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October 10, 2014

Mrs. Kiera Thompson  
Division of Environmental Remediation  
NYS Department of Environmental Conservation  
625 Broadway, 11th Floor  
Albany, NY 12233-7014

Re: Schmukler's Dry Cleaners, Brownfield Cleanup Agreement  
Site No. C360088  
City of New Rochelle, Westchester County  
Response to NYSDEC Comments August 11, 2014  
January 2013 IRM Pilot Study

Dear Mrs. Thompson:

John V. Soderberg (JVS) is responding on behalf of our client, HNJ Realty, LLC, relative to comments received from the New York State Department of Environmental Conservation, Division of Environmental Remediation (NYSDEC DER) dated August 11<sup>th</sup>, 2014 with regard to the submission of the Interim Remedial Measure Pilot Study dated January 2013. As required, this letter provides a response to the NYSDEC comments on the aforementioned report. Each of the NYSDEC comments is reiterated below, with a response that follows.

**Comment: 1** All IRM designs and work plans, including this pilot study, must be certified by a New York State licensed professional engineer, as defined at 6 NYCRR 375-1.2(aj).

**Response:** I agree with this comment and have provided the necessary certification. Please see revised work plan.

**Comment:2** Clarify that the presented work plan is pilot scale. The purpose of a pilot study is to evaluate whether the technology selected for, in this case an interim remedy, is effective in achieving remedial action objectives. Pilot studies for in situ treatments also gather data to be used in full -scale applications such as effective dosages, appropriate locations for injection wells, and the time required to observe a decrease in contaminant concentrations. For instance, a pilot-scale treatability test for bio-remediation products generally include but are not limited to a) pumping test to determine sustained groundwater extraction rate and general aquifer response; b) aquifer recharge response tests (tracer test); c) microbial response to injection of electron acceptor and nutrients; and, d) long-term operability of the system (aquifer and/or injection well fouling).

Section 1.0 states that, "The intention of this pilot study is to mitigate groundwater contamination issues discovered at the subject property in effort to strive toward governing standards," which is a more accurate description of a full-scale interim remedial measure (IRM). The Department supports a pilot scale effort which could easily lead into a full scale IRM should the pilot prove its effectiveness.

Also, studies conducted in a laboratory (as mentioned in Section 4.1) often have vastly different outcomes than those conducted in the field, hence the practicability of performing a field pilot study.

Response: The work plan will be made clear to express this is a pilot study work plan. The work plan will propose effective dosage amounts and the exact location of the intended treatment area. Time frames on the amount of time to see adequate reductions can be estimated but pinpointing an exact time is difficult. Based on our prior experience with working with these microbes we expect to see declination of all VOC (aromatics and halogenated) and SVOC's within the first 6 months or two quarterly sampling events. No pumping tests or aquifer response tests were recommended by the manufacturer of the biological agent so it is not anticipated that any such tests listed in comments a-d will be performed.

**Comment: 3** Section 1.1: Please update the site use/tenants, and verify whether the office space on the second floor of the site building remains unoccupied.

Response: Section 1.1 lists the updated site use/tenant that currently reside on the second floor. Please see revised report section 1.1.

**Comment: 4** Section 1.4 This section is repeated from the previous section in regards to public supply, please remove the earlier section.

Response: This section has been removed. Please see revised text in section 1.4.

**Comment: 5** Section 1.5 & 2.0: Relevant data from the Supplemental Remedial Investigation should be included as well as referencing older data. The older data is appropriately referenced when used to depict maximum detected contaminant concentrations.

Response: The supplemental investigation data mainly pertains to off-site investigation. This data which includes: off-site bedrock well sampling data, does not pertain to this pilot study.

**Comment: 6** Section 2.0, Summary of Site Contamination: When discussing contaminant concentrations in this section, the environmental media in which the contaminants reside must be given, as well as sample dates. Data tables and/or figures depicting the extent of maximum contaminants and the most recent round of data which may demonstrate the effect of the soil vapor extraction/sub-slab depressurization system (SVE/SSDS) as mentioned, should also be included.

Response: The environmental media discussed in section 2.0 pertains to groundwater, as revised in the work plan. The data discussed in the work plan is several years old. More recent data does not exist other than data from the MW-3 monitoring well located in the former equipment room.

We really don't have any concrete evidence of groundwater concentration reductions as a result of the on-going SSDS/SVE remediation other than reductions of PCE concentrations in MW-3 post installation.

**Comment: 7** Section 2.0: When referring to particular areas or well points at the site, please indicate where the locations of these may be found on a figure.

Response: A figure has been added to the pilot plan depicting the areas discussed/well points in 2.0.

**Comment:8** Section 3.0: Add, "to the extent practicable," to the remedial action objectives of reducing groundwater contaminant concentrations to New York State groundwater quality standards. Also, clarify if the purpose of the pilot is to study the effect of the treatment on source area contaminant reduction, or to study the effect of treatment on the horizontal and vertical extent of the contaminant plume in all environmental media.

Response: Please refer to the report for the revised text stating, "to the extent practicable". The report is also revised to state that the purpose of the pilot study is to determine the effect of the treatment on source area groundwater contamination.

**Comment:9** Section 4.1 Clarify if field parameters in groundwater have been measured to determine whether field conditions are amenable to this type of in situ treatment.

Response: Information provided by the manufacturer, Micro-Bac® International, state that the only relevant parameter that needs to be analyzed for is pH. According to the scientists at Micro-Bac® International, the pH should be between 5-9. We have since gathered the wet chemistry data from the site during quarterly monitoring/sampling activities and found that the pH of the groundwater throughout the site is in optimal range. As stated in the revised section 4.1 additional degradation parameters will also be analyzed including: dissolved oxygen (D.O), ORP, temperature and conductivity.

**Comment:10** As mentioned in comment #2 above, the calculations for product dosage is based on optimal laboratory conditions. Baseline groundwater parameters should be recorded, and consultation with the supplier providing the biological agent should be considered regarding which field parameters should be tested for prior to implementation.

Response: As mentioned above the manufacturer has stated that pH is of the utmost importance but additional baseline parameters will be analyzed in addition to pH such as: dissolved oxygen (D.O), ORP, temperature and conductivity.

**Comment:11** Section 4.2: Clarify if the calculations presented are taking into account the horizontal and vertical extent of the plume or just the total volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) present in the groundwater in the immediate source area. If the calculations presented are taking the extent of the plume into account, site hydrogeological information must be considered.

Response: Since the work plan is now being presented on a pilot scale, the focus of the remediation will be concentrated in the source area (former dry-clean equip room), particularly the area of MW-3 where PCE was found in the > 10,000 ppb range. Please see revised sections 4.2 and 4.3 for a more in depth discussion of the proposed study area.

**Comment: 12** Section 4.2: Remove references to the percentage of contamination in particular areas of the site; the determination of the nature and extent of contaminants has not been approved by the Department in a Remedial Investigation Report at this point in time.

Response: I agree with this comment and have removed all references regarding the percentage of contamination in any given area. Please see revised section 4.2 of the work plan.

**Comment: 13** A chemical handling, staging, and storage plan should be included in the pilot study.

Response: A chemical handling, staging and storage plan has been added as section 4.5 of the work plan.

**Comment 14:** Section 4.3: The Department will not approve using the current SVE/SSDS to deliver the treatment. The SVE/SSDS is part of an ongoing IRM system and must remain in working order until such time the Department, in consultation with the NYSDOH, agrees it may be shut off. A plan for the SVE/SSDS during the treatment pilot study must be presented in this pilot study (e.g. how long system will remain shut off, when system is deemed safe to shut back on, monitoring and action plan for indoor air while system is shut down and/or sampling to indicate the indoor air is safe with system off, etc.). The pilot study must include a plan depicting the location of injection points and monitoring wells necessary for the pilot study.

Response: Based upon the fact that this work plan is being conducted on a pilot scale, the system will remain fully operational throughout the conduct of the application procedure. The dosage quantities proposed are not expected to significantly raise the water table to levels that could have an effect on the system. The SSDS/SVE is also equipped with a water knock-out drum which would capture any liquid pulled in through the vapor wells.

Section 4.4, "Supplemental Monitoring Wells" discusses the application well location (MW-3) and locations of proposed monitoring wells at the site. Figure-4 attached to the work plan also depicts the locations of all existing and proposed wells at the site.

**Comment: 15** Section 4.3: The following groundwater field parameters must be measured to monitor treatment effectiveness: dissolved oxygen, oxygen reduction potential, total organic carbon, pH, temperature, iron, methane, sulfate. The pilot study proposes monitoring for VOCs on a monthly basis post-injection. Again, consultation with the supplier regarding effective monitoring may be

beneficial, and may also allow the monitoring of field parameters until particular or asymptotic levels are approached before VOC/SVOC analysis and comparison of tetrachloroethylene (PCE) degradation products is performed. For instance, sampling for ethene, the end product in PCE enhanced biological in situ treatments, has been demonstrated as a good method for determining healthy microbe populations and treatment effectiveness.

Response: Please refer to section 5.0, "Monitoring Effectiveness" which discusses monitoring for the following parameters: dissolved oxygen, oxygen reduction potential, total organic carbon, pH, temperature, iron, methane, sulfate. According to the manufacturer monitoring for VOCs is the best way to determine the effectiveness of the treatment. I agree that adding an ethene test to the monthly monitoring event will be beneficial in determining complete breakdown of chlorinated solvents.

**Comment 16:** Section 4.0 & 8.0: Please indicate whether other or newer products have also been considered for use in this pilot study. While the products specified in the pilot study have been effective in some case studies, newer and potentially more effective products for present site conditions have come on the market in recent years.

Response: After researching alternative products available on the market, the manufacturer has assured me that the M1000H bacteria strand is the best, most cost effective biological agent available, given the site conditions. The M1000H has the unique ability to simultaneously degrade both aromatics and halogenated compounds.

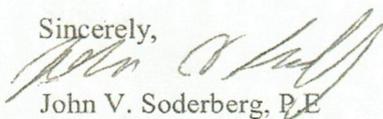
**Comment 17:** Additional detail must be provided on how to measure effectiveness of the pilot study and how to determine whether the pilot study is successful. As mentioned in comment #15, groundwater field parameters should be added to the monitoring plan.

Response: As mentioned in the response to comment 15, additional parameters such as: dissolved oxygen, oxygen reduction potential, total organic carbon, pH, temperature, iron, methane, sulfate and ethene will be analyzed for in addition to the full VOC list (8260C).

**Comment: 18** Section 7.0 states that a comprehensive report will include, "Conclusions and recommendations pertaining to the need for additional treatment events if warranted." This should instead indicate that the report will include whether the pilot test was successful enough to warrant full-scale treatment or warrant another pilot study using a different method or injection product.

Response: Section 7.0 has been revised to state that either a full-scale treatment plan will be proposed or an alternative pilot study using a different product will be proposed; depending on the results of the pilot study.

Sincerely,



John V. Soderberg, P.E.

cc Justin Halpin  
Walter Berninger  
Hal Shapiro

**BROWNFIELD CLEANUP PROGRAM**

**PILOT STUDY  
WORK PLAN**

**FOR**

**HNJ REALTY LLC.**

**FOR**

**SCHMUKLERS CLEANERS**

**358 - 364 North Avenue, New Rochelle, New York**

**Site No.: C360088**

**Index No.: A3-0542-0306**

**PREPARED FOR**

**NEW YORK STATE DEPARTMENT OF**

**ENVIRONMENTAL CONSERVATION**

**625 BROADWAY**

**ALBANY, NEW YORK 12233-7016**



**PREPARED BY**

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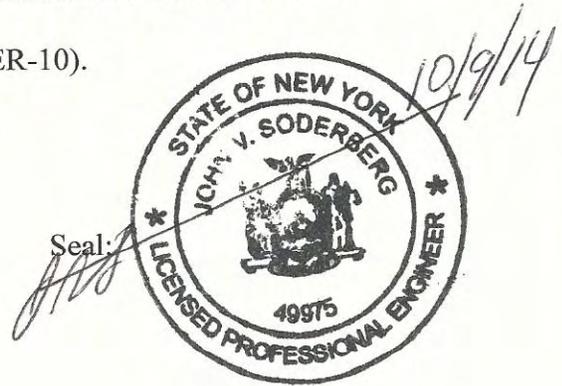
**October 2014**

Draft

**DER-10 Certification**

I, John V. Soderberg, certify that I am currently a NYS registered professional engineer [as defined in 6 NYCRR Part 375] , and that this Pilot Study Work Plan was prepared in accordance with all applicable statutes and regulations and is in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

John V. Soderberg P.E



Signature: *John V. Soderberg*

License number: 049975

Date: October 10<sup>th</sup>, 2014

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### FIGURES

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### ATTACHMENTS

- Attachment-A Micro-Bac Brochure
- Attachment-B Lab Case Study
- Attachment-C M1000H Product Info
- Attachment-D Tri-Phasic 12 Product Info
- Attachment-E M1000H Material Safety

## 1.0 INTRODUCTION

This document serves as a Pilot Study (PS) Work Plan to be performed at the subject property pursuant to the requirements of an executed Brownfield Cleanup Program Agreement (BCA) (dated February 27, 2006), between the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER) and HNJ Realty, LLC, *the Volunteer*. The Site is a commercial property located at 358 through 364 North Avenue, New Rochelle, New York (see Figures 1 and 2), fully described as Section 4 - Block 1206 - Lot 19 of the tax maps of City of New Rochelle.

The intention of this PS is to determine the effectiveness of the proposed remedy at a select location on-site. The PS will evaluate the remedies ability to reduce groundwater contamination to concentration levels that are applicable with the governing standards. Substantial groundwater impacts have been documented at the subject property through the conduct of the Remedial Investigation (RI) for which the presence of chlorinated solvents and petroleum related hydrocarbons were discovered in groundwater. The overall remedial objective of this study is to meet the regulatory standards for groundwater with regard to the standard guidance values (SGVs) outlined in the New York State Department of Environmental Conservation (NYSDEC) Division of Water Technical and Operational Guidance Series (TOGS). Primarily halogenated volatiles dominate the contamination at the subject site but significant petroleum related hydrocarbons remain interior at the site within the groundwater. The simultaneous treatment of both halogenated and petroleum related volatile organic compounds (VOCs) via one (1) type of treatment method is the main objective discussed in the following IRM Work Plan.

The proposed in-situ treatment method involves biological remediation by enhanced biological degradation. Micro@Bac International, an environmental biotechnology company, has been chosen as the soul provider of the proposed microbial degradation products to be used at the site. The primary target location for the use of these microbes will be in the area known as the “former dry-

cleaning equipment room”(referred to as the “equipment room” throughout). Significant chlorinated impacts have been discovered in this area with concentrations of tetrachloroethene (PCE) far exceeding the applicable standards. The treatment method proposed herein will aim to reduce chlorinated contamination and petroleum related contamination by employing a single tactical approach. See Attachment-A.

### 1.1 Site History

According to review of the City of New Rochelle records, as well as a review of historical Sanborn Fire Insurance Maps, the subject property was developed as early as 1891 with two residential-use buildings. The property was subsequently redeveloped with a multi-tenant two-story commercial building. The first floor and basement of the building have been utilized by Schmukler’s Dry Cleaners since around 1914. This business has historically operated on the first floor and in the basement of the building. Currently, the first floor of the building is being rented by United Community Center owned by Jackie A. The southern portion of the building is currently being rented by Comfort Homes. The second floor of the building provides professional space including: a spa, music studio, taxi cab company, HNJ Realty office and a financial company.

### 1.2 Site Description

#### Physical Site Description

Site Name: Schmukler’s Dry Cleaners  
358 through 364 North Avenue, New Rochelle, New York

Owner: HNJ Realty, LLC

Location: 358 through 364 North Avenue, New Rochelle, New York  
Latitude -73.784480", Longitude "40.914176"

Brownfield Cleanup Agreement Site No.: C360088

Index No.: A3-0542-0306

The subject property is located at an elevation of approximately 80 feet above mean sea level according to review of USGS Topographic Map, Mount Vernon Quadrangle (Figure 1). The subject property consists of a partial two-story/part one-story commercial building on a 0.21 acre

parcel identified as the street addresses 358 through 364 North Avenue, New Rochelle, New York. The subject parcel (Site) is located in the City of New Rochelle, County of Westchester. The property is assessed as 0.21 acres in size and improved with a commercial building constructed in 1914. The owner of record of the subject property is HNJ Realty, LLC<sup>1</sup>. An addition was made to the western portion of the building circa 1937. An addition was also made to the southwestern portion of the building sometime prior to 1987. A final addition was made to the northwestern portion of the building (which includes the steam boiler) in 1987.

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### 1.3 Adjacent Property and Land Use

The subject property is located within a mixed commercial/residential use area. Properties along North Avenue are predominantly occupied for commercial use, with some maintaining residential apartments above. Commercial uses dominate areas within one block east and west of North Avenue. Beyond this one block area, residences are the prevailing land-use.

The following businesses are located to the north of the subject site on the west side of North Avenue: 366 Real Estate Company; 360 Family Dentistry. Located on the southern side of Lockwood Avenue heading to the west the following businesses are noted: 2 Lockwood, Mattress Dealer; 6 Lockwood, Cabinet Store; 8 Lockwood, LB Inc Swimming Pools.; 10 Lockwood, Modern Press; 12 Lockwood, LBI. Located to the direct west is 17 May Street which is mainly a residential complex. To the south on the west side of North Avenue is Love Music Inc.

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<sup>1</sup>According to the information provided by the client.

#### 1.4 Public Water Supply

Public water is provided to the subject property by United Water New Rochelle. No on-site potable or dry cleaning or washing make-up supply wells, active or inactive, were observed during the inspection. According to information provided by United Water, the supply source is surface water that is purchased from the New York City Department of Environmental Protection (NYCDEP). The three sources of the New York City supply that is utilized includes the Croton, Catskill and Delaware Aqueducts. The Central Avenue and little Catskill pump stations supply the day to day demands to the system.

#### 1.5 Surface Water and Hydrogeology

According to the Surficial Geology Map of New York Lower Hudson Sheet produced by the University of the State of New York; State Education Department, 1989, the subject property is located within an area of New York where the surficial geology is defined as glacial till. The till is described as variable texture (e.g., clay, silt-clay, boulder clay), usually poorly sorted, which was deposited beneath glacial ice. The till is generally characterized by mixtures of relatively impermeable loamy matrix-to-sandy in areas underlain by gneiss or sandstone. The thickness of the till varies between one and 50 meters.

The subject property is located in the eastern portion of the City of New Rochelle and groundwater flow direction could not be determined from published information. As groundwater is not used as a potable water source in the Site vicinity, current groundwater quality data are very limited. No water table elevation maps are available for the City of New Rochelle. However, given both the surface and bedrock topography in the area (which generally slopes down toward the Long Island Sound), groundwater flow in unconsolidated deposits and/or upper weathered bedrock is likely easterly-southeasterly, toward the Long Island Sound. A groundwater flow survey was conducted at the site as part of the supplemental remedial investigation activities utilizing all available overburden wells and bedrock wells. The results of the survey concluded that groundwater appears to be moving in a south-easterly direction.

Due to the heavily developed nature of the immediate surrounding area, groundwater quality is expected to be regionally degraded. No surface water bodies are located on, adjoining or proximate to the subject property. Ferris Creek and The Long Island Sound are located approximately 3,250 feet to the east/southeast of the subject property. According to Freshwater Wetland, National Wetland Inventory, Westchester Wetlands and Tidal Wetlands data available on the Westchester County GIS System, there are no regulated wetlands on or adjoining the subject property.

## 2.0 SUMMARY OF SITE CONTAMINATION

Historic data collected over the past several years has indicated the presence of chlorinated VOCs and petroleum related VOCs at the subject site in groundwater. The former dry-cleaning equipment room has been the main source area for chlorinated contamination and continues to be the main focus of our remedial efforts. An SVE/SSDS combo remediation system has been in operation since approximately the winter of 2009 and has been removing volatiles from the sub surface around the clock. The SVE/SSDS system is geared heavily towards the dry cleaning equipment room and the basement. The system also extends to the rear of the building focusing on the former dry-well where substantial PCE was found in GW-9 at 25,000 ppb. Concentrations of PCE have been discovered in GW-4 as high as 830,000 ppb and TCE as high as 58,000 ppb in groundwater beneath the dry-cleaning equipment room. (note: These concentrations are from the August 2007 RI). The active SVE/SSDS system has likely reduced these numbers since the system's inception during the winter of 2009. Please see Figure-3 for historical data discussed above. In December of 2008 MW-3 (located in the equipment room) was sampled and lab data indicated that PCE had a concentration of 26,000 ppb, TCE at 6,000 ppb, DCE at 2,400 ppb and Vinyl Chloride (VC) at 430 ppb. Samples were also collected during November of 2009 from MW-3, just prior to the start-up of the SSDS/SVE system, and PCE was recorded at 75,000 ppb, TCE at 4,000, DCE at 4,100 ppb and VC at 250. Nearly four years later, during August of 2012, PCE concentrations in MW-3 have been reduced to 18,000 ppb, TCE was significantly reduced to 810 ppb, DCE was recorded at 1,400 ppb and VC at just 61 ppb. This is most likely attributed to the active and ongoing SVE/SSDS system installed during the winter 2009 volatilizing VOCs from the shallow water table. The basement area had some levels of PCE detected but nothing close to the levels found in the equipment room.

Chlorinated VOC levels totaled approximately 10,000 ppb in the basement with the majority of the contamination consisting of DCE (8,700 ppb).

Petroleum related contamination has been found throughout the site in groundwater, mainly in the basement and the former dry-cleaning equipment room. Petroleum constituent levels have been detected as high as 890 ppb (1, 3, 5 trimethylbenzene) in the equipment room and 670 ppb (naphthalene). The source of these impacts is unknown but speculation as to the origin of the source widely differs. Regardless of the source origin remedial efforts provided in this work plan will address all significant petroleum related contamination at the site.

### **3.0 REMEDIAL ACTION OBJECTIVES**

Based upon the NYS TOGs document PCE, trichloroethene (TCE), dichloroethene (1-2 DCE) have a water quality standard of 5 ug/L or ppb. VC or vinyl chloride has a water quality standard of 2 ppb. Benzene has a standard value of 1 ppb, but many if not most of the petroleum related constituent standard values are 5 ppb. The goal of the proposed pilot study is to reduce groundwater contamination within the source area (former cleaner equipment room) to the extent practicable with regard to the applicable standards listed above.

### **4.0 PROPOSED PLAN**

The proposed remedial measure to be undertaken at the subject property involves treatment of both chlorinated VOCs and petroleum related VOCs by enhanced bioremediation. The use of bacteria (microbes/bac-t or M-1000H®) and Tri-Phasic®12 (nutrients), is proposed to help stimulate the degradation process where the proper naturally occurring microbes may be lackluster or nonexistent. The applied microbes produce enzymes that break down petroleum products and halogenated compounds, digest it, utilize it as a food source and after they've broken it all down, they die and go away. This remedial method of introducing bac-t and nutrients to a contaminated aquifer has been widely recognized by the environmental industry throughout the United States when treating

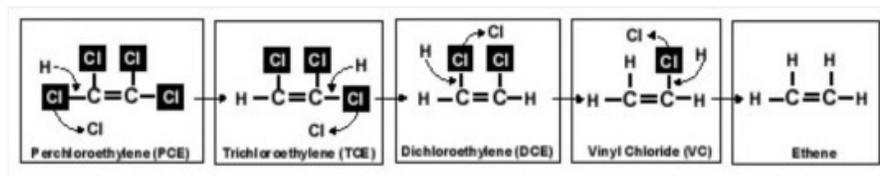
hydrocarbon and chlorinated solvent spill incidents. This pilot study will provide a unique and exclusive opportunity to treat chlorinated solvent and petroleum impacted groundwater, simultaneously, through enhanced bio-degradation. The following section will give a brief overview of the chemical processes that are undergone when remediation takes action and the process of accelerated degradation. The subsequent sections will provide information regarding dosage amounts and the proposed method for the installation of the microbes. Please see Attachments-C and D.

#### 4.1 Biological Process and Historical Evidence

The proposed microbial treatment method will seek to enhance two (2) processes that occur naturally in nature. These naturally occurring biological processes are known as anaerobic (absence of oxygen) and aerobic (oxygen present) biodegradation. Initial field parameters such as pH will be measured prior to the application process to assure that pH levels are within the optimal range of 5-9. Additional baseline field parameters measured will include: dissolved oxygen (D.O), ORP, temperature and conductivity.

Anaerobic degradation is the process of adding hydrogen (an electron donor) to soil or groundwater to increase the number and vitality of microorganisms that perform reductive dechlorination on chlorinated contaminants. The most common chlorinated contaminants found in groundwater are PCE, TCE, DCE, and VC. During this process anaerobic microbes substitute hydrogen (H) for chlorine (Cl) on chlorinated contaminant molecules, thus dechlorinating the compound. The illustration below exhibits the chemical breakdown process that is undergone during dechlorination.

As seen in this illustration the ending result of the degradation process leaves only ethene behind which is a non-toxic substance.



Aerobic degradation is the process in which oxygen (an electron acceptor) is added to soil or groundwater to increase the number of natural micro organisms performing biodegradation. Oxygen is widely considered by many to be the primary growth limiting factor for hydrocarbon degrading bacteria, however, it is normally depleted in zones that possess petroleum hydrocarbon contamination. During this process oxygen is used as a receptor for electrons in aerobic respiration, as it makes for a good receptor for electrons. Once the oxygen receives the electrons, it then converts them into water.

Each of these naturally occurring processes discussed above will be greatly enhanced by the addition of the proposed micro bacteria and nutrients. JVS has used Micro®Bac products on multiple projects and has been largely successful with the use of microbes for aerobic applications to petroleum contaminated environments. After only one (1) or two (2) applications of bac-t and nutrients, JVS has observed concentration levels significantly decline at sites where hydrocarbon levels far exceed the levels we are presented with at this site.

Micro®Bac International has had an enormous amount of success at sites where environmental conditions exhibited petroleum and chlorinated contamination. In a laboratory study conducted by Micro®Bac scientists groundwater samples were collected in order to conduct a four (4) week biodegradation study. This study concluded that at the end of four (4) short weeks PCE contamination was reduced from 49,000 ppb to less than 5 ppb through the use of the M1000H bacteria strand. Please see the case study as Attachment-B.

#### 4.2 Quantitative Calculations

The proposed bac-t and nutrients are proposed to be applied in the source area of the former dry-cleaning equipment room. Since this work plan is being proposed on a pilot scale, this is the only area that will currently receive treatment.

Approximately one (1) gallon of M1000H is required to treat <10,000 ppb of petroleum hydrocarbons and two (2) gallons of M1000H is used to treat every <10,000 ppb of chlorinated VOC per four (4) cubic yards (yd<sup>3</sup>). Each gallon of bac-t installed requires a nutrient chaser subsequent to the bac-t install. Nutrients are provided in one (1) gallon containers for which each one gallon container gets pre-mixed with 55 gallons of water (H<sub>2</sub>O). Four (4) gallons of this H<sub>2</sub>O/nutrient mixture will be applied for each one (1) gallon of bac-t applied. ( i.e. 10,000 ppb of total PVOCs occupied in an area that measures 10 yd<sup>3</sup> would require; 2.5 gallons bac-t, 10 gallons nutrient/H<sub>2</sub>O mix).

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Based upon closely estimated concentration values in the pilot study area (MW-3 PCE at 18,000ppb, TCE 810 ppb, DCE at 1,400 ppb), the table below illustrates the application dosage required in the source area:

Treatment Area	M1000H (bac-t)	Nutrient/H <sub>2</sub> O Mix	Number of Applications
Former Dry Cleaning Equipment Room (MW-3)	5 gallons M1000H	20 gallon nut./h <sub>2</sub> o	1 application event

During the initial application event JVS will closely observe the manner in which the sub-surface takes to the application. The information gained from the first application event will aid in determining the vadose and saturated zones load capacity.

#### 4.3 Application Procedure

In order to apply the bac-t and nutrient mix to the contaminated source area, JVS will utilize existing well MW-3 as the application well for the pilot test. Current site conditions are not conducive to installing additional wells in the former dry cleaning equipment room at this time. The former cleaner room is now a fully operational business with fully renovated office space and wall to wall

carpeting throughout. Considering the location of MW-3 and the fact that it is a fully viable well, this makes for ideal conditions to perform this pilot study. If the pilot study is a success, then future plans will have to be made in order to install additional application wells in this area.

Baseline groundwater data for MW-3 has indicated elevated chlorinated VOCs (approximately 20,000 ppb) and small amounts of Benzene breakdown products (xylenes, ethylbenzenes), which we expect to fully degrade through one application event.

Before, during and post application of the bacteria and nutrient installment nearby monitoring wells (see 4.4) in the vicinity of the treatment zone will be gauged for depth to groundwater (DTW). Before treatment, static water level measurements will be recorded to establish baseline readings. During the installment process nearby monitoring wells in the vicinity of MW-3 will be gauged for DTW (every five (5) minutes) to ensure that the water level does not rise too quickly. If a substantial increase in the water table elevation is observed the application process will cease. The application procedure will only continue when water level readings have returned or are close to pre-application water table levels.

The actual installation of the bacteria and nutrients is very simple. A small submersible pump is connected to a clean 1/4" piece of poly-tubing which is used to draw the bacteria solution from a small 5 gallon container. Poly-tube is then lowered to the bottom of the well and the pump is turned on, dispersing the bacteria into the groundwater at a very low flow rate. The minimal pressure generated from the pump allows for the solution to disperse vertically and laterally throughout the contaminated aquifer. The nutrient mix is prepared separately as discussed in section 4.2 and applied in the same manner as the bacteria at a low flow rate. Please see Figure-5 pilot study area.

During the application event in the source area the SSDS/SVE system will remain fully operational. Given the depth to groundwater in this area and the bottom of the nearest SVE well, this buffer will provide enough area for the dosage amount to be safely applied without infiltrating the vapor extraction system. The SSDS/SVE is equipped with a water knock-out drum which would prevent

any water/solution from infiltrating the system if indeed the water level did rise above the vapor well screens.

#### 4.4 Supplemental Monitoring Wells

Due to the limited access available at the site and the fact that the site has active residences occupying the building, additional monitoring well installations will be minimal. Since MW-3 is going to be utilized as a temporary application well two (2) monitoring wells will be installed in the area exterior to the rear of the building in order to monitor water levels in the former dry-well area. One (1) additional monitoring well will be installed near the western wall of the southern basement section. This well will be utilized to monitor the former dry-cleaning equipment room located directly adjacent to the western wall. Please refer to Figure-4 for the proposed locations and current locations of the monitoring wells.

#### 4.5 Chemical Handling, Staging and Storage

The M1000H will be stored off-site, at our facility, prior to the application event. M1000H is a natural, non-pathogenic, non-engineered biological product that meets Environmental Protection Agency (EPA) requirements for release into the environment. Special clothing or equipment is not required for handling M1000H.

### **5.0 MONITORING EFFECTIVENESS**

Monitoring the effectiveness of the treatment will be a key factor in determining the need for additional treatment. If necessary, supplemental applications of bac-t and nutrients will be conducted in order to reduce groundwater contamination levels to the extent practicable with regard to

acceptable TOGs standards. Routine sampling of monitoring well MW-3 will be conducted on a monthly basis. Analyzation of the following parameters will be conducted on a monthly basis: dissolved oxygen, oxygen reduction potential, total organic carbon, pH, temperature, iron, methane and sulfate. Monitoring wells will also be sampled by EPA method 8260 (VOCs) with ethene, in order to analyze chlorinated and petroleum related VOC levels. The first sampling event will take place one (1) month after the last treatment event and a second sampling event will be conducted two (2) months after the last treatment event. The lab data results will be used to determine the need for additional bacteria applications. If additional treatments are required the same procedure will follow the supplemental applications with regard to sampling the monitoring wells. If contamination levels after the first treatment event show a decline in contaminant concentrations, sampling events should be adjusted and performed on a quarterly basis. Moving from monthly sampling to quarterly sampling will require approval from the Department.

## **6.0 HEALTH AND SAFETY**

All Micro-Bac® products are natural, non pathogenic, and are not genetically engineered. They were developed by Micro® Bac's research and development laboratories and are manufactured under strict quality guidelines with batch and lot control. No special clothing or equipment is necessary to handle the product. Micro-Bac® products meet United States Environmental Protection Agency (USEPA) requirements for release into the environment.

In order to ensure the safety of our workers and staff involved with the treatment procedure JVS will adhere to the Occupational Safety and Health Administration (OSHA) guidelines. During the installment procedure JVS field technicians and staff will be equipped with Level D personal protective equipment (PPE). Level D OSHA guidelines require the following PPE:

- Eye protection- wear goggles or face shield (splash prevention)
- Head- hard hat when required
- Respiratory- Use dust respirator approved by NIOSH/MSA

- Hands- Wear neoprene gloves
- Feet- Wear steel-toe boots with chemical resistant soles or neoprene covers
- Clothing- Long sleeve shirts and long pant legs. Consider using Tyvek body suit or coveralls

Please refer to Attachment-E for M1000H material safety and data information.

## 7.0 PROJECT SCHEDULE AND REPORTING

DRAFT

Upon the NYSDEC's approval of this PS WP JVS will prepare to mobilize to the site within four (4) to six (6) weeks of the approval date. This will allow time for materials to be ordered and shipped directly to JVS. The NYSDEC will be given at least seven (7) days notice prior to the initial start date. The remedial work is anticipated to take between 2-4 working days.

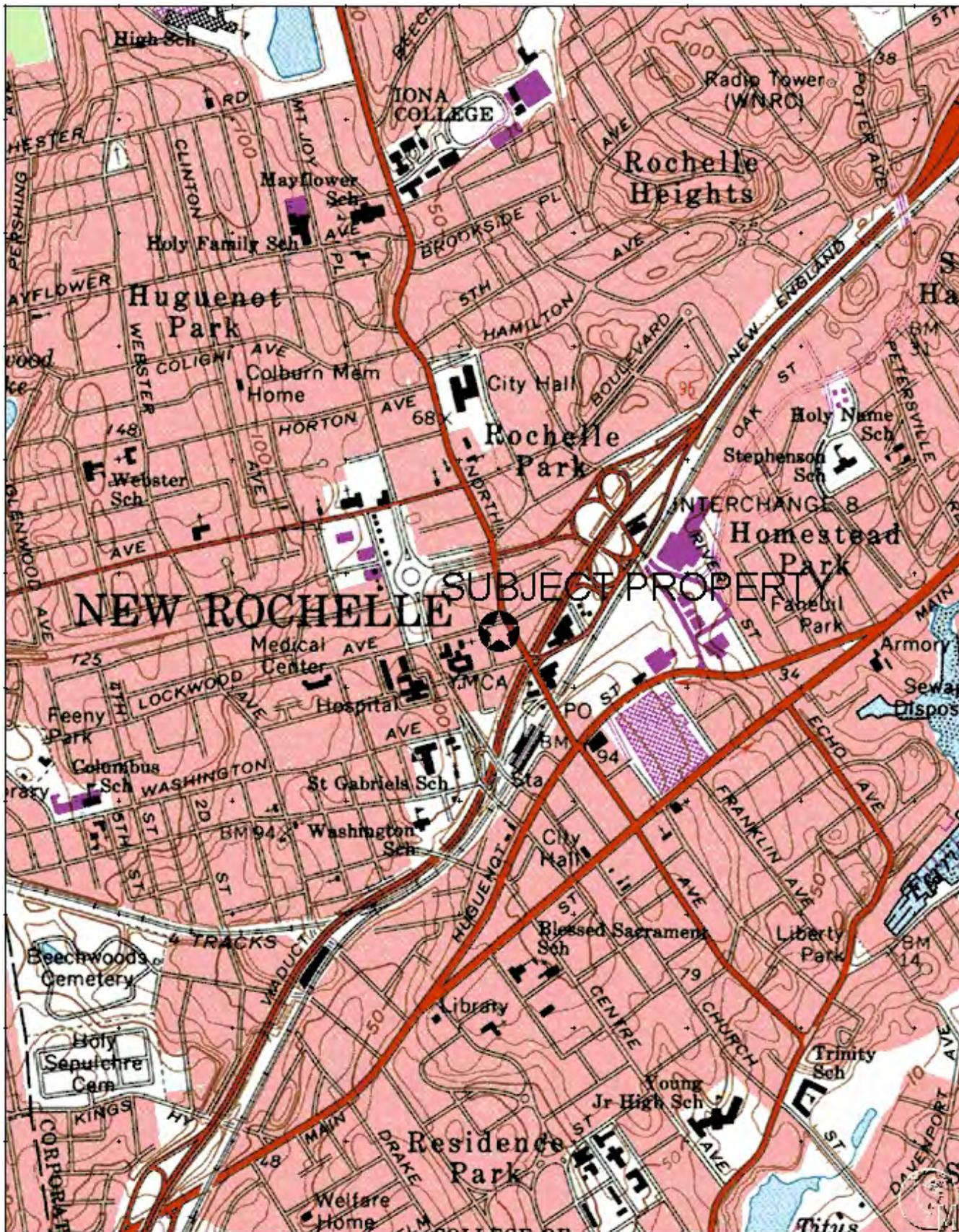
A comprehensive report detailing the events that took place during the conduct of the PS WP will be issued to the Department within 6 weeks after the final monitoring well sampling event. The comprehensive report will include but not limited to the following items:

- Precise dosing amounts of bac-t and nutrients installed
- DTW readings recorded during the treatment event
- Laboratory data results from monitoring wells associated with the pilot study
- Graphs, tables, spreadsheets and charts depicting lab data
- A comparative discussion which outlines pre and post application conditions
- A discussion on the effectiveness of the pilot study and whether or not a full-scale treatment plan will be proposed or an alternative pilot study using a different product will be proposed

## 8.0 CONCLUSION

In conclusion, JVS believes that this particular site is a great candidate for biological treatment due to the relatively shallow water table and underlying bedrock . These geological features should provide an ideal set of circumstances for achieving rapid success. The use of monitoring well MW-3 to apply the microbes will prove to be a major asset based on the current site conditions, access and the fact that it resides in the heart of the source area. JVS welcomes the input of the Department regarding this PS and is ambitiously looking forward to effectively cleaning up this site and more importantly our environment.

## **FIGURES**



Copyright © 1997, Maptech, Inc.

Remedial Investigation Report November 2007

**Figure 1- Site Location**

**Schmuklers Cleaners**  
**358 - 364 North Avenue**  
**New Rochelle, NY**  
**Site #C360088**  
**Index# A3-0542-0306**



**BERNINGER ENVIRONMENTAL INC.**

**groundwater consultants and geologists**

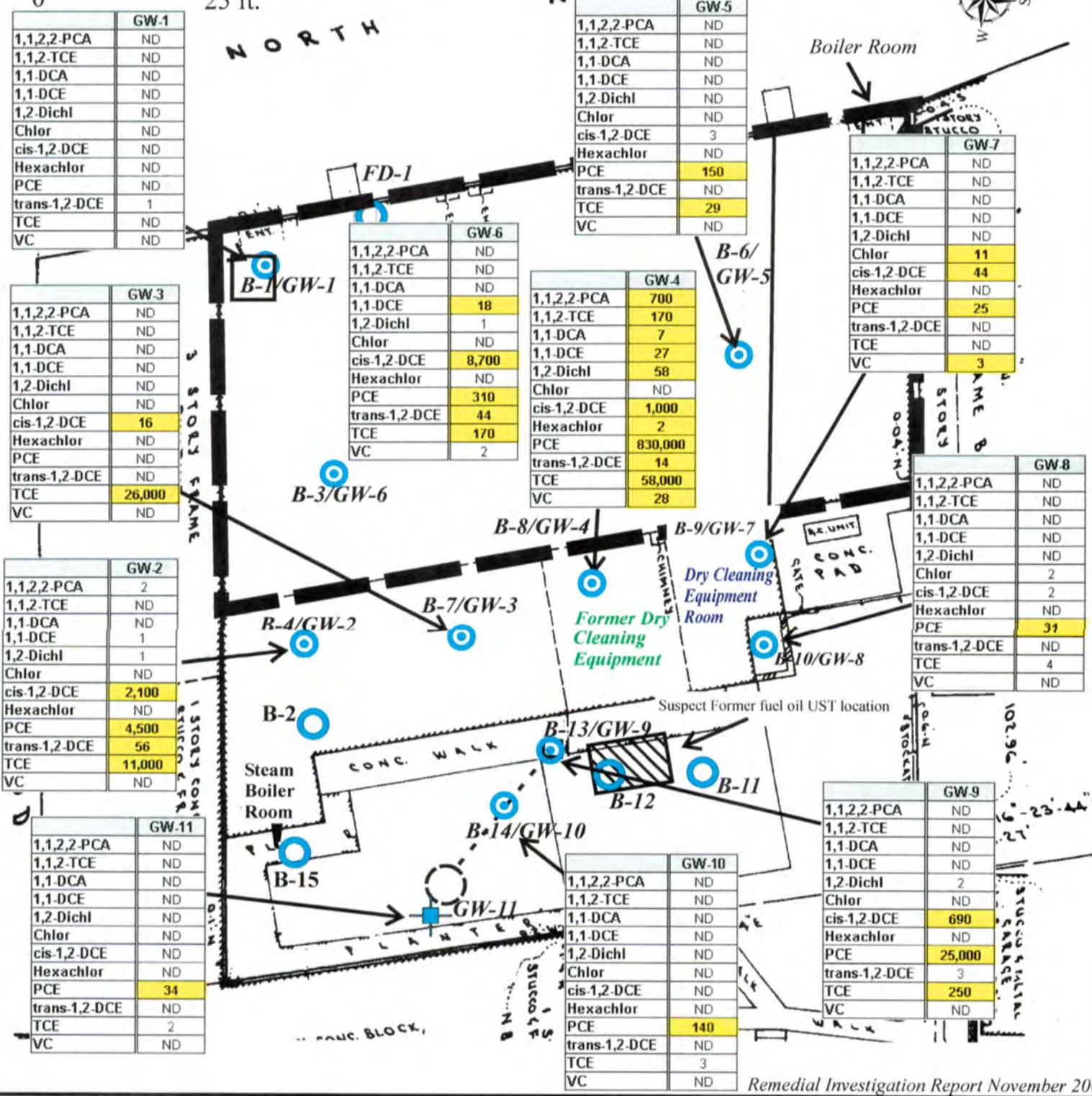
90 B Knickerbocker Avenue  
 Bohemia, New York 11716

Phone # (631) 589-6521  
 Fax # (631) 589-6528



Scale: 0 25 ft.

NORTH AVENUE



1,1,2,2-PCA- 1,1,2,2-Tetrachloroethane; 1,1,2-TCE- 1,1,2-Trichloroethene; 1,1 - DCA - 1,1-Dichloroethane; 1,1-DCE- 1,1-Dichloroethene; 1,2-Dichl- 1,2-Dichlorobenzene; Chlor - Chloroethene; cis-1,2-DCE - cis-1,2-Dichloroethene; Hexachlor- Hexachlorobutadine; PCE- Tetrachloroethene; TCE - Trichloroethene; VC - Vinyl chloride

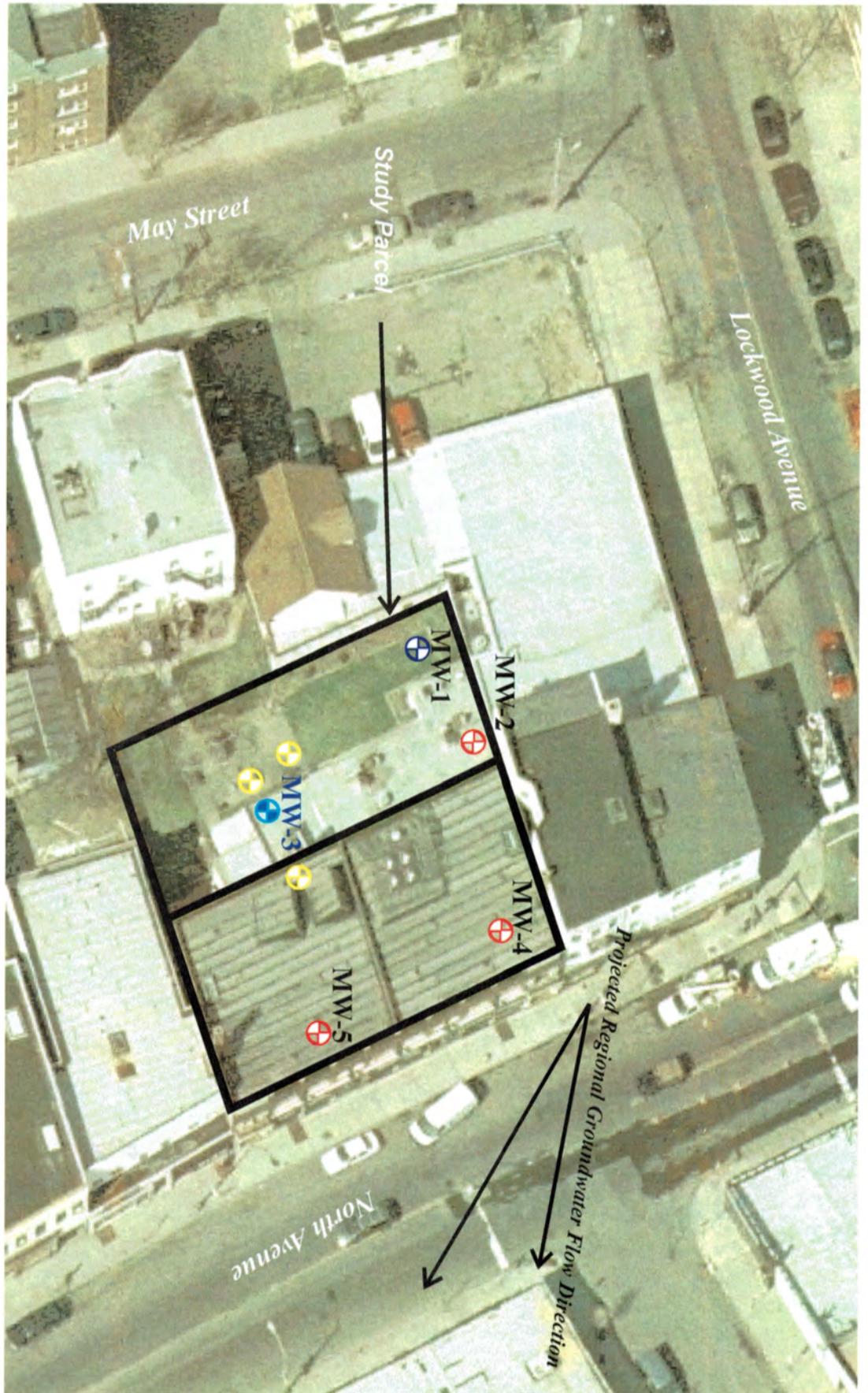
Bolded and highlighted concentrations are indicative of VOC detected at concentration exceeding applicable NYSDEC Class GA Groundwater Standards and/or Guidance Values

- Basement Portion of the Building - Soil Only Sampling Location - Soil and groundwater sampling locations - Groundwater Only Sample Location

Figure 3 - Halogenated VOCs detected in Groundwater Samples in micrograms per liter (ug/L)

Schmuklers Cleaners  
358 - 364 North Avenue  
New Rochelle, NY  
Site #C360088  
Index# A3-0542-0306

John V. Soderberg P.E.  
P.O Box 263  
Stony Brook, NY



⊕ -Proposed Application Well Location MW-3

⊕ -Proposed Monitoring Well Locations

⊕ -Viable Existing Monitoring Well

⊕ -Non-Viable Existing Monitoring Well

### Proposed Monitoring Existing Well Locations

Figure-4

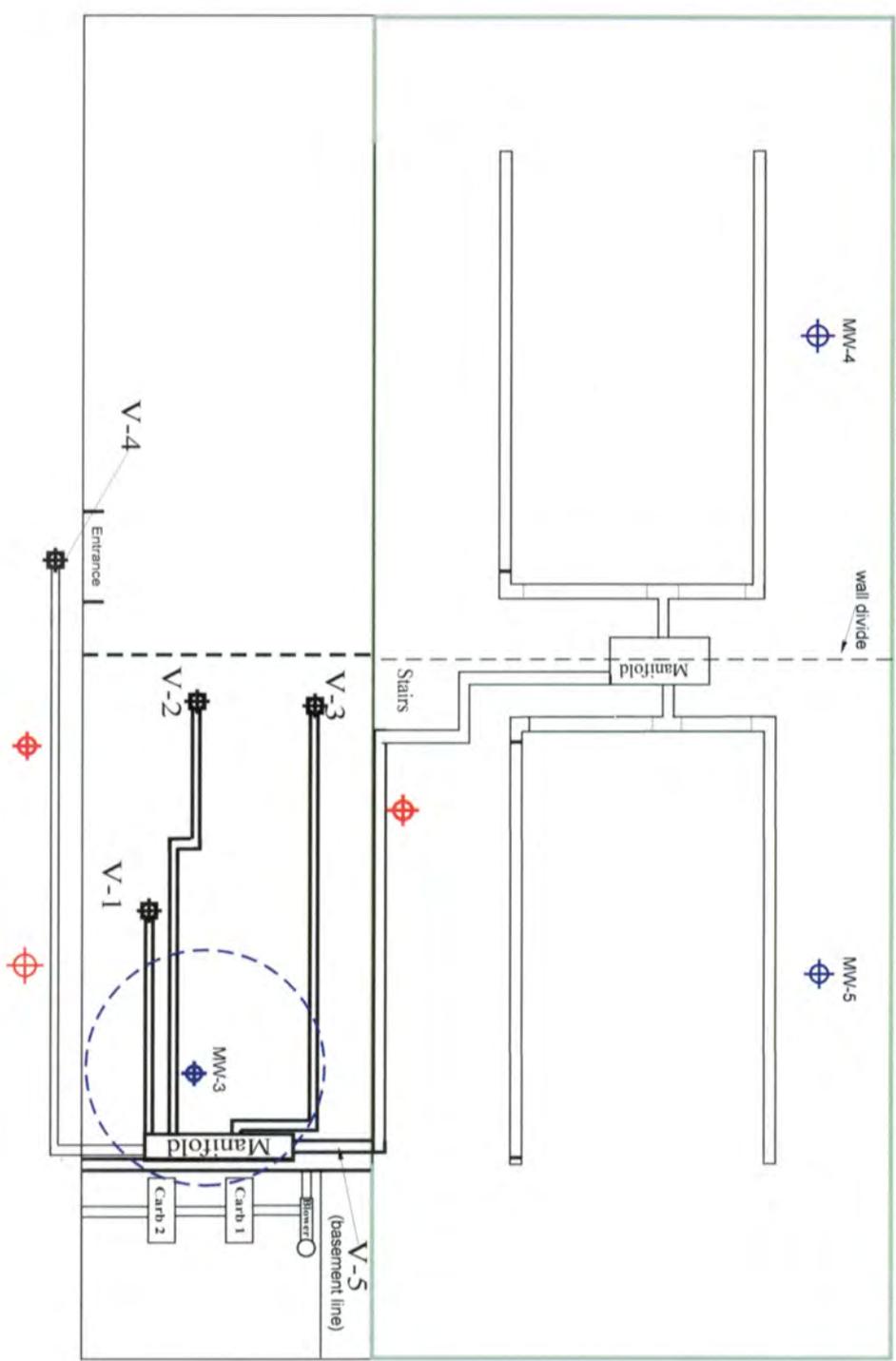
Drawn: JGH

Schmuklers Cleaners  
358 - 364 North Avenue  
New Rochelle, NY  
Site #C360088  
Index# A3-0542-0306

John V. Soderberg PE  
P.O. Box 263  
Stony Brook, NY



North Ave.



MMW-1

MMW-4

MMW-5

V-4

Entrance

V-2

V-3

V-1

MMW-3

Manifold

Stairs

Manifold

V-5 (basement line)

Blower

Carb 1

Carb 2

John V. Soderberg P.E.  
 P.O. Box 263  
 Stony Brook, NY

Schumklers Cleaners  
 358-364 North Ave.  
 New Rochelle, NY  
 Site# C360088  
 Figure-5

Drawn by: JGH

**Key**

- Basement Area
- ⊕ Vapor Extraction Well
- ⊕ Existing Monitoring Well
- ⊕ Proposed Monitoring Well
- Area of Proposed Pilot Study

## **ATTACHMENTS**

Attachment-A

*Micro Bac International Brochure*

*Leading*  
*The New Direction*

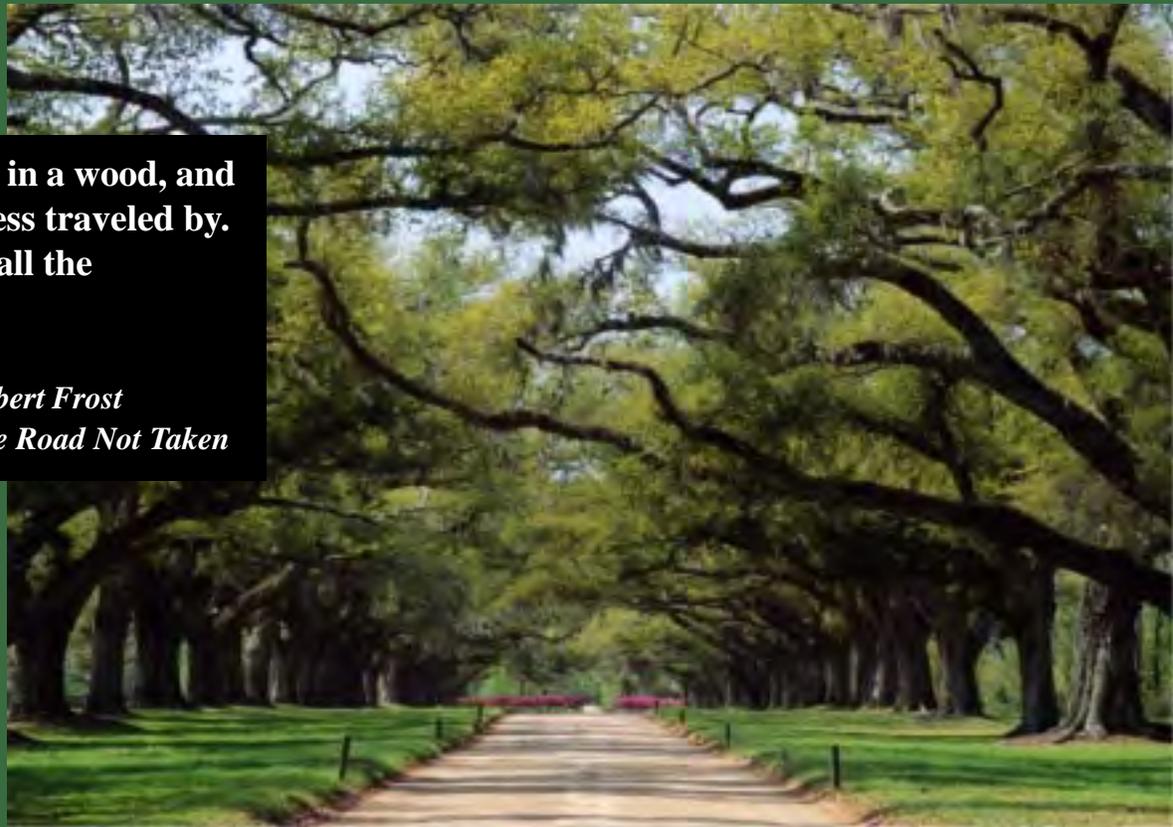
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**Micro-Bac International Inc.®**

**“Two roads diverged in a wood, and  
I -- I took the one less traveled by.  
And that has made all the  
difference.”**

*Robert Frost  
The Road Not Taken*



When Micro-Bac International Inc.® set out in 1979 to improve the environment and enhance the accessibility to the world’s energy reserves, they had little more than a conscience and a vision. Today, Micro-Bac continues to create global solutions for our resource-strapped planet. From the critical issues with water and wastewater, to the detrimental effects of environmental contamination, to the challenges of efficient petroleum production, Micro-Bac is committed to solving these problems with innovative and environmentally friendly solutions. And that first step has made all the difference.

## **A Commitment to Innovation**

Developing solutions for a marketplace that is fast approaching \$1 trillion requires not only constant innovation, but a dedication to a new way of thinking. Toward this goal, Micro-Bac R & D teams are firmly committed to new ideas such as Green Integrated Technologies. By recognizing the value of integrating other key technologies, Micro-Bac ensures that new product development creates compatible and synergistic solutions for us all.

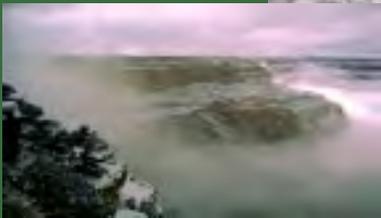


# Unlocking the Secrets of the Universe

The key to solving the world's environmental and energy problems is apparent to those researchers who truly understand the dynamics of environmental biotechnology. Micro-Bac has spent decades compiling and maintaining one of the most extensive environmental culture collections in the world. Micro-Bac scientists continue to discover new biological solutions from the myriad that can be expressed under the diverse conditions that exist in the environment.



*"The secrets to environmental solutions are ours for the taking."*



## Biotechnologies

Micro-Bac technologies are successfully being used in the following markets:\*

- ◆ Oil Production
- ◆ Reservoir Stimulation
- ◆ Refinery and Terminal Services
- ◆ Paraffin and Scale Control
- ◆ Fracture Damage Repair
- ◆ Tank Cleaning
- ◆ Bioremediation
- ◆ Municipal Wastewater Treatment
- ◆ Industrial Wastewater Treatment
- ◆ Grease Trap Maintenance
- ◆ Food Processing Waste
- ◆ Waste Odor Control
- ◆ Animal Waste Degradation
- ◆ Animal Health

\* Box color represents product line color

# SOLUTIONS WITH A CONSCIENCE

Oil Production



Paraffin & Scale Control



Tank Cleaning



Terminal Services

Frac Damage Repair



NASA Commercial Technology Spinoff



Soil & Groundwater Clean-up



Bioremediation



Wastewater Remedies



Grease Digestion and Trap Maintenance



Animal Waste Solutions



Degradation of Food Processing Wastes

# A Global Marketplace



Strategically located business interests throughout the world.

Micro-Bac has developed an impressive list of partnerships around the world that share our vision. It is the mission of the business development group to seek out those individuals which exemplify the entrepreneurial spirit and those businesses that realize the value in sharing strategies, time and resources.

## Information

As advances in Information Technology rapidly unfold, Micro-Bac will continue to develop its seamless business and distribution channels. Using both internet and intranet capabilities, our goal is to link partners, distributors, industries and customers with the latest information, the best products and the most innovative platform from which to build business.

# A Formula for Success



Today more than ever, businesses need to build strong relationships to stay competitive.

From distributors to joint ventures to strategic alliances, Micro-Bac continues to refine its business models for success. All Micro-Bac distributors are trained both technically and in business development to ensure long term success and greater market growth.

## A Full Service Company



# Leading the New Direction

The new direction requires us to address the Earth's diminishing resources with a dynamic consortium of science, business and vision. Micro-Bac is at the forefront of this revolution by combining biological innovation and information technology to develop safe, alternative solutions for cleaning up the environment.

The new direction has just begun and Micro-Bac is leading the way.



**Micro-Bac International Inc.**  
**3200 N. I H 35 • Round Rock, TX 78681**  
**Ph: 512-310-9000 • Fax: 512-310-8800**  
**Email: [mail@micro-bac.com](mailto:mail@micro-bac.com) • Web: [www.micro-bac.com](http://www.micro-bac.com)**

Attachment-B

*Lab Case Study*



## M-1000H★ Biodegradation Lab Study

**SUBSTANCE:** PCE Contaminated water

**TESTING:** Groundwater samples were obtained to perform a four week biodegradation study. The study was conducted such that each sampling point had a sterilized sample, a control sample, and test samples with bacteria only, with nutrients only, and with bacteria and nutrients.

The samples were incubated at 35°C in containers sealed to minimize any volatilization. Samples were analyzed by U.S. EPA method 8260 for volatile organics.

**RESULTS:** The following compounds were found in the samples: 2-butanone, acetone, benzene, ethylbenzene, m,p xylenes, methylene chloride, o-xylenes, t1,2 dichloroethene, tetrachloroethene (PCE), toluene, and trichloroethene. No vinyl chloride was detected in any sample prior to treatment.

The principal contaminants found were 2-butanone (methyl ethyl ketone) at 12,000 micrograms per liter and tetrachloroethene (PCE) at 49,000 micrograms per liter. All other contaminants were in the in the 200 micrograms per liter or less range. Volatilization appeared to be minimal as levels of 2-butanone and methylene chloride in the control were maintained throughout the incubation period.

Good evidence for biodegradation of the various pollutants was found. The M-1000H★ treated samples consistently produced levels lower than the uninoculated controls. The level of biodegradation ranged from >99% for 2-butanone to >97% for tetrachloroethene by week four. (see table below)

		<u>2-butanone</u>	<u>tetrachloroethene</u>
	Starting concentrations	12,000	49,000
Day 7	Control	10,000	17,000
	Bacteria	<100	4,000
Day 14	Control	14,000	270
	Bacteria	<100	11
Day 21	Control	9,200	27
	Bacteria	<100	<5
Day 28	Control	12,000	210
	Bacteria	<100	<5

Methylene chloride exhibited the least amount of biodegradation (19% decline), and by week four was the only pollutant out of eleven still detected in the samples. Vinyl chloride was not detected in any of the samples following treatment.

Attachment-C

*M-1000H Product Information*



## ● TECHNICAL DATA

# M-1000H★™

FOR THE DEGRADATION OF  
CONTAMINATED SUBSTANCES

### General Description

M-1000H★™ is a biological product designed and formulated for the broad spectrum degradation of a variety of compounds found in contaminated and/or hazardous wastes. These compounds include simple aromatics such as benzene, toluene, ethyl benzene, and xylenes, as well as more complex aromatics like naphthalene, chlorinated compounds, and benzo-a-pyrene. Alkane mixtures, including transport fluids (gasoline and diesel), are also degraded. A variety of chlorinated aliphatic and aromatic compounds such as trichlorethene and chlorinated benzenes and biphenyls (PCBs) are also degraded. This product has been used successfully in a variety of *in-situ* and *ex-situ* applications.

M-1000H★™ consists of live, specially selected, biologicals and biochemicals, along with a supply of balanced nutrients in a ready-to-use liquid medium.

These microorganisms thrive in a variety of site conditions with diverse soils and various water chemistries. They are capable of using many of the listed hazardous waste chemicals as a carbon source.

### Specifications

Color	light pink to tan
pH	6.5-8
Weight per gallon	8.51 lbs.
Specific gravity	1.02
Freeze point	32°F
Viscosity	1.30 cps - 60°F
Odor	mild organic

### Application

M-1000H★™ can be applied to contaminated or hazardous substances in numerous ways. For soil applications, the product can be sprayed, or the soil can be reduced to a slurry and circulated with added product. For vadose zone or groundwater applications, the product can be applied into wells or infiltration galleries. Often the addition of specially-formulated nutrients can be used to augment the activity of the product in conditions where macro nutrients such as carbon, nitrogen, or phosphate are limited. A good monitoring program is critical to the success of any bioremediation project.

### Handling and Safety

M-1000H★™ is a natural, non-pathogenic, non-engineered biological product that meets EPA requirements for release into the environment. Special clothing or equipment are not required for handling M-1000H★™. Routine hygiene should be observed.

### Shipping

M-1000H★™ is shipped in two sizes: in 5-gallon containers (45 lbs), and in 55-gallon containers (495 lbs), F.O.B. Round Rock, Texas.

### Service

When the use of M-1000H★™ is indicated, Micro-Bac International provides technical support services to its customers.

Attachment-D

*Tri-Phasic-12(Nutrients)*



# ● TECHNICAL DATA TRI-PHASIC 12™ BIOLOGICAL STIMULANT

## General Description

TRI-PHASIC 12™ is a proprietary blend of vitamins, minerals and organic nutrients used to stimulate microbial activity in product applications for Micro-Bac® International biological products where indigenous nutrients are insufficient to support optimal microbial activity. Such applications include bioremediation of contaminated soil and water. TRI-PHASIC 12™ may also be used in the remediation of oligotrophic waters and tank bottoms. By lowering the carbon/nitrogen ratio, biodegradation is enhanced and mineralization is promoted. TRI-PHASIC 12™ is supplied in an easy-to-use colloidal liquid form that flows and is freely soluble in water. It is designed to be used in conjunction with Micro-Bac® International products such as M-1000H\*™.

## Product Formula

TRI-PHASIC 12™ contains all the major and minor mineral compounds as well as defined vitamins required by the specific microorganisms used in the Micro-Bac® International products. It supports maximal activity of these microorganisms under both aerobic and anaerobic conditions.

## Product Specifications

Color	dark brown layers
pH concentrated	circa 4.3
pH diluted	5-8
Shipping Size	1 gal. container
Odor	mild
Wt. per Gal.	11.4 lbs.
Specific Gravity	1.30
Solubility	> 2 gal. per 100 gal water

## Dosage

Micro-Bac's® technical staff can provide dosage recommendations based on the design and volumes of the project site. For example one container of Tri-Phasic 12™ nutrient is generally used with 50 cubic yards of contaminated soil.

## Application

TRI-PHASIC 12™ is generally dissolved in water at a rate of 1 container per 55 gallons. It is generally applied after and occasionally simultaneous with microbial treatments.

## Handling & Safety

TRI-PHASIC 12™ is a natural product that meets EPA requirements for release into the environment. Special clothing and equipment are not required for handling TRI-PHASIC 12™ although contact by inhalation or touch should be avoided and the use of gloves and a dust respirator is suggested. Routine hygiene should be observed.

## Shipping

TRI-PHASIC 12™ is shipped in a one gallon container, F.O.B. Round Rock, Texas

## Service

When the use of TRI-PHASIC 12™ is indicated through testing, Micro-Bac® provides technical support and treatment design to its customers.

Attachment-E

*M-1000H MS/MSD*

**MICRO-BAC INTERNATIONAL, INC.**  
**3200 N. IH-35**  
**ROUND ROCK, TX 78681-2410**  
**(512) 310-9000 fax (512)310-8800**

**MATERIAL SAFETY DATA SHEET**

**Section 1. Identification**

Tri-Phasic Nutrient #12

**Section 2. Identity Information / Composition**

Hazardous Components

Phosphates, Potassium, Nitrogen Compounds

Common Name

Same

**Section 3. Physical Characteristics**

Specific Gravity

1.35-1.50

Boiling Point

>100°C

Melting Point

N/A

Solubility in Water

Water Soluble

Appearance and Odor

Rich chocolate brown liquid when suspended.  
Product settled in three phases after prolonged storage, faint chemical odor

**Section 4. Fire and Explosion Hazard**

Flash Point

N/A

Flammable Limits

N/A

Extinguishing Media

N/A

Special Fire Fighting Procedures

N/A

Unusual Fire and Explosion Hazards

None

**Section 5. Reactivity Data**

Stability

Stable

Incompatibility

Reducing Agents

Conditions to Avoid

Extreme Conditions

Hazardous Decomposition or Byproducts

Nitrogen Oxides

**Section 6. Health Hazard Data**

Routes of Entry

Skin, Ingestion

Carcinogenicity (NTP or IARC)

N/A

Signs and Symptoms of Exposure

If ingested, may cause gastric and/or intestinal upset, may cause irritation to skin or eyes

Emergency and First Aid Procedures

**Eye or Skin Contact:** Flush with clean water for 10 minutes

**Ingestion:** Do not induce vomiting; Drink plenty of water

**Section 7. Precautions for Safe Handling**

Material Release or Spillage

Clean with soap and water

Waste Disposal Method

Flush with clean water

Handling and Storage Precautions

Avoid contact with skin and eyes

Ventilation Required

None

Respiratory Protection

None

Personal Protection

Rubber, plastic, or cloth gloves

Work/Hygienic Practices

Routine

**MICRO-BAC INTERNATIONAL, INC.**  
**3200 N. IH-35**  
**ROUND ROCK, TX 78681-2410**  
**(512) 310-9000 FAX (512)310-8800**

**MATERIAL SAFETY DATA SHEET**

**Section 1. Identification**

**M-1000H★**

**Section 2. Identity Information / Composition**

Hazardous Components

None (TSCA 40 CFR 710.4 b)

Common Name

Microbial Product: Naturally occurring microorganisms

**Section 3. Physical Characteristics**

Specific Gravity

1.02

Boiling Point

100°C

Melting Point

0°C

Solubility in Water

Water Soluble

Appearance and Odor

Light Pink to Tan Liquid with Moderate Odor

**Section 4. Fire and Explosion Hazard**

Flash Point

NA

Flammable Limits

NA

Extinguishing Media

NA

Special Fire Fighting Procedures

None

Unusual Fire and Explosion Hazards

None

**Section 5. Reactivity Data**

Stability

Stable

Incompatibility

None

Conditions to Avoid

Extreme Conditions

Hazardous Decomposition or Byproducts

None

**Section 6. Health Hazard Data**

Routes of Entry

Ingestion; Eye Contact

Carcinogenicity (NTP or IARC)

None

Signs and Symptoms of Exposure

May Cause Gastric and/or Intestinal Upset

Emergency and First Aid Procedures

Ingestion: Do Not Induce Vomiting; Drink plenty of water

Eye Contact: Flush with clean water for 10 minutes

**Section 7. Precautions for Safe Handling**

Material Release or Spillage

Clean up with soap and water or with disinfectant

Waste Disposal Method

Flush with clean water

Handling and Storage Precautions

Store in tightly closed original container at temperatures between 13°C to 32°C

Ventilation Required

None Required

Respiratory Protection

None Required

Personal Protection

None required; use of gloves and safety glasses suggested

Work/Hygienic Practices

Routine