate bioremediation of the entire contaminant mass

HRC and ORC: Solutions for Vinyl Chloride Remediation

Lab and field results have shown that HRC can support remediation of the DCE and VC that is produced as a result of PCE/TCE degradation.

However, although anaerobic conditions favor PCE and TCE degradation, daughter products like DCE and VC can degrade faster under aerobic conditions. Given that VC accumulation is of particular concern, optimal results for CAH remediation with HRC may be achieved by combined treatment with Oxygen Release Compound (ORC®) to enhance aerobic bioremediation of vinyl chloride. HRC treatment can be used in conjunction with ORC in either of two dual phase strategies:

- **Simultaneous HRC/ORC application:** HRC is applied to treat higher order CAHs at the source, while ORC is concurrently applied in a downgradient zone to treat the resulting daughter products.
- **Sequential HRC/ORC application:** For an appropriate period of time, HRC is applied to treat higher order CAHs. As vinyl chloride accumulates, HRC treatment is terminated and ORC is introduced to treat this compound.

HRC TECHNICAL BULLETIN # 3.1.3

Hydrogen Release Compound HRC™

HRC Field Demonstration in WI

The direct-push injection of HRC is currently being demonstrated with Montgomery Watson at a site in Wisconsin contaminated with high levels of PCE. Aquifer materials consist of sand with a calculated groundwater velocity of 0.03 ft/day. 240 pounds of slightly flowable HRC were injected via twelve delivery points in a sixty square foot area as illustrated in Figure 1.

Reduction of PCE relative to HRC injection points and existing monitoring well locations are presented in Figure 2. Approximately five months following the installation of HRC, PCE mass was reduced 111 grams, representing a reduction of 70%. Concurrent increases in PCE-degradation daughter products, TCE and DCE, were also documented and are presented in Figures 3 and 4. DCE and TCE levels rise continuously through the first 120 days with a slight decrease occurring through day 148. Mass balance results of 27% to 46% have been an important indicator that the HRC injections facilitated contaminant removal by biodegradation.There has been no real detection of vinyl chloride or ethene. Vinyl chloride may be degrading as soon as it is formed, or may be migrating out of the demonstration area.

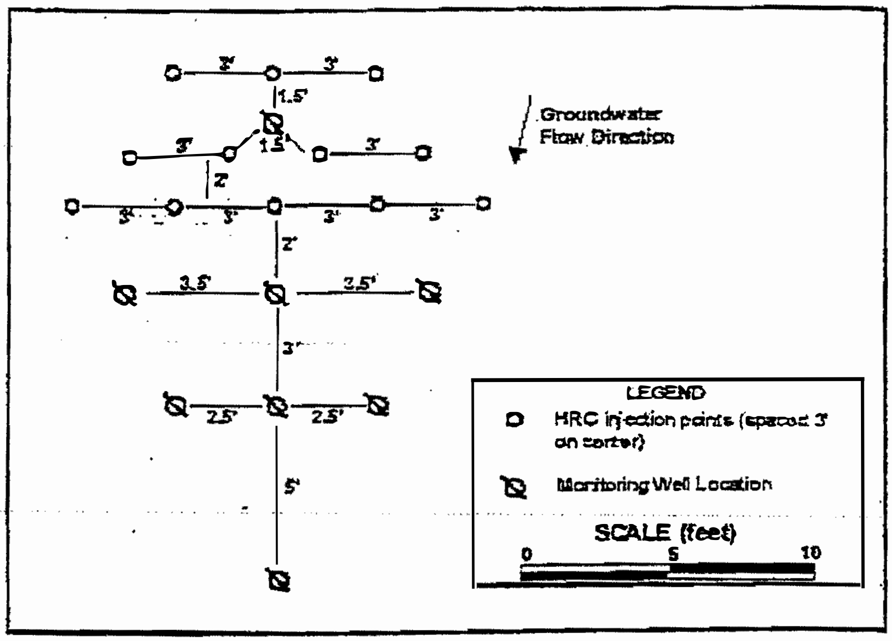
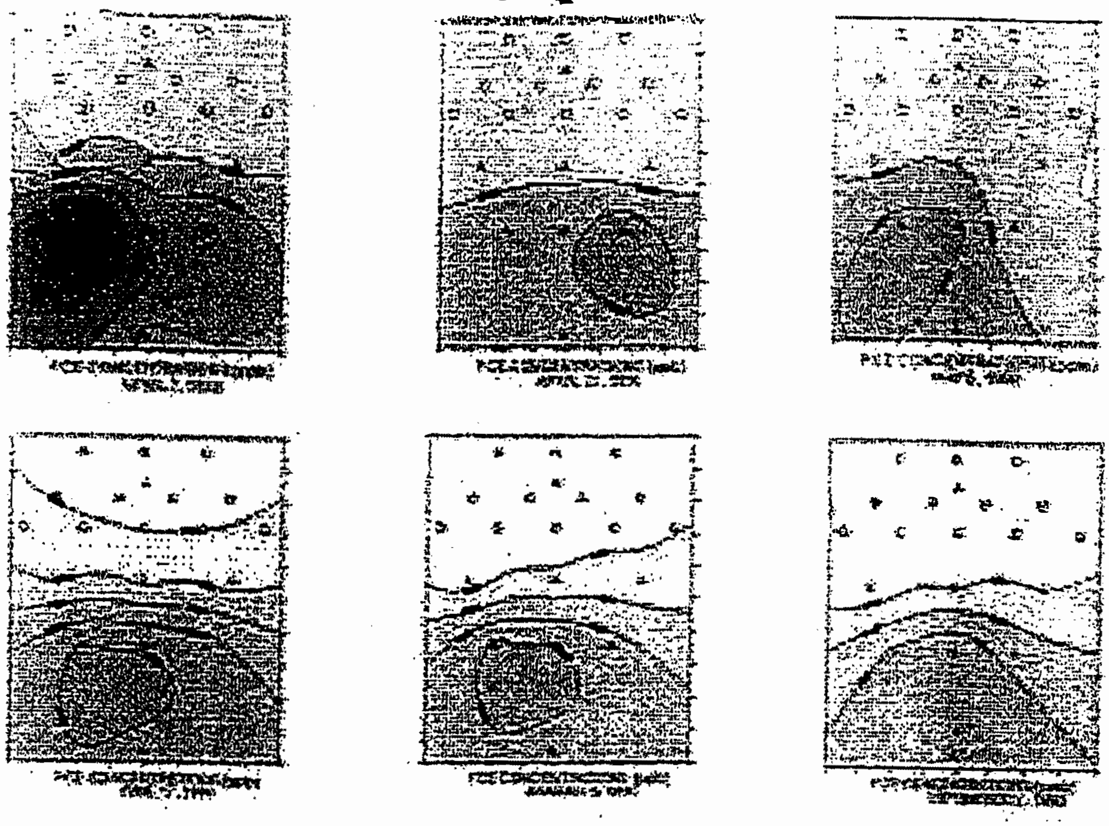


Figure 1

HRC Field Demonstration in WI
Change in PCE



○ **HRC injection point** △ **Monitoring well**

Figure 2

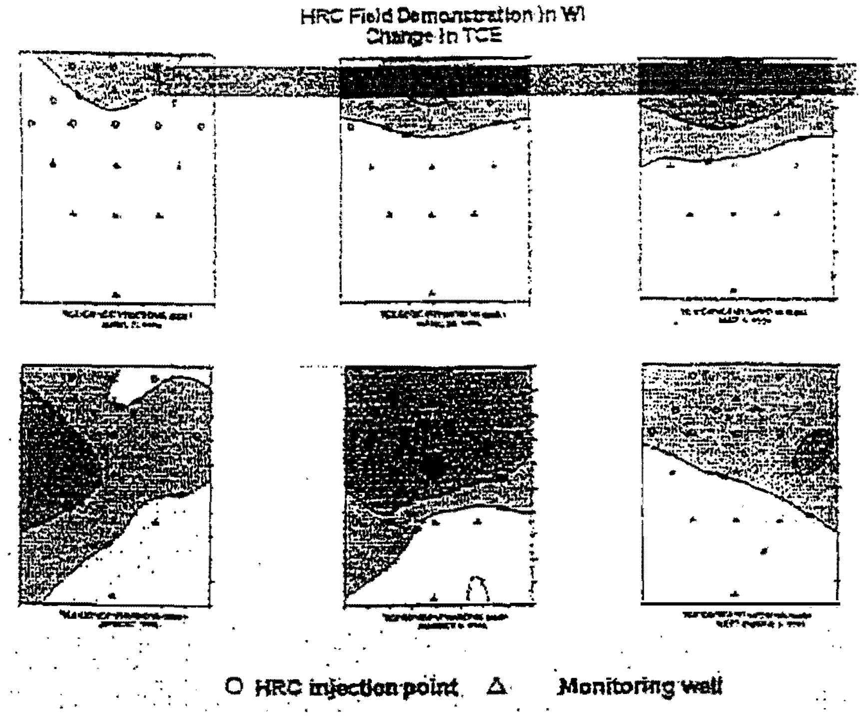


Figure 3

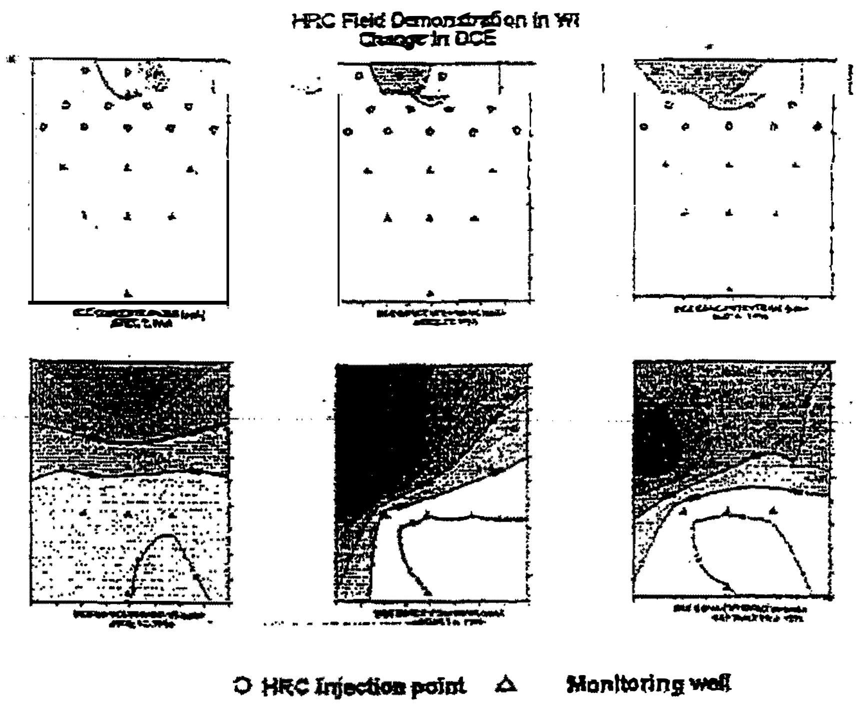


Figure 4

Hydrogen Release Compound and the Remediation of Higher Order CAH's

Regenesis has just announced the experimental availability of its new Hydrogen Release Compound (HRC) as an option for the bioremediation of higher order CAHs such as PCE and TCE. The material is a proprietary food grade polymer that degrades to produce a simple alcohol and lactic acid. The role of short chain organic acids and alcohols in the remediation of CAHs has been defined by Gibson and Sewell (1). In this process, the acids and alcohols are metabolized by one group of organisms to yield hydrogen which in turn is used by another group of organisms to effect reductive dechlorination. A typical system would involve the conversion of lactic acid to acetic acid by acetogens whereby one mole of lactic acid produces two moles of hydrogen. The two moles of hydrogen are then available for a very efficient stochiometric conversion of PCE or TCE to dechlorinated alkanes by organisms conveniently called reductive dehalogenators.

The value of a controlled release of lactic acid is emphasized in a body of work from the Gossett lab at Cornell including, most recently, Fennell (2). In these studies it emphasizes that there is competition between reductive dehalogenators and methanogens, the latter wanting to use the hydrogen in the conversion of carbon dioxide to methane. A low concentration of hydrogen favors the reductive dehalogenators and starves out the methanogens who have a larger appetite for hydrogen. With an excess of hydrogen in the system the methanogens are favored and crowd out the reductive dehalogenators. Therefore, one wants to keep hydrogen concentrations low. This in turn is accomplished by the addition of organic acids which are slowly converted to hydrogen.

The problem with additions of pure lactic acid are that it all has to added at one time unless it is metered in with active systems. Also, by this method, using water that delivers dissolved oxygen will disrupt anaerobic conditions. Lastly, the use of a liquid pulse invites a flow of active agent away from the chlorinated source over time. In order to combat these problems with organic acid delivery, Regenesis developed its solid polymer that can be implanted conveniently through various push point technologies. The lactic acid is hydrolyzed off the polymer at a more appropriate, slower rate and stays where it is placed offering a long term source of hydrogen releasing material. This advance is analogous to the conversion from injections of chemotherapeutic agents which "spike the system" to the various time release approaches that offer more steady dosage.

1) Gibson, S.A. and G.W. Sewell. 1992. Applied and Environmental Microbiology 58(4): 1392-1393.

2) Fennell, D.E.., J.M. Gossett and S.H. Zinder. 1997. Environmental Science and Technology. 31: 918-926.

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Apr. 1992, p. 1392–1393 Vol. 58, No. 4
0099-2240/92/041392-02$02.00/0

Stimulation of Reductive Dechlorination of Tetrachloroethene in Anaerobic Aquifer Microcosms by Addition of Short-Chain Organic Acids or Alcohols

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Received 10 June 1991/Accepted 22 January 1992

The effect of the addition of common fermentation products on the dehalogenation of tetrachloroethene was studied in methanogenic slurries made with aquifer solids. Lactate, propionate, crotonate, butyrate, and ethanol stimulated dehalogenation activity, while acetate, methanol, and isopropanol did not.

Although the ecological and public health risks associated with tetrachloroethene (PCE) contamination may be the most severe when spills affect groundwater, little is known about the environmental conditions necessary to initiate and sustain dehalogenation activity in contaminated aquifers. This study was done with core material collected from a site impacted by both aviation gasoline and chloroethenes at a Coast Guard Air Station at Traverse City, Mich.

Collection of core material, making of microcosms, sampling, and chloroethene analysis were done as described previously (11). The microcosms differed in that 10 g of aquifer material and 20-ml serum bottles were used. The final concentrations of donors added were as follows: acetate, 4 mM; lactate, 3 mM; propionate, 3 mM; butyrate, 2 mM; crotonate, 2 mM; methanol, 4 mM; ethanol, 2 mM; and isopropanol, 3 mM. The PCE addition was 1 μl of a methanol stock solution (0.751 g of PCE per 10-ml total volume in methanol) to give a PCE initial concentration of approximately 30 μM. A small amount of headspace was left in these bottles for ease of handling. All bottles were well shaken after all amendments had been made.

Four fatty acids and three alcohols were tested for the ability to act as the source for reducing equivalents for PCE dehalogenation. The production of trichloroethene (TCE) and total dichloroethenes in microcosms, using these compounds as electron donors, is shown in Fig. 1. Samples from microcosms amended with lactate or ethanol had TCE present at the first sampling point at 6 days (Fig. 1). Butyrate, crotonate, and propionate also supported dehalogenation, although the lag period was longer, while acetate, methanol, and isopropanol did not support dehalogenation above that observed in the unamended control during this time period (Fig. 1). The measurements from the early time points were quite variable because of differences in the onset of dehalogenation. However, at the last two time points, significant differences (Student's *t* test with $\alpha = 0.05$) in the total amount of dehalogenation products present were observed between microcosms amended with lactate, ethanol, propionate, crotonate, or butyrate and those which were unamended or were amended with acetate, methanol, or isopropanol.

Several researchers have demonstrated the stimulation of reductive dehalogenation of chloroethenes by addition of organic supplements or hydrogen (1, 4, 5, 7, 10). These studies were done with soil which was high in organic material (4.2% organic carbon) (1), with inoculum from a bioreactor (4, 7, 10), or with a pure culture derived from anaerobic sludge (5). In contrast, our study was done with aquifer material from an oligotrophic aquifer (maximum total organic carbon of 0.04% in unamended microcosms).

This experiment showed that dehalogenation activity could be observed with an appropriate electron donor within a week, although in other experiments several weeks were required (data not shown). This was probably due to the particular core material used. However, although the time at which dehalogenation capability develops in a particular sample may vary, the overall pattern is consistent. The microcosms amended with substrates which would be expected to be easily degraded under anaerobic conditions, such as lactate and ethanol (9), showed dehalogenation products as early as 6 days in this particular experiment. Microcosms amended with compounds such as butyrate, crotonate, and propionate, which are more difficult to degrade anaerobically (9), had a longer incubation period before large amounts of dehalogenation products were present (Fig. 1). The compounds which supported dehalogenation of PCE in this aquifer material would all be expected to produce hydrogen during their anaerobic oxidation (9). Methanol and acetate did not support significant dehalogenation activity during the time course of this experiment. Although both of these compounds have been shown to produce some hydrogen under some circumstances (3 [and references therein], 12), neither would be expected to produce large amounts of hydrogen during their anaerobic metabolism. This suggests that in this system hydrogen produced during the metabolism of the fatty acids and alcohols may be the immediate electron donor for supporting dehalogenation. Freedman and Gossett (7) showed that hydrogen could support dehalogenation of chloroethenes, although methanol was the better substrate for their bacterial cultures.

It appears that this experimental ecosystem may be different in nature from the others reported from digesters (4, 6, 7) or biofilms (2) in that neither acetate nor methanol appeared to support dechlorination of the PCE during the course of the experiment, although many compounds known to produce hydrogen during anaerobic metabolism did support dechlorination activity. Similar results were seen in a study of the

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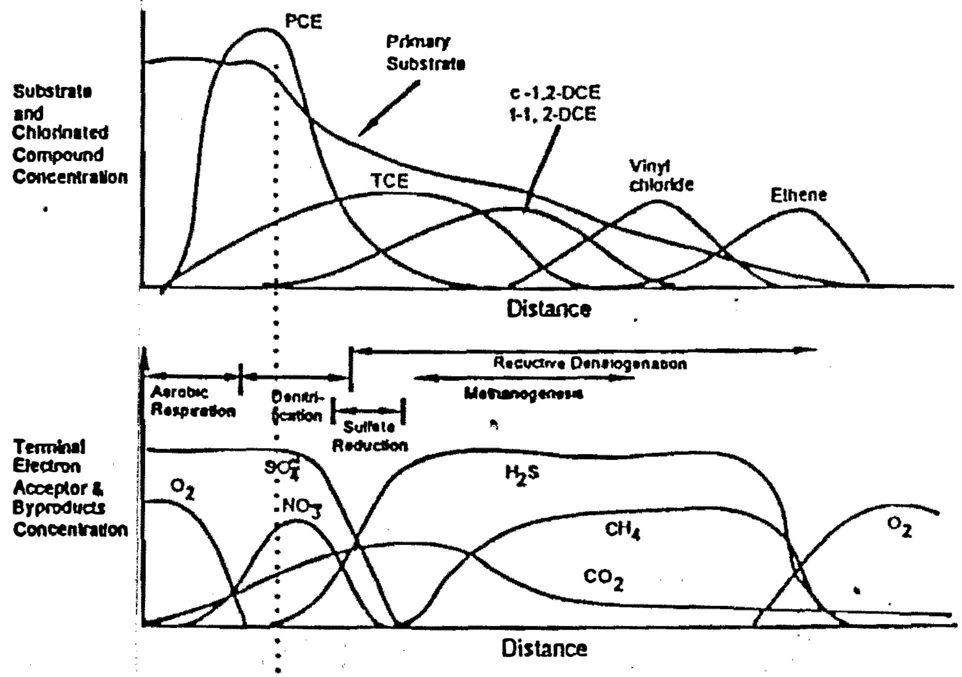
Evidence of Chlorinated Solvent Degradation

- Reduced Aquifer Conditions
  - Oxygen & Nitrate Depletion
  - Hydrogen Sulfide & Methane Present
  - Hydrogen Generation
- Microbial Degradation Products
  - cis-DCE
  - Vinyl Chloride
  - Ethylene
- Source of Electron Donor Identified at Site

Typical Degradation Patterns in Chlorinated Solvent Plumes

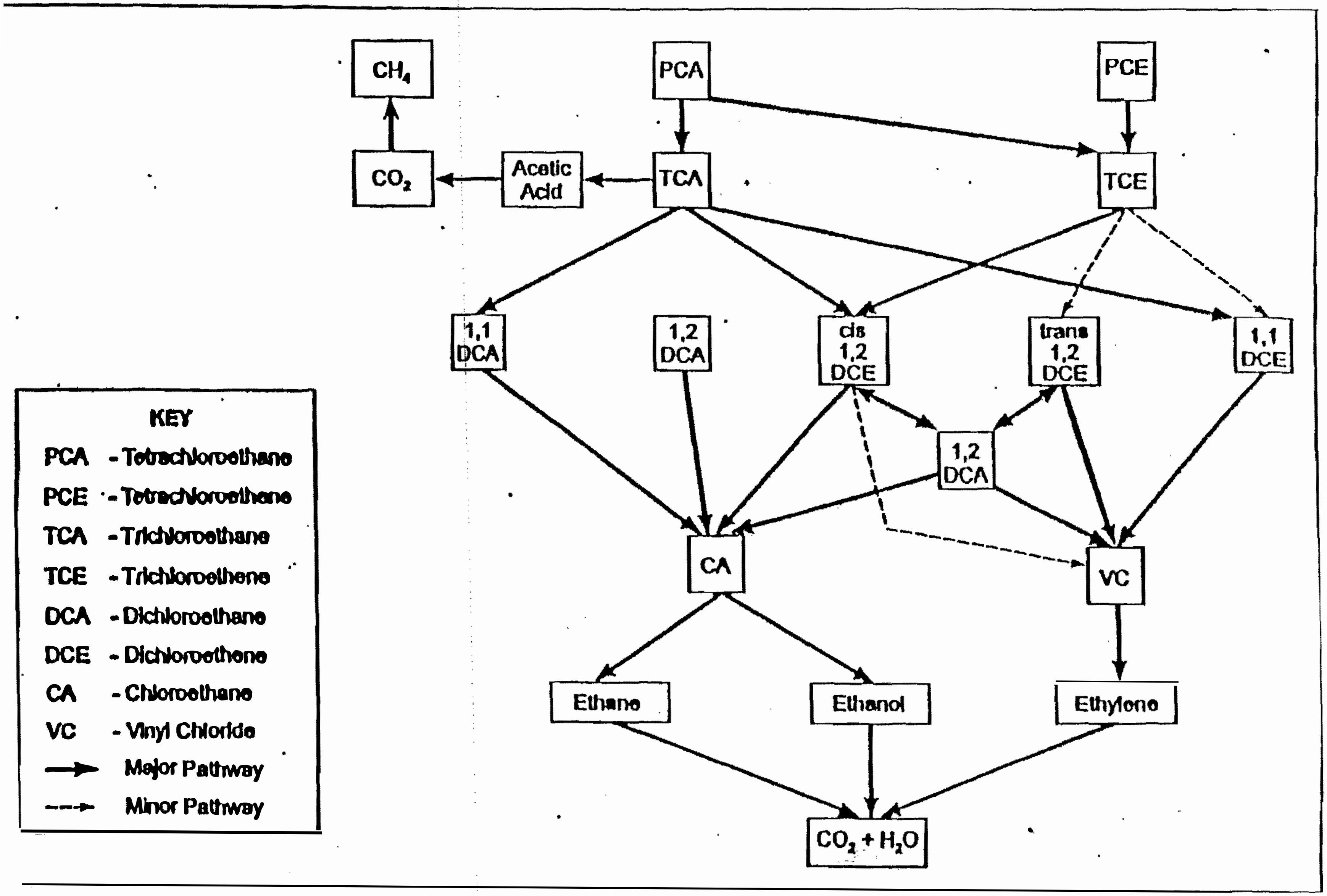


Hydrogen Peroxide Addition

- Application since 1970's
- Decomposition Releases Oxygen
- Strong Oxidant-Forms Free Hydroxyl Radicals
- Continuous Feed for Aerobic Enhancement
- Concerns
  - Safety
  - Microbial Fouling or Disinfection

Performance Results

- Results from an industrial site indicate that vinyl chloride degraded most rapidly with ORC as the only applied treatment technology (Bell, 97)
- Another study found that the rate of vinyl chloride degradation in the presence of ORC is significantly greater than the rate achieved by natural attenuation alone (Martinovich, et.al. 97)



igure 2. Transformations of chlorinated aliphatic hydrocarbons.

How does HRC work ?

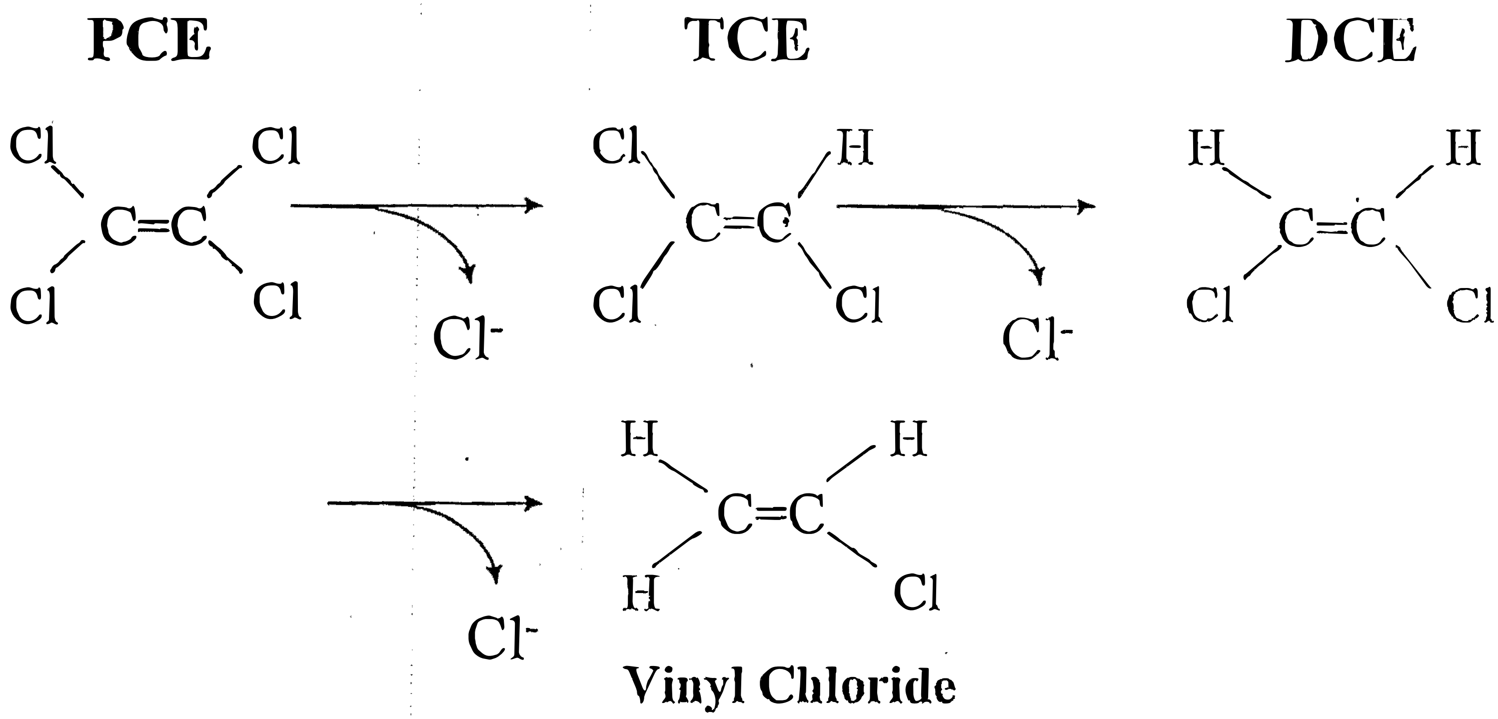
HRC is composed of a proprietary, food grade lactic acid polymer which steadily degrades in water to alcohol and lactic acid which are metabolized by fermentation organisms to yield hydrogen. The hydrogen is then utilized by reductive dechlorinating microorganisms to convert PCE & TCE to lower chlorinated species

What is HRC ?

HRC is an acronym for "Hydrogen Release Compound"

HRC is an In-Situ Anaerobic Dechlorination technology which stimulates the release of hydrogen by naturally occurring microorganisms into a contaminated plume

Anaerobic Dechlorination



Requires anaerobic conditions and reduced carbon source

Key benefits to using HRC

- HRC is a passive remediation technology
- HRC is non toxic in water
- HRC adds food grade lactic acid to a contaminated plume, naturally generating hydrogen thereby enhancing the natural dechlorination process without the use of costly capital equipment

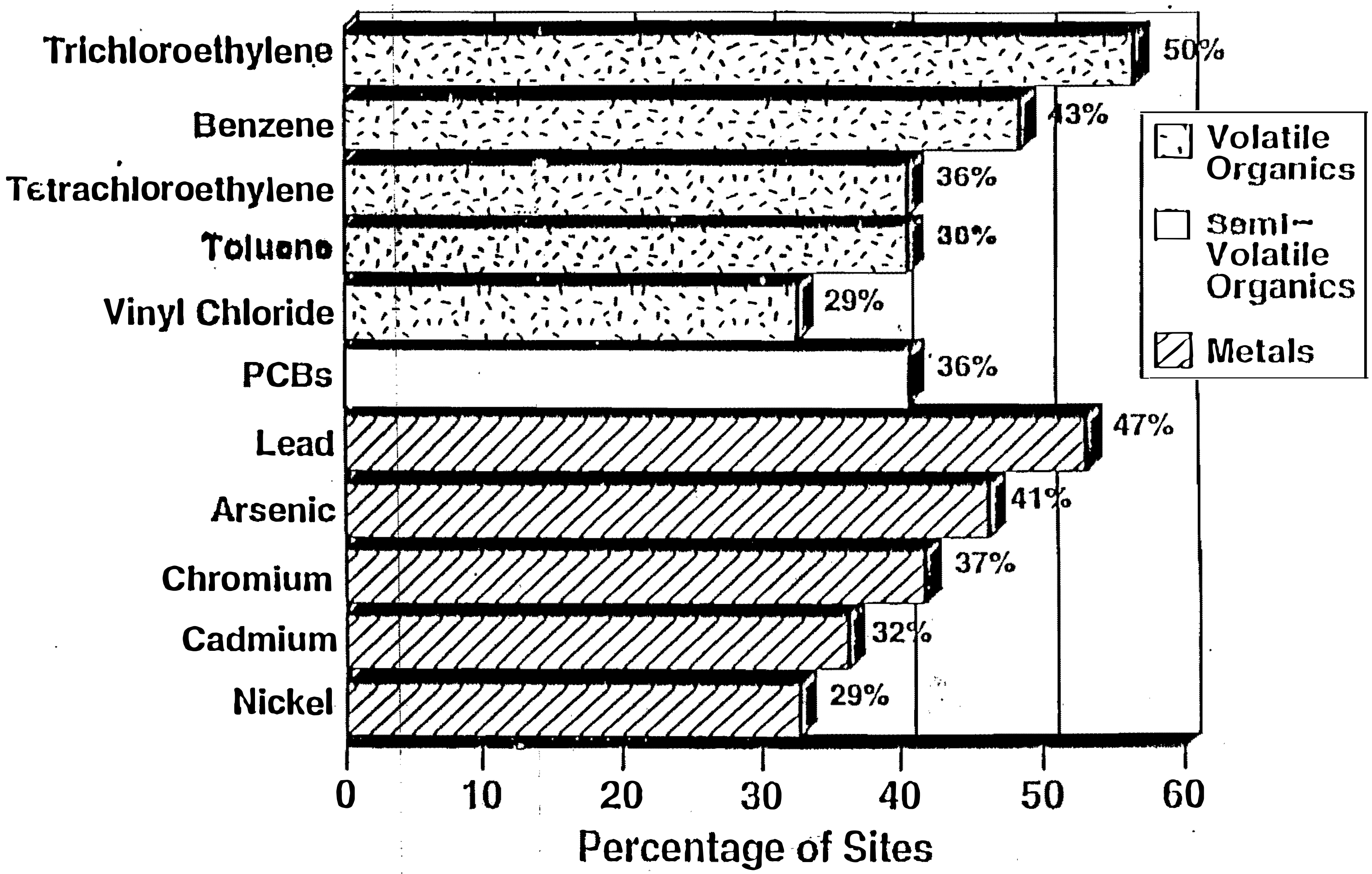
HRC Development Approach

- Patents applied for in late 1997
- Lab tests performed demonstrating process
- 1st phase of field demonstration underway
  - 10 single well and minbarrier tests
- 2nd phase to include expanded sites-3Q98
- Quantifiable Field Demonstrations for peer review publication due to start by 4Q98

CHLOROALKANE Contaminants with Greatest Remediation Potential

COMPOUND	PRIMARY USE	CONTAMINATED SITE MARKET	DEGRADATION TYPE
<u>PCE</u>	Dry Cleaning, Degreasing	Dry Cleaners; Metal Prod. Manuf,Landfills	An Dechlor. (An Met)
<u>TCE</u>	Dry Cleaning, Degreasing	Dry Cleaners; Metal Prod. Manuf,Landfills	An Dechlor. Aero CoMet. (An Met)
<u>DCE</u>	Solvent, Degreasing	PCE/TCE Sites; Metal Prod. Manuf,Landfills	An Dechlor. Aero CoMet. (Aer/An Met)
<u>VC</u>	Plastics Indus, Refrigerants	PCE/TCE Sites; Metal Prod. Manuf,Landfills	Aero Met. Aero CoMet (An Dechlor.)

Most Common Contaminants at Superfund Sites



* A site may contain more than one of these contaminants

6/17/97

State Monitoring Requirements

- Duration
  - 1 Yr. (5)
  - 2 Yr. (5)
  - ≥ 2 Yr. (2)
  - 1-4 Yr. (1)
  - Meet Stds. (8)
  - Plume Shrinks (1)
  - Site Specific (5)
- Frequency
  - Quarterly (25)
  - Semi-Annually (2)
  - Tri-Annually (1)
  - Site Specific (13)
- Typically 2-6 wells