

# DRAFT Pre-Remedial Design Investigation Report

# **Jack's Drycleaners Site**

Site No. 734112

Village of Brewerton Town of Cicero Onondaga County New York

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Prepared for:

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REMEDIATION SOLUTIONS

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DRILLING APPLICATIONS

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#### 1.0 Introduction

Aztech Technologies, Inc. (Aztech) was contacted by the New York State Department of Environmental Conservation (NYSDEC) to perform a pre-remedial design investigation at the Jack's DryCleaners site under Aztech's NYSDEC Standby Remedial Services Contract number C100904. Previous investigations at the site identified a chlorinated volatile organic compound (CVOC) groundwater contamination plume originating from a septic system located behind the drycleaner building and extending approximately 500 feet to the southeast.

The purpose of the investigation is to assess the potential effectiveness of an enhanced anaerobic bioremediation alternative recommended in a feasibility study previously performed at the site by EA Engineering, P.C. of Syracuse, New York. The investigation is to determine if natural attenuation processes are occurring under current conditions and to evaluate hydrogeologic, geochemical and microbial characteristics to define parameters for possible implementation of enhanced anaerobic bioremediation. The remedial goals and objectives of the enhanced anaerobic bioremediation would be to restore the site to pre-disposal/pre-release conditions to the extent practical and legal. Remedial action objectives (RAOs) are based on contaminant-specific standards, criteria and guidance (SCG). For groundwater remediation at this site, Ambient Water Quality Standards (AWQSs) will be the RAO.

#### 2.0 Background

The site is located at 9628 Brewerton Road in the Village of Brewerton, Town of Cicero, Onondaga County, New York (**FIGURE 1 – Site Location Map**). The general topography is flat with a slight downward gradient to the east-southeast. The Oneida River is located approximately 1,000 feet northeast of the site.

Surrounding site use along Brewerton Road is primarily commercial. The immediate area east and southeast of Jack's Drycleaners consists of low-lying wet areas, open grassy areas and wooded land. A residential area is located further to the east and southeast.

In 2006, a petroleum spill resulting from a leaking underground storage tank (UST) system at the property adjacent to the south of Jack's Drycleaners was reported. Following the excavation of impacted soils, a subsequent subsurface investigation was performed at the property in 2007. Analysis of groundwater samples collected in close proximity the rear of the Jack's Drycleaners building indicated the presence of CVOCs.

The Jack's Drycleaner property was reportedly utilized as a gasoline station in the 1950s and as a dry cleaning facility since at least 1972. The site building was connected to a septic system which was located adjacent to the east side of the site building. After determining that the

septic system was the potential source area of CVOCs detected at the site, the septic system and impacted soils were removed in 2009 as an interim remedial measure (IRM).

Site characterization and remediation investigations included the installation of 22 monitoring wells, three (3) test pits, and the analysis of soil gas samples. Investigations performed by EA Engineering, P.C. concluded the following:

- The site is underlain by silt and clay with alternating layers of fine to coarse sand.
- Bedrock is encountered at depths ranging from approximately 14 feet to 25 feet below grade (fbg) and consists of highly weathered gray shale. The bedrock surface reportedly dips to the southeast and a trough feature is located southeast of the site.
- Shallow/overburden groundwater is generally encountered at 2 to 13 fbg. Overburden and bedrock groundwater are part of the same aquifer.
- Groundwater flow at the site is toward the southeast at a gradient of approximately 0.01 ft/ft
- A soil vapor intrusion (SVI) investigation indicated that none of the contaminants of concern were detected in the buildings adjacent to Jack's Drycleaners. A SVI investigation performed at eight (8) structures located downgradient of the groundwater plume indicated that CVOCs were present in these structures but at concentrations less than applicable New York State Department of Health air guidelines and at concentrations where monitoring and/or mitigation was not required. Analysis of sub-slab soil gas from beneath the Jack's Drycleaner building indicated elevated concentrations of perchloroethene/tetrachloroethene (PCE).
- Post-excavation soil analysis of sidewall and bottom samples retrieved following the IRM excavation of the septic system behind the Jack's Drycleaners building showed CVOCs present but at concentrations less than Part 375 Unrestricted Use and Protection of Groundwater SCGs. CVOCs in soil are not considered a media of concern at the site.
- CVOC impacts have been documented at monitoring well MW-15, approximately 500 feet from the former septic system location. The selection of contaminants of concern (COC) in groundwater at the site is based upon the frequency of detection exceeding standards and concentrations in groundwater. The COC are PCE and it's breakdown compounds; trichloroethene (TCE); cis-1,2,-dichloroethene; trans-1,2-dichloroethene, and; vinyl chloride (VC). PCE has reportedly been detected at concentrations as high as 41,300 ug/L. Groundwater monitoring data collected from 2009 to 2011 reportedly suggests that total VOC concentrations are decreasing.

Background information and data was obtained from the following:

• Feasibility Study (734112), prepared by EA Engineering, P.C., May 2012.

• Pre-Remedial Design Investigation Work Plan (version: draft), prepared by EA Engineering, P.C., July 2012.

#### 3.0 Scope of Work

The purpose of the pre-remedial design investigation is to determine if natural attenuation processes are occurring under current conditions and to evaluate hydrogeologic, geochemical and microbial characteristics to define parameters for possible implementation of enhanced anaerobic bioremediation. Tasks performed during this investigation included:

- Gauging of the site monitoring wells and development of groundwater elevation maps;
- Low-flow groundwater sampling and analysis of fifteen (15) monitoring wells, data collected included:
  - Monitoring well headspace analysis of total volatile organic compounds (VOCs) utilizing a photo ionization detector (PID);
  - Dissolved oxygen, pH, specific conductivity, oxidation-reduction potential, temperature, turbidity;
  - Total organic carbon, alkalinity, mercury, methane, ethane, ethene, sulfate, nitrate, target analyte list (TAL) metals and VOCs by EPA Method 8260;
- The installation of two (2) soil borings and analysis of soil samples from the soil borings for in-situ fraction organic carbon ( $f_{oc}$ ), soil bulk density and grain size analysis;
- Slug testing of five (5) monitoring wells to determine hydraulic conductivity;
- Microbial sampling and analysis of nine (9) monitoring wells to determine specific microbial species and populations;
- A site survey to update data on an existing site map, and;
- A report of findings.

#### 4.0 Methodologies and Results

#### 4.1 Monitoring Well Gauging

On September 17, 2012, an Aztech environmental scientist mobilized to the site (**FIGURE 2 – Site Map**) to gauge, purge and to conduct low-flow sampling on fifteen (15) monitoring wells. Prior to sample collection, selected monitoring wells were gauged to determine the depth to groundwater. Gauging was conducted utilizing a Solonist® water level probe capable of readings to one one-hundredth of a foot (0.01'). Gauging included nine (9) overburden monitoring wells (MW-1R, MW-2, MW-5, MW-6, MW-7, MW-9, MW-10, MW-12 and MW-14) and six (6) bedrock wells (MW-10BR, MW-13, MW-14BR, MW-15BR, MW-16BR and MW-17BR).

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Overburden depths to groundwater ranged from 5.28 (MW-1R) feet below grade (fbg) to 9.62 fbg (MW-6). Overburden depth to water averaged 7.86 fbg. Bedrock depths to water ranged from 7.41 fbg (MW-13) to 15.74 fbg (MW-16BR). Bedrock groundwater averaged 10.78 fbg.

Groundwater elevations were subsequently calculated by subtracting the depth to water from the respective top of casing elevation. The overburden and bedrock groundwater flow on September 17, 2012 was southeast in direction, which is consistent with historical data. Monitoring well gauging data is presented in the **Table 1** - **Appendix B**. Groundwater elevation maps for bedrock and overburden wells are attached as **Figures 3 & 4**.

#### 4.2 Low-Flow Groundwater Sampling

Prior to purging or sampling activities, the headspace in each monitoring well was field analyzed for total VOCs with a calibrated PID (10.6 eV). A vinyl chloride correction factor (2.0) was applied to all PID readings. Monitoring well headspace field analysis results are detailed below in **Table 2**.

Т	able 2 – Monitoring Wel	l Headspace Field Analys	sis
MW ID	Total VOCs (ppm)	MW ID	Total VOCs (ppm)
MW – 1R	37	MW – 12	4.0
MW – 2	8.0	MW – 13	357
MW – 5	10	MW – 14	1.1
MW – 6	1.6	MW – 14BR	4.6
MW – 7	81	MW – 15BR	6.1
MW – 9	1.7	MW – 16BR	3.8
MW – 10	7.9	MW – 17BR	2.7
MW – 10BR	1.8	-	-

All groundwater sampling was conducted in accordance with EA's Pre-Remedial Investigation Work Plan and USEPA low-flow guidelines. Purging occurred at a sustainable rate that minimized drawdown and stabilized the water table. According to EA's Pre-Remedial Investigation Work Plan, purging could not exceed 250 mL/min and drawdown could not exceed more than 0.3 feet throughout the purge. Each monitoring well was purged using a peristaltic pump with dedicated polyethylene and silicone tubing until water quality parameters stabilized and groundwater turbidity reached less than 50 nephelometric turbidity units (NTU's). This occurred at all monitoring wells in less than tree well volumes, with the exception of MW-2. MW-2 exhibited turbidity readings ranging from greater than 800 NTU's to 129 NTU's. Approximately 4.5 gallons were purged from MW-2 (4.5 gallons equals ~ approximately

4 well volumes), at which point, a sample was collected. Field sampling record and water quality parameters collected during purging are included as part of **Appendix C**.

Purge water was field analyzed using a Horiba U52 water quality meter, outfitted with a flow thru cell. Water quality parameters (temperature, pH, specific conductivity, oxidation reduction potential [ORP], dissolved oxygen and turbidity) were measured in real time and recorded throughout the well purging process and immediately prior to sample collection. The final water quality parameter readings of each well, prior to sample collection are detailed below in **Table 3**.

	Table 3 –	Low- Flow San	npling Final Wa	ter Quality Par	rameters		
MW ID	Temperature (Celsius)	рН	Specific Conductivity (mS/cm)	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	
MW-1R	18.41	6.48	0.48	-26	0.75	4.0	
MW-2	20.02	7.51	1.03	130	0.00	130	
MW-5	20.73	7.36	0.32	-75	0.00	18.3	
MW-6	16.22	7.01	0.87	-81	0.00	21.6	
MW-7	14.80	7.04	0.94	-1	0.00	23.5	
MW-9	18.69	7.46	1.12	107	0.02	47	
MW-10	14.64	7.11	1.31	-4	0.00	47.3	
MW-10BR	14.30	7.11	4.31	-33	0.00	5.2	
MW-12	16.56	7.47	0.84	-23	0.00	45.3	
MW-13	19.68	7.09	8.94	70	0.00	0.7	
MW-14	16.14	7.13	1.04	-38	0.20	12.4	
MW-14BR	14.98	7.26	0.98	-97	0.00	1.6	
MW-15BR	13.66	7.51	0.88	-57	0.00	32.2	
MW-16BR	14.22	7.51	0.62	62	0.00	6.4	
MW-17BR	13.99	7.77	0.48	-14	0.08	4.7	

Groundwater samples were collected subsequent to purging. Samples were transferred into laboratory provided containers and stored on ice. On a daily basis, samples were delivered to a Test America sub-office located in Syracuse, New York. Subsequently, the samples were sent to and analyzed at Test America Laboratory, located in Buffalo, New York (NELAC – NY455). The samples were analyzed for:

VOCs via EPA Method 8260;

- TAL metals via EPA 6010;
- Mercury via EPA method 7470;
- Methane, ethane and ethene via RSK-175;
- Total alkalinity via EPA 310.2.
- Total organic carbon via EPA 9060;
- Sulfate via ASTM D-516, and;
- Nitrate as N via EPA 353.2;

A summary of laboratory analytical results is presented below, refer to the Ground Water Analytical Summary Table (**Table 4 - Appendix B**) for details on individual monitoring wells and analysis results.

- Volatile organic compounds were detected within all groundwater samples. Furthermore, chlorinated solvents were detected in all groundwater samples.
- Tetrachloroethene was detected in all submitted groundwater samples, with the exception of MW-9 and MW-14. These concentrations ranged from 1.8 ppb at MW-6 to 10,000 ppb at MW-13.
- Trichloroethene was detected at MW-2, MW-5, MW-7, MW-9, MW-10, MW-12, MW-13, MW-14, MW-14BR, MW-15BR and MW-17BR. These concentrations ranged from 0.7 ppb at MW-10 to 2,000 ppb at MW-13.
- Vinyl Chloride was detected in five (5) overburden wells (MW-2, MW-7, MW-14, MW-12 and MW-14) and (3) bedrock wells (MW-13, MW-14BR and MW-16). Vinyl chloride concentrations ranged from 1.1 ppb (MW-2) to 270 ppb at (MW-13).
- Target Analyte List (TAL) metals were detected in all groundwater samples. Additionally, calcium and magnesium were detected above standards set forth by the NYSDEC in all groundwater samples. Aluminum, arsenic, barium, iron, manganese and sodium were also detected above standards in selected groundwater samples.
- Ethene, ethane and methane were analyzed via RSK-175. Ethene and ethane were detected in MW-13 at concentrations of 38 and 62 ppb, respectively. Methane was detected in all monitoring wells, with the exception of MW-15BR and MW-17BR. Methane ranged from 6.5 ppb at MW-10 to 1,700 ppb at MW-13.
- Total alkalinity was analyzed in all submitted groundwater samples. Alkalinity ranged from 142 ppb ant MW-1R to 562 ppb at MW-16BR.
- Total organic content (TOC) was analyzed at each sampling location via EPA method 9060. TOC was detected in all sampled monitoring wells with the exception of MW-17BR. TOC ranged from 0.6 ppm at MW-12BR to 6.3 parts per million (PPM) at MW-1R.

- Sulfate was analyzed via ASTM method D-516-90.02 and was detected within all analyzed groundwater samples. Sulfate ranged from 31 ppm at MW-1R to 236 ppm at MW-5. All sulfate detections were below standards set forth by the NYSDEC (250 ppm).
- Nitrate as N was analyzed via EPA method 353.2. Nitrate was detected in eight (8) (MW-1R, MW-2, MW-5, MW-9, MW-12, MW-13, MW-14BR and MW-17BR) of the submitted fifteen (15) soil samples.

#### 4.3 Soil Boring Installation and Soil Sample Analysis

On October 2, 2012, two (2) soil borings (AZ-SB-1 and AZ-SB-2) were sampled at the site by Aztech under the supervision of an Aztech environmental scientist. The soil borings were located and sampled in accordance with EA's Pre-Remedial Work Plan, dated July 2012. Soil boring AZ-SB-1 was located within a wooded area approximately 315 feet east of Jacks Dry cleaners. Soil Boring AZ-SB-2 was located within the grass lawn area, approximately 115 feet east of the dry cleaners. Soil boring locations are depicted on **Figure 2**.

Soil boring installations were completed utilizing hydraulically driven direct-push soil core (Geoprobe 2.25 inch Macrocore) sample techniques to terminal depths of 16.7 and 18.7 fbg at AZ-SB-1 and AZ-SB-2, respectively. The terminal depths represent the soil-bedrock interface as expressed by sampler refusal. The initial groundwater table was observed at depths of approximately 6.5 and 8 fbg in AZ-SB-1 and AZ-SB-2, respectively.

During soil boring operations, soil samples were classified and logged by an environmental scientist and screened for total VOCs using a PID. The maximum total VOC concentration by PID analysis for AZ-SB-1 and AZ-SB-2 was 33.4 ppm and 28.8 ppm, respectively. Refer to the soil boring logs (**Appendix D**) for further details of soil descriptions and PID results.

Two (2) soil samples from each boring were collected for grain size analysis and determination of total organic carbon in soil via ATSM Method D422 and the Lloyd Kahn method, respectively. These soil samples targeted the interval of seven (7) feet through twelve (12) feet below grade (fbg) and the interval of fifteen (15) feet to the top of observed bedrock (16.7 fbg at AZ-SB-1 and 18.7 fbg at AZ-SB-2). Soil samples were transferred into laboratory provided glassware and stored on ice. Subsequently, the soil samples were submitted to Test America Laboratory (NELAC - NY455), located in Buffalo NY. It should be noted that a transcription error was recorded on the chain of custody. The chain of custody indicates that the second AZ-SB-2 soil sample was collected from a depth of 12.0 - 18.7 fbg. In reality, the second AZ-SB-2 sample was collected from a depth of 15.0 to 18.7 fbg.

Laboratory analytical results indicate that total organic carbon was detected in three of the four collected soil samples; AZ-SB-1 (7' - 12'), AZ-SB-1 (15' - 16.7') and AZ-SB-2 (15' - 18.7')

exhibited organic carbon readings of 1,780 ppm, 4,740 ppm and 2,510 ppm, respectively. Organic carbon was not detected (<1290 ppm) within soil sample AZ-SB-2 (7' - 12').

Sieve and hydrometer analysis was conducted (via ASTM D422) on all soil samples. Analysis showed that AZ-SB-1 averaged 20.6% gravel, 42.9% sand, 23.7% silt and 13.6% clay. AZ-SB-2 averaged 14.3% gravel, 22% sand, 33.2% silt and 30.5% clay. Additionally, each soil sample was analyzed for percentage of solids; AZ-SB-1 averaged 89.5% solids and AZ-SB-2 averaged 78.5% solids. Refer to the Soil Sample Analytical Summary (**Table 5 - Attachment C**) for further details.

#### 4.4 Hydraulic Conductivity Slug Testing

On October 3<sup>rd</sup> through October 5<sup>th</sup>, 2012, an Aztech environmental scientist conducted slug testing on five (5) monitoring wells across the site to determine hydraulic conductivity (K) values. As stated in the Pre-Remedial Work Plan, "both rising head and falling head (slug) tests will be conducted in wells where the screen does not bridge the water table". After a complete round of groundwater gauging and consulting historical boring logs, five (5) monitoring wells that met the given criteria were selected. MW-1R, MW-9, MW-13, MW-14BR, and MW-15BR were selected based on field measurements collected on October 3<sup>rd</sup>, 2012.

After selection of slug testing wells, a Level Troll transducer was used to collect depth to water information throughout the duration of the rising and falling head slug tests. The transducer was connected to a laptop computer and used in conjunction with Win-Situ 5 software to track water level changes at a pre-designated time interval. Once the transducer was in-place, a pre-constructed slug (four (4) foot slug) was inserted into the well, while software tracked the changes on water depth (rising head).

Once the monitoring well recharged to 85% of its original volume, the slug was removed while software tracked the changes to the hydraulic head. This process was repeated at the four (4) remaining wells.

The slug testing data were analyzed by the Bouwer-Rice method to determine approximate hydraulic conductivities. Resulting hydraulic conductivity values are present in **Table 6**.

		Table 6 – Slug Test Res	ults Summary	
MW ID	Slug Type	Hydraulic Conductivity (cm/sec)	Average K (cm/sec)	Overall Average K (cm/sec)
MW-1R	Slug In	1.88x10-4	1.77x10-4	
IVIVV-IK	Slug Out	1.66x10-4	1.77X10-4	
MW-9	Slug In	1.5x10-3	1.72x10-3	
10100-9	Slug Out	1.947x10-3	1.72x10-5	
MW-13	Slug In	2.36x10-3	2.21x10-3	8.40x10-4
10100-12	Slug Out	2.056x10-3	2.21x10-5	0.40x10-4
MW-14BR	Slug In	3.8x10-5	4.05x10-5	
IVIVV-14BK	Slug Out	4.3x10-5	4.U3X1U-3	
MW-15BR	Slug In	4.5x10-5	5.35x10-5	
INIAN-TORK	Slug Out	6.5x10-5	3.33X10-2	

The data shows an average hydraulic conductivity (overburden & bedrock) of  $8.40 \times 10^{-4}$  cm/sec. The overburden/soil results from monitoring wells MW-1R and MW-9 indicated an average K value of  $9.50 \times 10^{-4}$  cm/sec which is typical of silty sand. The bedrock (shale) monitoring well's (MW-13, MW-14BR & MW-15BR) average K value was calculated at  $7.68 \times 10^{-4}$  cm/sec. Additional slug test data is presented in **Appendix E**.

#### 4.5 In-Situ Microbial Analysis

To assess the potential for reductive dechlorination and to determine if natural attenuation may be occurring at the site, non-baited Microbial Insights (MI) Bio Traps® were installed in nine (9) monitoring wells at the site. The Bio Traps® were installed in monitoring wells MW-5, MW-7, MW-9, MW-12, MW-13, MW-14BR, MW-15BR, MW-17 and MW-17BR for a period of 35 days commencing on October 22, 2012. The Bio Traps® were then recovered and submitted to MI of Rockford, Tennessee for CENSUS quantification analysis of Dehalococcoides, Dehalobacter and Desulfuromonas (halorespiring bacteria) species. These analyses indentify microbial populations and assess the potential for reductive dechlorination of tetrachloroethene (PCE) and its daughter products.

Dehalococcoides species were detected in two (2) of the five (5) analyzed overburden wells (MW-5 and MW-7) at concentrations near the minimum laboratory detection limit. The low concentrations indicate that current conditions at the site are not likely to completely reduce PCE or TCE to ethene. Dehalococcoides were not detected within any bedrock well.

Dehalobacter species were detected at MW-9 and MW-12. Desulfuromonas species were detected at MW-5. The concentrations of these halorespiring bacteria species were recorded at low concentrations, indicating that the potential for complete reductive dechlorination is

limited under current site conditions. Desulfuromonas and Dehalobacter species were not detected in any bedrock wells.

Although the current conditions at the site are not conducive to complete reductive dechlorination, the presence of cis-DCE and vinyl chloride at significant concentrations indicate that limited reductive dechlorination has occurred. As stated in the attached MI report (**Appendix F**), "the septic system that was present until 2009 likely provided additional organic materials that could have served as electron donors generating reducing conditions in the source zone and initially supporting reductive dechlorination". Furthermore, the report states "Currently however, growth of halorespiring populations may be hindered by the presence of competing electron acceptors and low electron donor availability". Methogens, which compete for available hydrogen, were detected in all of the samples.

MI concluded that complete reductive dechlorination is unlikely under monitored natural attenuation (MNA) conditions. In order to promote the growth of halorespiring bacteria species and reductive dechlorination, an electron donor and bioaugmentation should be considered. Please refer to Appendix F for the complete MI comprehensive report.

#### 5.0 Conclusions/Discussion

#### **5.1 Pre-Design Remedial Investigation Observations**

Data collected during the Pre-design Remedial Investigation indicate that current site conditions and characteristics are moderately conducive to the application of enhanced reductive dechlorination by anaerobic bioremediation. The successful application of this remedial strategy may be challenging without further understanding of the mechanisms required to promote microbial growth. This assessment is based upon the following data collected during the investigation:

- Dissolved oxygen (DO) concentrations are very low or zero at the site monitoring wells.
   This is a good indicator that the reductive conditions are favorable, however, the oxidation-reduction potential (ORP) at several impacted monitoring wells (i.e. MW-13) indicates a less than optimal reducing condition;
- pH close to neutral is favorable for microbial growth;
- Relatively high sulfate concentrations (>20 mg/L) indicate potential competition with reductive pathways and consumption of electron donor substrate;
- The detection of ethane, ethene and methane and the presence of vinyl chloride at monitoring well MW-13 suggest limited dechlorination is occurring.

- Total organic carbon is relatively low, <1%. This condition indicates a lack of adequate naturally occurring electron donors.
- The site's hydraulic conductivity is moderate to low. A relatively dense injection grid may be required to adequately distribute electron donor substrate.
- Favorable microbial species were detected at low populations in only four (4) of nine (9) monitoring wells. Dehalococcides function genes for TCE and vinyl chloride reductase were not detected.

The recorded parameters can be used in conjunction with analytical data to quantitatively determine the amount of natural attenuation that has occurred at that particular monitoring point. The EPA guidance document, "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater", has derived a scoring system to measure natural attenuation. Value points are awarded or deducted based water quality measurements (alkalinity, temperature, pH, oxidation reduction potential), and concentrations of analyzed compounds (nitrate, sulfate, methane, ethene, ethane, total organic carbon and various volatile organic compounds). MW-2, MW-13 and MW-17 were compared to this set of criteria. MW-13 exhibited a total value of 15 points, indicating that natural attenuation has, at one point, occurred at this location. MW-11 totaled 11 points and MW-17 totaled 4 point. A total value of less than 15 points indicates that natural attenuation is unlikely to occur without an electron donor or bioaugmentation. A score of 6 though 14 points indicate that limited evidence for anaerobic biodegradation. A score of 4 or less indicates that anaerobic biodegradation is unlikely to occur. See **Appendix B** for a complete record of all water quality parameters. See Appendix C – MNA Scoring Table for details and criteria regarding scoring system.

#### **5.2 Dissolved VOC Plume Observations**

Dissolved phase VOC's from overburden and bedrock wells from July, 2011 (as described in Figures 4A and 4B within "Feasibility Study (734112)), prepared by EA Engineering, P.C., May 2012" were compared to the September 2012 dissolved phase VOC concentrations.

- Dissolved phase VOC concentrations have increased in seven (7) of the nine (9) sampled overburden wells. MW-1R, MW-2, MW-5, MW-6, MW-7, MW-10 and MW-12 increased from July 2011 to September 2012. The largest increase was observed at MW-1R. MW-1R increased from 745 ppb in July 2011 to 12,024 ppb in September 2012.
- MW-9 and MW-14 dissolved phase VOC concentrations decreased from 5,675 and 130 ppb to 533 and 104 ppb, respectively.

- Dissolved phase VOC concentrations have increased in four (4) (MW-10BR, MW-13, MW-16BR and MW-17BR) of the six (6) sampled bedrock monitoring wells. The largest increase was observed at MW-13. MW-13 increased from 8,424 ppb in July 2011 to 12,356 ppb in September 2012.
- MW-16BR and MW-17BR dissolved phase VOC's increased from non-detect levels in July 2011 to 732 and 16 ppb, respectively.
- Dissolved phase VOC's at MW-14BR and MW-15BR decreased from 269 ppb and 1,376 ppb to 94 and 732 ppb, respectively.

#### **6.0 Recommendations**

Based on the collected information, Aztech recommends the following:

- That the department should consider a baited Bio-Trap Insitu Microcosm study to determine the effects of electron donor addition, to determine if electron donor substrate addition to the subsurface may stimulate microbiological activity (halorespiring bacteria) to promote reductive dechlorination. The study would include the deployment and analysis of several Bio-Traps in select monitoring wells baited with electron donor substrate suitable for site conditions.
- That the department considers the installation of additional monitoring wells in the area north/northeast of MW-16BR and east of MW-17BR. As described in Figures 4A and 4B within "Feasibility Study (734112), prepared by EA Engineering, P.C., May 2012", MW-17 and MW-17BR were void of any detected VOC's. When sampled in September, 2012, MW-17BR laboratory results showed a PCE and TCE concentrations of 15 ppb and 1.6 ppb, respectively. Furthermore, dissolved phase VOC levels MW-16BR increased from non-detect concentrations in July, 2011 to 732 ppb in September, 2012. The increase in VOC concentrations at MW-16BR and MW-17BR indicate that the plume is migrating to the east, at a minimum.
- That a supplemental Soil Vapor Intrusion study be conducted at selected residences along Kathan Road and Tagus Lane. The data presented herein indicates that the contaminant plume is migrating to the east and northeast. Aztech recommends that indoor air be monitored in the areas north of MW-16BR and east of MW-17BR.

#### 7.0 References

Feasibility Study (734112), prepared by EA Engineering, P.C., May 2012.

Pre-Remedial Design Investigation Work Plan (version: draft), prepared by EA Engineering, P.C., July 2012.

Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, U.S. Environmental Protection Agency (USEPA). September 1998

Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents, Parsons Corporation, August 2004

Aztech appreciates the opportunity to conduct work for the NYSDEC. If you have any questions regarding the information described herein, please contact me at (518) 885-5383 at your convenience.

Sincerely

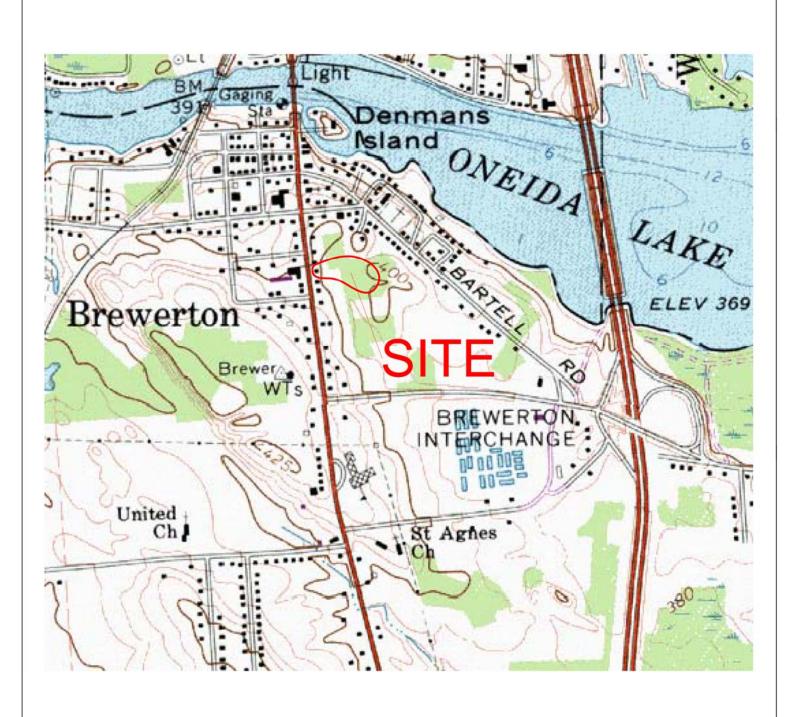
AZTECH TECHNOLOGIES, INC.

Bul: DRAFT - 4.26.12

Brian Baulsir Project Scientist

# **APPENDIX A**

**Figures** 





- Remediation Solutions
- Environmental Consulting
- Drilling Applications

5 McCrea Hill Road Ballston Spa, NY 12020 p 518.885.5385 info@aztechtech.com www.aztechtech.com

### SITE: Jacks Dry Cleaners

9628 NYS Route 11 Brewerton, NY

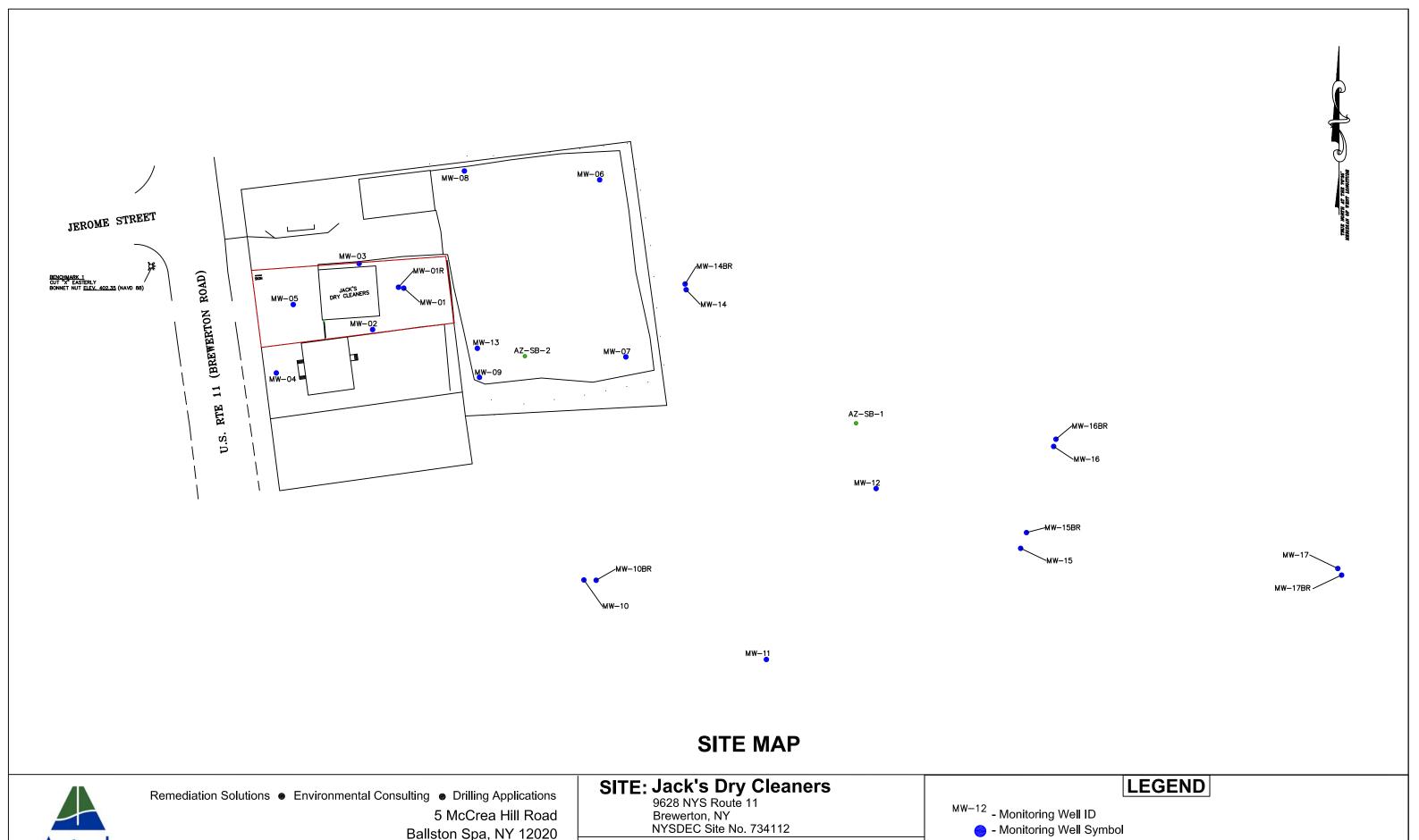
#### FIGURE 1

DATE: September 2012

NOT TO SCALE

#### LEGEND





Woman Owned Business

Ballston Spa, NY 12020

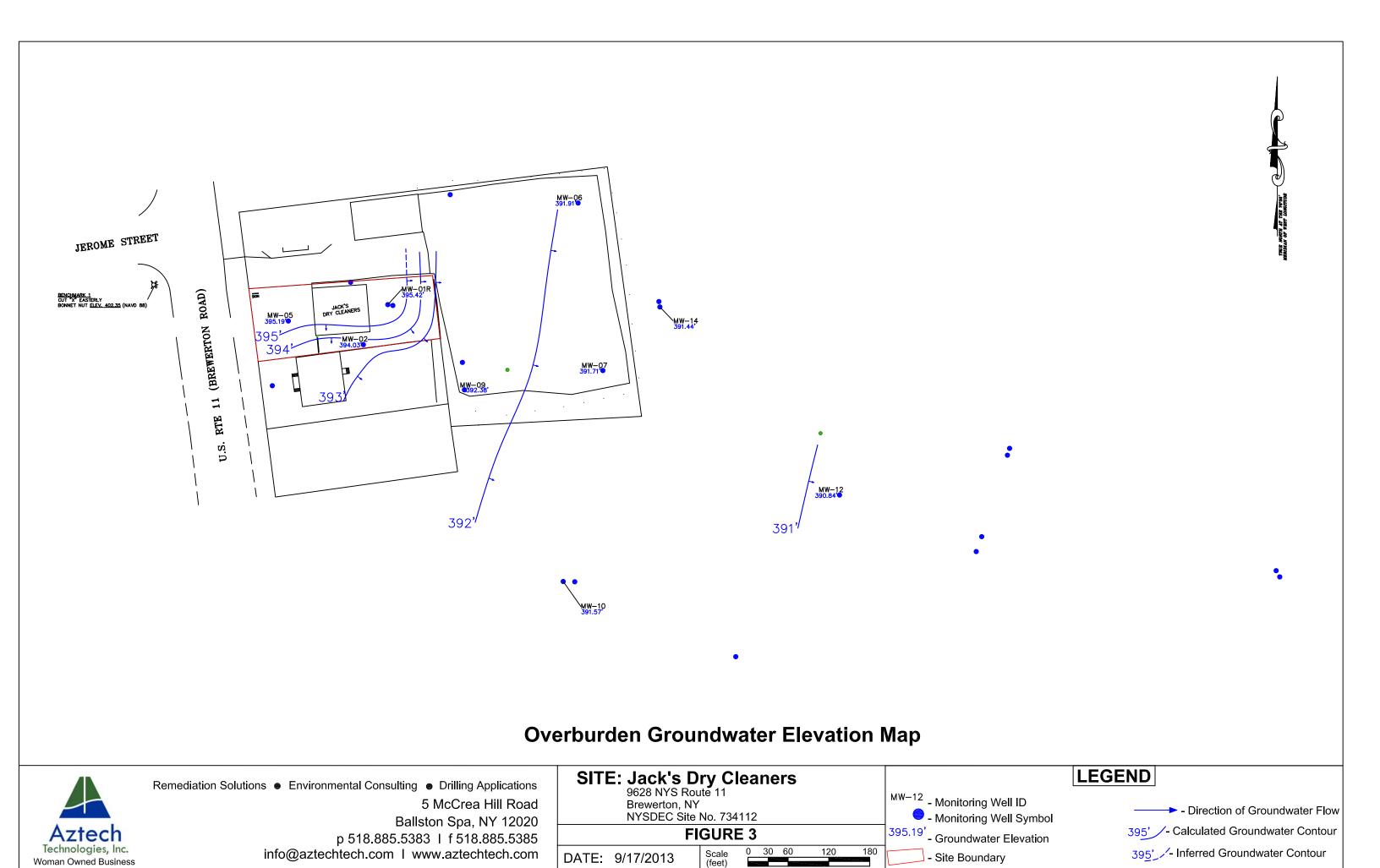
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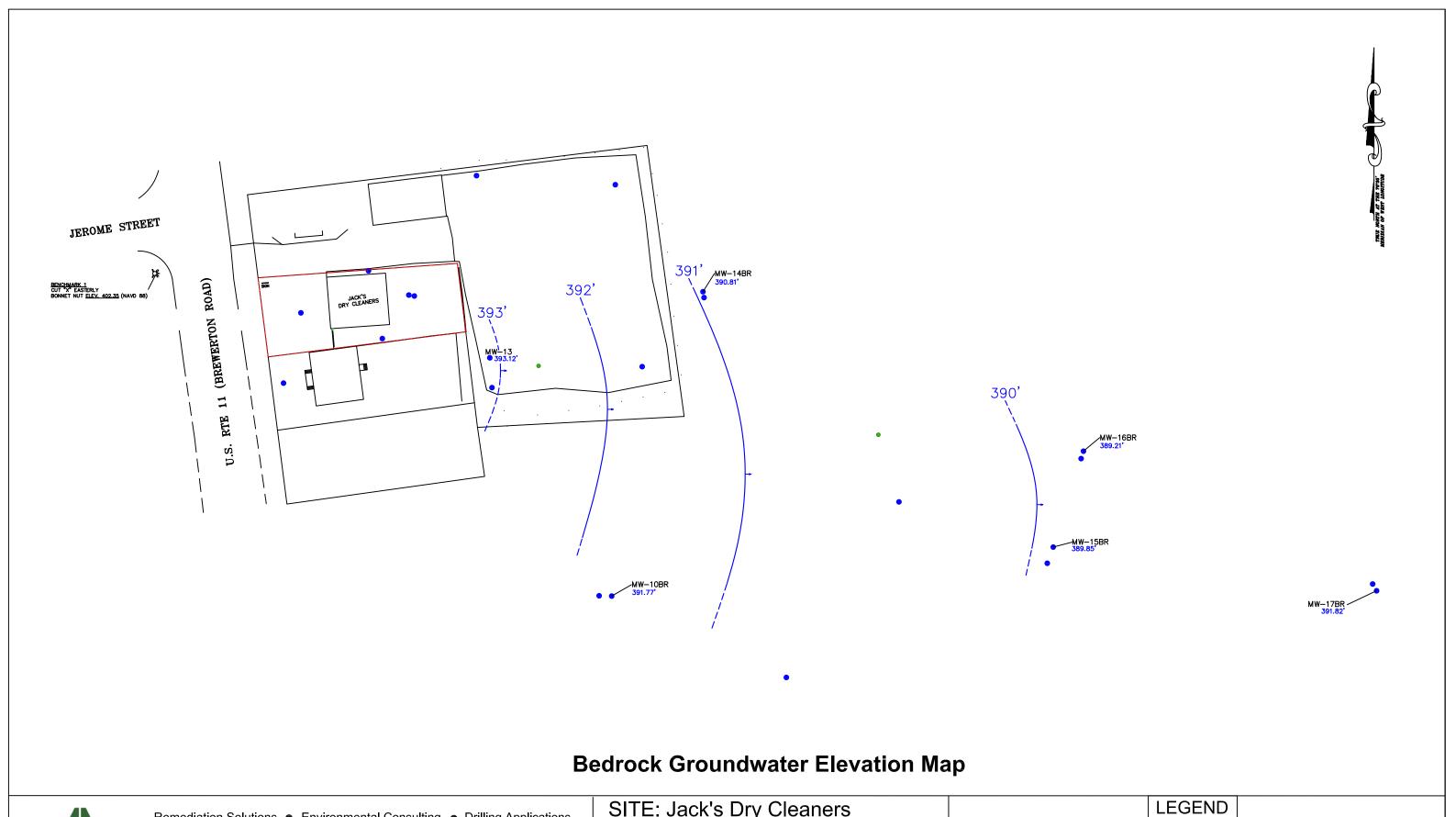
FIGURE 2

0 30 60 120 DATE: Sept., 2012

- Monitoring Well Symbol Soil Boring Symbol

- Site Boundary





# Remediation Solutions • Environmental Consulting • Drilling Applications

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SITE: Jack's Dry Cleaners 9628 NYS Route 11 Brewerton, NY NYSDEC Site No. 734112 FIGURE 3 0 30 60 DATE: 9/17/2012

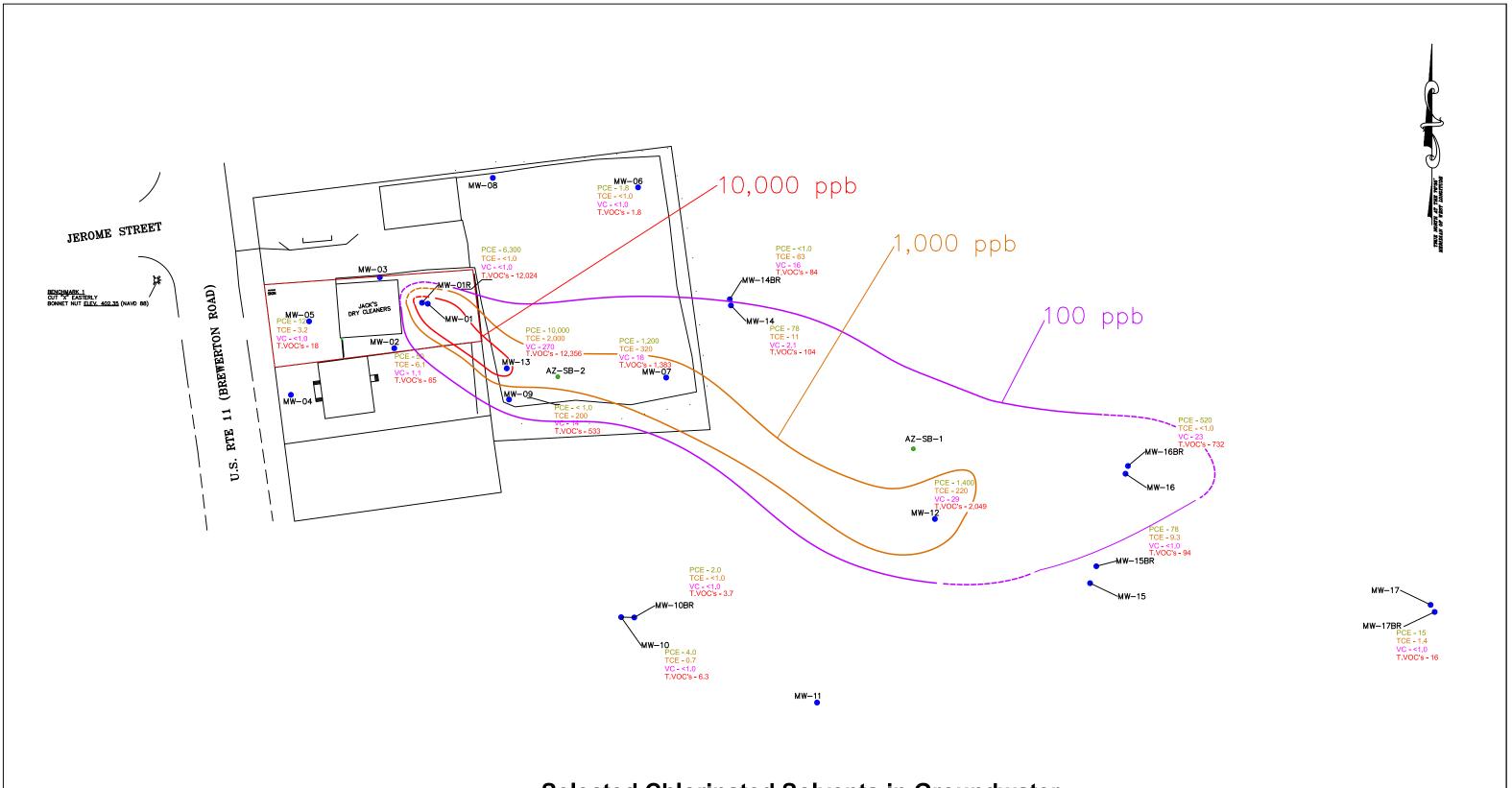
MW-12 - Monitoring Well ID - Monitoring Well Symbol 395.19' - Groundwater Elevation - Site Boundary

- Direction of Groundwater Flow 395' /- Calculated Groundwater Contour

395' /- Inferred Groundwater Contour

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Woman Owned Business



## **Selected Chlorinated Solvents in Groundwater**



Remediation Solutions • Environmental Consulting • Drilling Applications

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Ballston Spa, NY 12020

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#### SITE: Jack's Dry Cleaners 9628 NYS Route 11

9628 NYS Route 11 Brewerton, NY NYSDEC Site No. 734112

DATE: Sept. 17 - 21, 2012

FIGURE 4

| 7 | 21 | 2012 | Scale | 0 | 30 | 60 |

180

120

- VOC Contour

- Monitoring Well ID
- Monitoring Well Symbol

- Monitoring Well Symbol- Site Boundary

- Inferred VOC Contour
Tetrachlorothene (PCE) 30.3
Trichlorothene (TCE) 30.3
Vinyl Chloride (VC) 30.3
Total VOC's (T.VOC's) 30.3
All results reported in parts per billion

LEGEND

# **APPENDIX B**

# Tables

#### TABLE 1

#### **Groundwater Elevations Summary**

Jack's Dry Cleaners NYS Route 11, Brewerton, New York NYSDEC Site No. 734112

MONITORING WELL IDENTIFICATION		MW-1R	MW-2	MW-5	MW-6	MW-7	MW-9	MW-10	MW-10BR
TOP OF PVC CASING		400.70	401.10	402.12	401.53	399.98	399.80	400.36	400.39
BOTTOM OF MONITORING WELL		383.05	387.08	387.47	382.73	380.92	382.05	382.83	369.89
GROUNDWATER ELEVATIONS									
9/17/2012	DTW	5.28	7.07	6.93	9.62	8.27	7.42	8.79	8.62
3/11/2012	GW Elev	395.42	394.03	395.19	391.91	391.71	392.38	391.57	391.77

Notes:

GW Elev = Groundwater Elevation (ft.)

DTW = Depth to water (ft.)

Survey elevations provided by Prudent Engineering of Syracuse NY

\* - Readings taken at static conditions and are measured in hundredth's of feet

MONITORING WELL IDENTIFICATION		MW-12	MW-13	MW-14	MW-14BR	MW-15BR	MW-16BR	MW-17BR	-
TOP OF PVC CASING		399.84	400.53	399.79	399.69	402.04	404.95	403.65	-
BOTTOM OF MONITORING WELL		388.49	372.19	374.04	360.71	369.87	364.91	373.91	-
GROUNDWATER ELEVATIONS									
9/17/2012	DTW	9.00	7.41	8.35	8.88	12.19	15.74	11.83	-
9/17/2012	GW Elev	390.84	393.12	391.44	390.81	389.85	389.21	391.82	-

#### Notes:

GW Elev = Groundwater Elevation (ft.)

DTW = Depth to water (ft.)

Survey elevations provided by Prudent Engineering of Syracuse NY

\* - Readings taken at static conditions and are measured in hundredth's of feet

#### Groundwater Analytical Summary Table Jack's Dry Cleaners NYS Route 11, Brewerton, NY

Sample Location												NYSDEC Part 703:							
Parameter	MW-1R	MS (MW-1R)	MSD (MW-1R)	MW-2	MW-5	MW-6	MW-7	MW-9	MW-10	MW-10BR	MW-12	MW-13	MW-14	MW-14BR	Duplicate (MW-14BR)	MW-15BR	MW-16BR	MW-17BR	Groundwater Qualit Standards
Tarameter				l	<u> </u>		EPA Meth	od 8260B (r	esults repo	rted in parts	per billion (ı	(dac	l	1		L	l		
1,1,1-Trichloroethane	1.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0
1,1-Dichloroethane	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.9 (J)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0
1,1-Dichloroethene	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.6 (J)	< 1.0	< 1.0	< 1.0	< 1.0	8.0	< 1.0	< 1.0	< 1.0	< 1.0	0.5 (J)	< 1.0	5.0
1,1,2-Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	28	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.0
1,2-Dichlorobenzene	0.9 (J)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.1	1.6	< 1.0	3.1	< 1.0	1.0
Chloroethane	4.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.8	1.2	< 1.0	< 1.0	< 1.0	21	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0
Chloroform	< 1.0	< 1.0	< 1.0	0.4 (J)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.0
cis-1,2-Dichloroethene	5,700	5,700	5,700	7.4	2.3	< 1.0	290	280	< 1.0	< 1.0	400	< 1.0	13	< 1.0	93	6.5	180	< 1.0	5.0
Cyclohexane	< 1.0	< 1.0	< 1.0	< 1.0	0.6 (J)	< 1.0	0.5 (J)	2.7	< 1.0	< 1.0	< 1.0	1.0	< 1.0	1.5	1.0	< 1.0	2.6	< 1.0	N/A
Ethylbenzene	2.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0
Methylcyclohexane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.5 (J)	< 1.0	< 1.0	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	N/A
Methy tert-butyl ether	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.6	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.4 (J)	< 1.0	
-				50								10,000 (B)	78 (B)		150 (B)	78 (B)	` '		10 <sup>1</sup>
Tetrachloroethene	6,300	6,300 (B)	6,300 (B)		12	1.8	1,200	< 1.0	4.0	2.0	1,400 (B)	. ,	` ,	< 1.0	` '	, ,	520 (B)	15 (B)	5.0
trans-1,2-Dichloroethene	< 1.0	130	130	< 1.0	< 1.0	< 1.0	6.6	6.7	< 1.0	< 1.0	< 1.0	51.0	< 1.0	1.7	< 1.0	< 1.0	1.9	< 1.0	5.0
Trichloroethene	< 1.0	1,700	1,700	6.1	3.2	< 1.0	320	200	0.7 (J)	< 1.0	220	2,000	11	63	58	9.3	< 1.0	1.4	5.0
Toluene	3.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0
Total Xylenes	8.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	0.8 (J)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	5.0
Vinyl Chloride	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	18	14	< 1.0	< 1.0	29	270	2.1	16	11	< 1.0	23	< 1.0	2.0
EPA 8260B Totals	12,024	13,830	13,830	65	18	1.8	1,838	533	6.3	3.7	2,049	12,356	104	84	315	94	732	16	-
							E	PA Method	6010B (res	ults reported	in ppb)								
Aluminum	< 200	<200	< 200	410	150 (J)	75 (J)	130 (J)	77 (J)	940	73 (J)	960	< 200	170 (J)	< 200	< 200	230	480	< 200	50 <sup>2</sup>
Arsenic	17	17	17	58 (J)	< 10	10	< 10	< 10	< 10	< 10	< 10	< 10	11	9.8 (J)	7.4 (J)	5.7 (J)	6.7 (J)	< 10	25
Barium	47	47	47	270	140	17	130	230	170	320	180	17	130	170	170	94	290	66	100
Calcium	61,300	61,300	61,300	97,300	122,000	126,000	141,000	203,000	201,000	281,000	91,900	122,000	122,000	107,000	104,000	76,500	137,000	46,000	50 <sup>2</sup>
Chromium	1.7 (J)	1.7 (J)	1.7 (J)	1.9 (J)	< 4.0	< 4.0	< 4.0	1.6 (J)	2.1 (J)	0.7 (J)	1.7 (J)	< 4.0	1.2 (J)	< 4.0	< 4.0	1.4 (J)	1.9 (J)	< 4.0	50
Cobalt	3.2 (J)	3.2 (J)	3.2 (J)	1.7 (J)	0.9 (J)	2.9 (J)	1.4 (J)	4.0 (J)	1.3 (J)	< 4.0	1.1 (J)	3.5 (J)	< 4.0	< 4.0	< 4.0	1.0 (J)	0.8 (J)	< 4.0	50 <sup>2</sup>
Copper	< 10	< 10	< 10	3.1 (J)	< 10	< 10	< 10	2.2 (J)	< 10	< 10	2.6 (J)	3.2 (J)	< 10	< 10	< 10	< 10	< 10	< 10	200
ron	5,000	5,000	5,000	320	700	5,600	610	640	1,400	730	1,000	< 50	2,000	1,200	1,500	590	1,500	46 (J)	300
Magnesium	10,100	10,100	10,100	17,500	28,100	39,300	42,600	31,600	55,700	154,000	72,600	37,800	79,900	72,100	70,600	34,100	80,900	41,000	35.000 <sup>1</sup>
Manganese	4,800	4,800	4,800	24	340	1,100	570	3,100	560	190	77	340	55	55	57	390	120	57	300
Nickel	1.5 (J)	1.5 (J)	1.5 (J)	2.6 (J)	3.0 (J)	3.1 (J)	2.6 (J)	6.2 (J)	1.9 (J)	< 10	3.0 (J)	2.4 (J)	2.3 (J)	2.1 (J)	2.1 (J)	2.7 (J)	2.4 (J)	2.1 (J)	100
Potassium	5,500	5,500	5,500	4300	5,400	17,800	4,900	10,100	3,200	4,700	1,800	9,100	3,500	5,900	6,300	21,100	11	6,700	N/A
Sodium	17,300	17,300	17,300	122,000	305,000	35,500	39,100	65,400	101,000	348,000	17,800	36,400	31,000	37,400	41,300	18,600	69,100	5,900	20,000
Vanadium	3.9 (J)	3.9 (J)	3.9 (J)	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	1.9 (J)	< 5.0	2.7 (J)	< 5.0	< 5.0	< 5.0	1.6 (J)	1.6 (J)	1.7 (J)	< 5.0	50 <sup>2</sup>
Zinc	< 10	< 10	< 10	3.4 (J)	1.9 (J)	1.7 (J)	3.1 (J)	< 10	2.9 (J)	< 10	2.7 (J)	< 10	< 10	< 10	< 10	5.6 (J)	2.4 (J)	1.5 (J)	2,000
EPA 6010B Totals	104,074	104,074	104,074	242,137	461,836	225,410	229,047	314,161	363,980	789,014	186,331	205,666	238,770	223,837	223,938	151,622	289,417	99,773	-
EFA 0010B Totals	104,074	104,074	104,074	242,137	401,630	223,410	225,047	· ·		, ,	<u> </u>	203,000	230,770	223,037	223,930	131,022	209,417	33,113	
-41			7.5			7.5	7.5	•	,	eported in pr		00				7.5			A1/A
Ethane	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	62	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	< 7.5	N/A
Ethene	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	<7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	38	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	N/A
Methane EPA RSK-175 Totals	270 <b>270</b>	270	270 <b>270</b>	76 <b>76</b>	220 <b>220</b>	400 <b>400</b>	150 <b>150</b>	120 <b>120</b>	6.5	< 4.0	56 <b>56</b>	1,700 <b>1,800</b>	40 <b>40</b>	120 <b>120</b>	110 <b>110</b>	< 4.0 < 4.0	41 <b>41</b>	< 4.0	N/A
EPA KSK-175 TOLAIS	210	270	210	76	220	400		•	6.5	< 4.0 ed in parts p		•	40	120	110	< 4.0	41	< 4.0	<u> </u>
				l _	l 1			,					l _			1 -	T _		
Total Alkalinity	142	142	142	247	373 (B)	484	425	299	430 (B)	389 (B)	377	414 (B)	292	435	420	291	562	282	N/A
								EPA Method	d 9060 (resu	lts reported i	n ppm)								
Total Organic Carbon	6.3	6.3	6.3	3.5	3.0	2.9	2.3	2.4	1.4	1.0 (J)	1.0	2.3	1.8	1.2	1.1	1.0 (J)	0.6 (J)	< 1.0	N/A
							ASTI	M Method D	-516-90, 02 (	results repo	ted in ppm)								
Sulfate	31	31	31	88 (B)	236 (B)	56 (B)	55 (B)	71 (B)	98	61 (B)	41	51 (B)	53	49	71	75	33	51	250 <sup>1</sup>
				. ,		,	,			eported in pr		· ,					1		
	0.7	NA	NA	0.6 (H)	0.4 (J)	< 0.05	< 0.05	0.4	< 0.05	< 0.05	0.02 (J)	0.3	< 0.05	0.05	< 0.05	< 0.05	< 0.05	0.15	10,000 <sup>2</sup>
Nitrate as N																			

 <sup>(</sup>J) = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
 (B) = Compound was found in the blank and sample.
 (H) = Sample was prepped or analyzed beyond the specified holding time
 1 - Standards listed in T.O.G.S. 1.1.1

N/A - Non Applicable

<sup>&</sup>lt;sup>2</sup> - Standards dervied from NYCRR part 702.15

#### **TABLE 5 -** Soil Analytical Summary Table October 2, 2012 Jack's Dry Cleaners Brewerton, NY

				Sample Location											
				AZ-	-SB-1	AZ	-SB-1	AZ-	-SB-2	AZ	-SB-2				
				7.0'	- 12.0'	15.0'	- 16.7'	7.0'	- 12.0'	15.0	' - 18.7'				
		Parameter	PID	14.3 - 3	33.4 ppm	22.4 - 2	23.1 ppm	0.8 - 1	L.2 ppm	27.3 -	28.8 ppm				
					Loyd K	ahn Method									
		Total Organic Carbon (ppm)	-	1,	780	4,	,740	1	ND	2,510					
		Percent Solids	-	8	8%	9	1%	7	8%	7	79%				
					D422	Grain Size									
		-		*	**	*	**	*	**	*	**				
_		Seive Size 3 inch - Percent Finer	-	100%		100%		100%		100%					
	Coorso	Seive Size 2 inch - Percent Finer	-	100%		100%		100%		100%					
	Coarse	Seive Size 1.5 inch - Percent Finer	-	100%		100%		100%		100%					
ΜE		Seive Size 1 inch - Percent Finer	-	100%	6 1 42 . 60/	100%	6	100%	6	100%	6 120.60				
GRAVEL	NA - di	Seive Size 0.75 inch - Percent Finer	-	100%	Gravel 12.6%	85.6%	Gravel 28.5%	100%	Gravel 0.0%	100%	Gravel 28.6%				
G	Medium	Seive Size 0.375 inch - Percent Finer	-	94.7%		80.4%		100%		84.0%					
	<b>-</b>	Seive #4 - Percent Finer	-	87.4%		71.5%		100%		71.4%					
	Fine	Seive #10- Percent Finer	-	77.6%		62.6%		100%		60.6%					
	Coarse	Seive #20 - Percent Finer	-	71.3%		57.1%		100%		51.6%					
		Seive #40 - Percent Finer	-	67.1%	Sand 46.9%	53.2%		99.8%		46.3%					
SAND	Medium	Seive #60 - Percent Finer	-	61.6%		49.1%	6. 120.00/	99.4%	6	41.9%	Sand 41.9%				
SA		Seive #80- Percent Finer	-	56.2%		45.1%	Sand 38.8%	99.1%	Sand 2.1%	38.7%					
	Fine	Seive #100 - Percent Finer	-	52.1%		42.0%		98.9%		36.4%					
		Seive #200 - Percent Finer	-	40.5%		32.7%		97.9%		29.5%					
	•	Hydrometer Reading 1	-	27.9%		20.6%		92.9%		23.0%					
		Hydrometer Reading 1 - Particle Size	-	31.2 μm		30.3 μm		26.9 μm		29.9 μm					
		Hydrometer Reading 2	-	24.6%		18.1%		81.3%		20.3%					
		Hydrometer Reading 2 - Particle Size	-	20.2 μm		19.8 μm		18.0 μm		19.5 μm					
	H	Hydrometer Reading 3	-	22.9%	C:I+ 2C C0/	15.5%	C:I+ 20 00/	69.8%	C:l+ 47 00/	15.9%	C:I+ 40 F0/				
	SILT	Hydrometer Reading 3 - Particle Size	-	11.8 μm	Silt 26.6%	11.8 μm	Silt 20.8%	10.9 μm	Silt 47.9%	11.8 μm	Silt 18.5%				
		Hydrometer Reading 4	-	17.9%		13.0%		59.9%		13.2%					
		Hydrometer Reading 4 - Particle Size	-	8.5 μm		8.5 μm		8.2 μm		8.7 μm					
		Hydrometer Reading 5	-	15.3%		11.9%		50.0%		11.0%					
		Hydrometer Reading 5 - Particle Size	-	6.4 μm		6.2 μm		6.0 µm		6.1 μm					
		Hydrometer Reading 6	-	9.4%		7.8%		36.8%		6.2%					
	÷	Hydrometer Reading 6 - Particle Size	-	3.3 μm	Cl 4E 22/	3.1 μm	Cl 11 C2/	3.0 μm	Cl FO C2/	3.2 μm	Cl=-: 44 C2/				
	Clay	Hydrometer Reading 7	-	6.9%	Clay 15.3%	5.3%	Clay 11.9%	26.9%	Clay 50.0%	4.0%	Clay 11.0%				
		Hydrometer Reading 7 - Particle Size	-	1.4 μm		1.3 μm		1.3 μm		1.4 μm					
		Soil Samples collected on 10.2.12					PID = Photo-Ic	nization Dete	ector						

All PID results are reported in parts per million (ppm)

ND = Not Detected (<PQL).

μm = Micrometers

\*- Percentage passing seive

ppm = parts per million

VOC's measured by PID calibrated to Vinyl Chloride standards

\*\* - Percentage found in sample

#### TABLE 7

# Criteria For Measuring Natural Attenuation within Chlorinated Solvent Plumes<sup>1</sup> Jack's Dry Cleaners NYS Route 11,Brewerton, NY

				MW-2		MW-13	3	MW-168	3R
Analysis	Concentration in Most Contaminated Zone	Interpretation	Value	Concentration	Value	Concentration	Value	Concentration	Value
Nitrate	< 1.0 ppm	At higher concentrations may compete with reductive pathway	2	0.6 ppm	2	0.3 ppm	2	< 0.05 ppb	-
Sulfate	< 20 ppm	At higher concentrations may compete with reductive pathway	2	88 ppm	-	51 ppm	-	33 ppm	_
	< 0.5 ppm	VC (vinyl chloride) oxidizes	0	76 ppb	0	1,700 ppb	-	41 ppb	0
Methane	> 0.5 ppm	Ultimate reductive daughter product, VC accumulates	3	76 hhn	-	1,700 ppb	3	41 ppb	-
	< 50 mV	Reductive pathway possible	1	130 mV	-	70 mV	-	62 mV	-
ORP	< -100 mV	Reductive pathway likely	2	130 1110	-	701110	-	021110	-
	5 < pH < 9	Optimal range for reductive pathway	0	7.51	0	7.09	0	7.51	0
рН	5> pH > 9	Outside optimal range for reductive pathway	-2	7.51	-	7.03	-	7.51	-
		Carbon and energy source; drives dechlorination; can be natural or							
TOC	> 20 ppm	anthropogenic	2	3.5 ppm	-	2.3 ppm	-	0.6 ppm	-
Temperature	> 20°C	At T > 20°C biochemical process is accelerated	1	20.02 °C	1	19.68 °C	-	14.22	-
Alkalinity	>2x background**	Results from interaction between CO <sub>2</sub> and aquifer minerals	1	247 ppm	-	414 ppm	-	562 ppm	-
BTEX	> 0.1 ppm	Carbon and energy source; derives dechlorination	2	0.0 ppb	-	0.8 ppb	-	3.1 ppb	-
Tetrachloroethene	Y/N	Material released	0	50 ppb	0	10,000 ppb	-	520 ppb	
	Y/N	Material released	0	-	-	-	-		-
Trichloroethene	Y/N	Daughter product of PCE	2	6.1 ppb	2	2,000	2	< 1.0 ppb	_
	Y/N	Material released	0	-	-	-	-		-
Dichloroethene	Y/N	Daughter product of TCE	2	7.4 ppb	2	< 1.0 ppb	-	180 ppb	2
	Y/N	Material released	0	-	-	-	-	-	-
Vinyl Chloride	Y/N	Daughter product of DCE	2	1.1 ppb	2	270 ppb	2	23 ppb	2
1,1,1-Trichloroethane	Y/N	Material released	0	-	-	-	-	-	-
Chloroethane	Y/N	Daughter product of DCA or VC under reducing conditions	2	< 1.0 ppb	-	21 ppb	2	< 1.0 ppb	-
Ethene	> 0.01 ppm	Daughter product of VC/ethene	2	< 7.0 ppb	-	38 ppb	2	< 7.0 ppb	-
Ethane	< 0.1 ppm	Daughter product of VC/ethene	3	< 7.5 ppb	-	62 ppb	2	< 7.5 ppb	-
	Y/N	Material released	0	-	-	-		-	-
Chloroform	Y/N	Daughter product of Carbon Tetrachloride	2	0.4 ppb	2	< 1.0 ppb	-	< 1.0 ppb	-
				Value Total	11	Value Total	15	Value Total	4

<sup>\*\*</sup> Background derived from Total Alkalinity at MW-17 (282 ppm)

<sup>- =</sup> Non applicable

# APPENDIX D

**Boring Logs** 

MONITORING WELL / BORING NO. <u>AZSB-1</u>										
Site Name: Jacks Dry Cleaners	Date Drilled: October 2nd, 2012									
Location: Brewerton NY	Drilling Co.:Aztech Technologies Inc.									
Client: NYSDEC	Driller:Ray Hammond / John Stutzke									
Phone No.: 518 885 5383	Logged by:Brian Baulsir									
Drilling Method: Direct Push (Dia): 2.25" Sampling Method: Macro Core (Dia): 2"										
Drilled TD: 16.7 feet below grade (Dia): 2.2	5" Sampled TD: 16.7 feet below grade (Dia): 2"									
Well TD: NA (Dia): N	A Well Type: NA									
Screen Interval: NA Slot Size:	NA Diameter: NA NA									
Cased Interval: NA Type:	NA Diameter: NA Diameter									
Sand Pack Interval: NA Ty	pe:NAWellhead Prot:NA									
Bentonite Seal Interval: NA Type: NA Grouted Interval: NA										

Aztech	

#### **EXPERTISE** YOU CAN COUNT ON

5 McCrea Hill Road Ballston Spa Fax: 518-885-5385 New York 12020 Fax: 518-885-5385 www.aztechtech.com

TD: Total Depth (ft.)

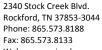
Observed Water Table

LOCATION:

**REFER TO FIGURE 3 (APPENDIX A)** 

		7.				
Depth (Feet)	Monitoring Well Construction	<u>Sample</u> <u>Recovery;</u>	<u>PID</u> (ppm):	Description / S	Soil Classification	
0 -	▼ Wet at 6.5' below grade		1.6	Brown fine SILT, with some fine Sand, trace Light brown fine SILT, with some fine Sand,		1.0'
4 -		88%	13.1	Light brown fine SILT, with some Clay, trace	e organic matter, moist	4.5'
6 -		86%	24.3	Brown fine SILT and CLAY, with some Grav	el, wet	6.5'
10 -	No Monitoring Well Installed		14.3			11.0'
12 —		73%	33.4	Weathered Rock, dry Brown fine SILT and CLAY, with some Grav Gray medium to coarse SAND, with some gray		11.5' 13.5'
14 —		20%	22.4	Gray medium to coarse SAND, SILT, GRAV	EL and CLAY, with some weathered Rock	
18 —					Bedrock Refusal at 16.7 fe	
20 —						
24 —						
26 –						
Monitoring Well Completion / Boring Log drafted by Aztech Technologies, Inc.  PAGE 1 of 1						

MONITOR	RING WELL / BORIN	EXPERTISE YOU CAN COUNT ON						
Site Name	Jacks Dry Cleaners	Dat	e Drilled	October 2nd, 2012	5 McCrea Hill Road Phone: 518-885-5383 Ballston Spa Fax: 518-885-5385 www.aztechtech.com			
Location: Brewerton NY Drilling Co.:_				Aztech Technologies Inc.	Technologies, Inc.			
Client: NYSDEC Driller:				Ray Hammond / John Stutzke	KEY:			
Phone No	518 885 5383	Log	ged by:	Brian Baulsir				
Drilling Me	ethod: Direct Push	(Dia) <u>: 2.25"</u>	Sampling	g Method: Macro Core (Dia): 2"	TD: Total Depth (ft.)  Observed Water Table			
				TD: 18.7 feet below grade (Dia): 2"	LOCATION:			
Well TD:_	NA	(Dia): <u>NA</u> <b>V</b>	Vell Typ	e:NA				
Screen Int	terval: <u>NA</u> Slo	ot Size:	NA.	Diameter:NA	REFER TO FIGURE 3 (APPENDIX A)			
Cased Inte	erval: <u>NA</u> Ty	pe: <u>NA</u>		Diameter:NA	,			
Sand Pack	k Interval: <sup>NA</sup> _	Type:	NA	Wellhead Prot: <sup>NA</sup>				
Bentonite	Seal Interval: NA	Type:	NA	Grouted Interval:NA				
			T	T				
Depth (Feet)	Monitoring Well	<u>Sample</u> Recovery:	PID	Description /	Soil Classification			
(1 661)	Construction	<u>Recovery,</u>	<u>(ppm):</u>	Description /	Soli Classification			
0 =				Light brown fine Sand and SILT, with some				
2		700/	0.6	Asphalt 1 Light brown fine Sand and SILT, with some Gravel, moist				
]   No	o Monitoring Well Installed	70%	1.4	Gray fine SAND and SILT, with some brick	3.5			
4 -				I STAY THE SAND AND SILT, WILL SOME BICK	, asii aliu yiass, iiiuist			
6			1.2	Brown SILT, trace clay, moist				
╡,	7 ) N/-4 -4 O/ h - l	100%			8.6			
8	Vet at 8' below grade		0.8	Brown CLAY, With some Silt, Wet @ 8'	0.1			
10 —	-							
-			18.4					
12 —		80%		Brown fine to coarse SAND, trace silt, Wet	12.5			
14 —			11.2	Dark brown fine to coarse SAND and GRA\	/EL, with some Silt and Clay, Wet			
16 —		58%	27.3					
18 —			28.8	Gray fine to coarse SAND and GRAVEL, w	ith some Silt and Clay, Wet 17.8			
, <del>-</del>					Bedrock Refusal at 18.7 feet below grade			
20 —								
22 —								
24 —								
26 –								
28 —								
Monitoring M	 	g drafted by Aztech	Technolog	ies. Inc.	PAGE 1 of 1			
			9		· · · · · · · · · · · · · · · · · · ·			





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# **SITE LOGIC Report**

Comprehensive Report

**Contact:** Brian Baulsir Phone: (518) 855.5383

Address: Aztech Technologies - Balliston Spa

> 5 McCrea Hill Road Email: bbaulsir@aztechtech.com

Balliston Spa, NY, 12020

**MI Identifier: Report Date:** 080JK December 13, 2012

**Project:** Jack's Dry Cleaners; NYSDEL Site# (734112)

Comments:

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# **Executive Summary**

Bio-Trap® samplers were deployed in select monitoring wells at the Jack's Dry Cleaners property on October 22, 2012. Following a 35 day deployment period, all Bio-Traps were recovered for CENSUS® quantification of *Dehalococcoides*, *Dehalobacter*, and *Desulfuromonas* spp. to assess the potential for reductive dechlorination of tetrachloroethene (PCE) and trichloroethene (TCE). Analytical results including volatile organic compounds (VOCs), dissolved gases, and geochemical parameters for the September 2012 groundwater sampling event were provided. Summaries of the chemical, geochemical, and microbiological data are provided in Tables 1 and 2.

#### Overburden Wells (MW-5, MW-9, MW-7, MW-12, and MW-17)

- Dehalococcoides spp. were detected in only two of the overburden wells (MW-5 and MW-7) and only at concentrations
  near the quantification limit indicating that complete reductive dechlorination of PCE and TCE to ethene is unlikely under
  existing site conditions.
- Likewise, Dehalobacter spp. (MW-9 and MW-12) and Desulfuromonas spp. (MW-5) were also detected but at low
  concentrations suggesting the potential for partial reductive dechlorination of PCE and TCE to cis-DCE is limited under
  existing subsurface conditions.
- The CENSUS® results indicating only low populations of known halorespiring bacteria are consistent with the current groundwater monitoring results for geochemical conditions.
  - o Although low, nitrate was detected in groundwater samples from three of the overburden monitoring wells.
  - o The presence of nitrate along with limited production of manganese and dissolved iron suggest at most mildly reducing conditions not generally conducive to reductive dechlorination.
  - TOC concentrations are low suggesting that growth of halorespiring bacteria, consumption of competing electron acceptors, and generation of anaerobic conditions is hindered by low electron donor availability.
- While the subsurface conditions are not conducive to growth of halorespiring populations currently, the detection of cis-DCE at significant concentrations suggests that reductive dechlorination has occurred at least to some degree at the site previously.
- Although data is not available to examine historical subsurface conditions, the septic system that was present until 2009 likely provided additional organic materials that could have served as electron donors generating reducing conditions in the source zone and initially supporting reductive dechlorination.

#### Bedrock Wells (MW-13, MW-14BR, MW-15BR, and MW-17BR)

- Halorespiring bacteria including *Dehalococcoides*, *Dehalobacter*, and *Desulfuromonas* spp. were not detected in Bio-Traps deployed in the bedrock wells indicating that reductive dechlorination is unlikely under current conditions.
- Overall, geochemical parameters are similar to those of the overburden wells and indicate at most mildly reducing conditions.
- As with the overburden wells, cis-DCE and some vinyl chloride production particularly at MW-13 suggest that reductive dechlorination has occurred at the site previously.
- With the overburden and shallow bedrock groundwater as part of the same aquifer, the organic materials in the former septic system may have also stimulated partial reductive dechlorination in the shallow bedrock historically.
- Currently however, growth of halorespiring populations may be hindered by the presence of competing electron acceptors and low electron donor availability.



#### **Overall Considerations**

- Taken as a whole, the available chemical, geochemical, and microbiological data suggest that reductive dechlorination is unlikely under monitored natural attenuation (MNA) conditions.
- The addition of electron donor could generate anaerobic conditions, promote growth of halorespiring bacteria, and stimulate reductive dechlorination.
- However, the low concentrations of halorespiring bacteria particularly in the bedrock wells suggest that bioaugmentation in addition to electron donor addition may need to be considered.
- A Bio-Trap® *In Situ* Microcosm study could be performed to compare biostimulation through electron donor addition and bioaugmentation as remediation options at the site.



# Results

Table 1.

Sample Information	MW-5	MW-9	MW-7	MW-12	MW-17
Overburden Wells					
Microbial Populations (cells/mL)					
Dehalococcoides spp.	4.07E+01	<2.50E+01	7.25E+01	<2.50E+01	<2.50E+01
tceA Reductase	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
bvcA Reductase	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
vcrA Reductase	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
Dehalobacter spp.	<1.50E+02	5.20E+00 (J)	<1.50E+02	1.02E+00 (J)	<1.50E+02
Desulfuromonas spp.	1.04E+02	<5.00E+01	<5.00E+01	<5.00E+01	<5.00E+01
Methanogens	1.26E+05	1.24E+06	1.56E+06	1.09E+06	2.97E+06
Contaminant of Concern (µg/L)					
PCE	12	1,200	ND	1,400	1,200
TCE	3.2	320	200	220	320
1,1-DCE	ND	0.57 (J)	ND	ND	0.57 (J)
cis-1,2 DCE	2.3	290	280	400	290
trans-1,2 DCE	ND	6.6	6.7	ND	6.6
Vinyl Chloride	ND	18	14	29	18
1,1,1-Trichloroethane	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	28	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND
Chloroethane	ND	1.8	1.2	ND	1.8
Dissolved Gases (µg/L)					
Ethene	ND	ND	ND	ND	ND
Ethane	ND	ND	ND	ND	ND
Methane	220	150	120	56	150
Anions (mg/L) and Geochemistry					
Nitrate as N	0.037 (J)	ND	0.4	0.02 (J)	ND
Manganese	0.34	0.57	3.1	0.077	0.57
Iron	0.7	0.61	0.64	1.0	0.61
Sulfate	ND	54.5	71.3	41.4	54.5
Methane (ug/L)	ND	150	120	56	150
TOC (mg/L)	3.0	2.3	2.4	1.0	2.3

J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. ND - Not detected at the reporting limit.

Table 2.

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Sample Information	MW-13	MW-14BR	MW-15BR	MW-17BR
Bedrock Wells				
Microbial Populations (cells/mL)				
Dehalococcoides spp.	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
tceA Reductase	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
bvcA Reductase	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
vcrA Reductase	<2.50E+01	<2.50E+01	<2.50E+01	<2.50E+01
Dehalobacter spp.	<1.50E+02	<1.50E+02	<1.50E+02	<1.50E+02
Desulfuromonas spp.	<5.00E+01	<5.00E+01	<5.00E+01	<5.00E+01
Methanogens	8.30E+05	7.47E+05	5.67E+05	1.44E+06
Contaminant of Concern (µg/L)				
PCE	10,000	190	78	15
TCE	2,000	63	9.3	1.4
1,1-DCE	8.0	ND	ND	ND
cis-1,2 DCE	3,000	100	6.5	ND
trans-1,2 DCE	51	1.7	ND	ND
Vinyl Chloride	270	16	ND	ND
1,1,1-Trichloroethane	1.7	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
Chloroethane	21	ND	ND	ND
Dissolved Gases (μg/L)				
Ethene	38	ND	ND	ND
Ethane	62	ND	ND	ND
Methane	1,700	120	ND	ND
Anions (mg/L) and Geochemistry				
Nitrate as N	0.33	0.051	0.26	0.15
Manganese	0.34	0.055	0.39	0.056
Iron	ND	1.2	0.59	0.046 (J)
Sulfate	51	49	75.2	51
Methane (ug/L)	1,700	120	ND	ND
TOC (mg/L)	2.3	1.2	0.99 (J)	ND

J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. ND - Not detected at the reporting limit.

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## Interpretation

The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Contaminant of Concern (COC) Concentrations: Under anaerobic conditions, some bacteria, most notable *Dehalococcoides* species, can use chlorinated ethenes as electron acceptors in a process called reductive dechlorination. The net result is the sequential dechlorination of PCE and TCE through daughter products DCE and vinyl chloride to ethene. In general, the production of reduced daughter products particularly ethene (See Dissolved Gases) suggests active reductive dechlorination.

Microbial Populations: CENSUS® analysis allows site managers to quantify targeted members of the microbial community deemed critical for site remediation. Total Eubacteria provides an index of the total bacterial biomass and is generally greater than 10<sup>6</sup> cells/bead in the absence of factors inhibiting microbial growth. While a number of bacterial cultures capable of utilizing PCE and TCE as growth supporting electron acceptors have been isolated 1-5, Dehalococcoides spp. may be the most important because they are the only bacterial group that has been isolated to date that is capable of complete reductive dechlorination of PCE to ethene<sup>6</sup>. In fact, the presence of Dehalococcoides spp. has been associated with the full dechlorination to ethene at sites across North America and Europe<sup>7</sup>. Thus, CENSUS® quantification of Dehalococcoides can be used to evaluate the likelihood of complete reductive dechlorination of PCE and TCE. The accumulation of the daughter products cis-DCE and vinyl chloride termed "DCE stall" is relatively common at PCE/TCE sites especially under MNA conditions. Accumulation of vinyl chloride, generally considered more carcinogenic than the parent compounds, is particularly problematic. CENSUS® quantification of vinyl chloride reductase genes (bvcA and vcrA) was developed to more definitively confirm the potential for biodegradation of vinyl chloride. Again, comparison of vinyl chloride reductase copies can be used to assess the efficacy of enhanced bioremediation approaches (biostimulation and bioaugmentation) to enhance populations of organisms specifically capable of reductive dechlorination of vinyl chloride.

Dissolved Gases: While ethene can volatilize, can be further metabolized, or be further reduced to ethane in some environments, greater concentrations of ethene generally indicate complete reductive dechlorination of PCE and TCE. In addition to quantifying the end products of reductive dechlorination, analysis of dissolved gases includes determination of dissolved methane. Combined with results of geochemical analysis, elevated methane concentrations are indicative of highly reducing conditions conducive to reductive dechlorination. However, methanogens also compete with dechlorinating bacteria including *Dehalococcoides* for available hydrogen.

# Glossary

**CENSUS**: CENSUS is based on a technique called quantitative polymerase chain reaction (qPCR) whereby many copies of a specific gene are generated. As each gene copy is made, a fluorescent marker is released, measured, and used to quantify the number of target genes present in a sample.

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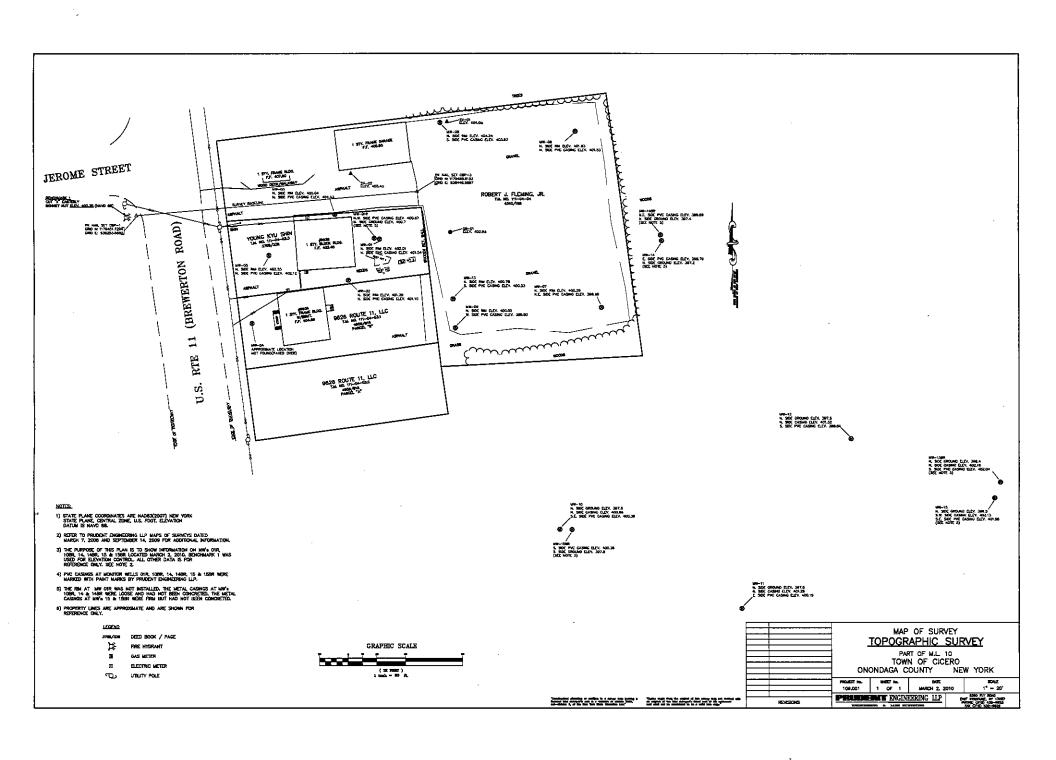


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## Appendix E

Soil Boring and Monitoring Well Construction Logs



EA Science and Technology   Locg of SOIL BORING   Sometiments   Locg of SOIL BORING	100		®_	201					Client:	New York St	200	a type or a second		ocation:
F.A. Science and Technology   Coordinates:   Substitute	200		EA E	ngin	eering	g, P.C.		14368.15	بنسينيا				_	The Delivery of the Party of th
Coordinates			EA So	cien	ce and	Techn	ology			4 1/4" hollov	v stem auge	rs		
Casing Below Surface: Reference Description:	Coordi		LOG OF SO	IL B	ORING			Sampling N	lethod:	2" Macro Co	re by 4-ft len	gth	Shee	t 1 of 1
Reference Blevations	Surface	e Elevatio	on:	7									D	Prilling
Secret   S								Water Lev.					Start	Finish
Note								Time			•		2/25/08	2/25/2008
Counts   Disgram     This   Feet   Log   Temperature: 30-F	Refere	nce Desci	iption:	_	-		-					+	935	1130
Counts   C	Dlaw	Feet	10-10-10-10-10-10-10-10-10-10-10-10-10-1		PID	Depth	-	Surface Cor	nditions:	GRAVEL				
	Section of the section of						USCS		turtions.					
2.5/4			Diagram				Log	Temperatu	re:					
2.5/4  2.				180	0	0		0-2.5				tone/Mudstone	rock fragments.	
2.5/4   0 2   1   1   1   1   1   1   1   1   1									Tight, semi-	cohesive. Mo	oist			
0   1   1   1   1   1   1   1   1   1					0	1								
3/4   3/4		2.5/4				2	-			-				
3/4    1		1			0	-	-							
3/4    1						3								
3/4    1														
3/4    0   0   0   0   0   0   0   0   0					0	4						one/Mudstone	rock fragments.	Perched Water
3,44    0						-		100000				LAV Tight C	obosivo Moist	
4/4  4/4  4/4  4/4  4/4  4/4  4/4  4/4					0	5	_	3-7	brown and d	ark grey mou	led SILTT C	LAT. Tight, C	oriesive. Moist	*
4/4  4/4  4/4  4/4  4/4  4/4  4/4  4/4		3/4			10.0	6		<b></b>						
4/4  4/4  4/4  4/4  4/4  4/4  4/4  4/4					0									
4/4  4/4  4/4  4/4  4/4  4/4  4/4  4/4						7		hwhat	MARKIN	THAT	FINE	THAT WE	MI MIE	
4/4  4/4  4/4  4/4  4/4  4/4  4/4  4/4								2.12			LOUTY			
4/4					0	8	_	8-10	Brown and d	ark grey mott	led SILTY C	LAY. Tight, C	onesive. Moist	
4/4						9	-							
0 10 10 10 10 10 10 10 10 10 10 10 10 10		1			0									
1		4/4			0	10		10-12	Brown and d	ark grey mott	led SILTY C	LAY with trace	SAND. Tight, Co	ohesive. Moist
3.5/4  3.					v									
3.5/4   0   13   0   15   15-16   TILL. Light brown SANDY SILT with rock fragements (Shale, Limestone).    15   15-16   TILL. Light grey SANDY SILT with Shale rock fragements. Wet, tight, non-cohesive.    2/4   0   15   16-18   TILL. Light grey SANDY SILT with Shale rock fragements. Wet, tight, non-cohesive.    0   17   0   18   0   19   19   19   19   19   19   19		1			0	11	_							
3.5/4   0   13   0   15   15-16   TILL. Light brown SANDY SILT with rock fragements (Shale, Limestone).    0   15   15-16   TILL. Light grey SANDY SILT with rock fragements (Shale, Limestone).    0   16   16-18   TILL. Light grey SANDY SILT with Shale rock fragements. Wet, tight, non-cohesive.    0   17   1   18   1   1   1   1   1   1   1						10		10.15	Drown and d	lark grov mott	lod SII TV C	I AV with trace	SAND Tight Co	phosivo Moist
3.5/4   0	-				0	12	-	12-13	Diowii and o	ark grey mou	ied Sill i O	LAT Will trace	SAND. Tigit, Co	Jilesive. Wolst
3.5/4		1				13	_	<del> </del>						
2/4  2/4  2/4  2/4  2/4  2/4  2/4  2/4		35/4			U									
Till material is saturated.    16		3.5/ 4			0	14								
Till material is saturated.    16						16		15 16	TILL Light	rown CANDY	CII T with r	ook fragomont	e (Shala Limosto	nol
2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4					0	15	_	13-10			SILT WILLT	ock fragement	s (Shale, Lilliesto	116).
2/4    18   *well heaved while well. Bottom of well is 19.5, not 20-ft below ground surface    19						16	_	16-18			SILT with Sh	ale rock frage	ments. Wet, tight,	non-cohesive.
2/4    18		1			0									
2/4    18     *well heaved while well. Bottom of well is 19.5, not 20-ft below ground surface    19					0	17								
*well heaved while well. Bottom of well is 19.5, not 20-ft below ground surface  1/1  1/1  1/1  1/1  1/1  1/1  1/1  1		2/4												
1/1   1/2   1/2   20   20-21   TILL. Light grey SANDY SILT with Shale rock fragements. Wet, tight, non-cohesive.   Refusal at 21-ft. SHALE bedrock   Refusal at 21-ft. SHALE bedrock		•				18	_		*well heaved	Lwhile well F	Rottom of we	Il is 19.5 not	O-ft below ground	l surface
1/1   0   20   20-21   TILL. Light grey SANDY SILT with Shale rock fragements. Wet, tight, non-cohesive. Refusal at 21-ft. SHALE bedrock    Logged by:						19	-		Well lieaved	Wille Well. L	ottom or we	ii 13 10.0, 110t 2	EO-It Delow ground	Juliaco
Logged by: Joe Von Uderitz Date: 25 February 2008  Drilling Contractor: Nothnagle Drilling, Inc. Driller: Steve Loranty  WELL SPECIFICATIONS:  Diam. of casing: 2' Screen Interval: 9.5-19.5 0.01" Sand pack: 7.5-21' #00N Grout: NA BOH: 21' Riser Interval: 0-9.5' Bentonite: 0-7.5' Cover: Flushmount  SOIL SAMPLE COLLECTED YES / NO Samples Collected for		. 7					7							
Logged by: Joe Von Uderitz Date: 25 February 2008  Drilling Contractor: Nothnagle Drilling, Inc. Driller: Steve Loranty  WELL SPECIFICATIONS:  Diam. of casing: 2' Screen Interval: 9.5-19.5 0.01" Sand pack: 7.5-21' #00N Grout: NA  BOH: 21' Riser Interval: 0-9.5' Bentonite: 0-7.5' Cover: Flushmount  SOIL SAMPLE COLLECTED YES / NO Samples Collected for		1./1			0	20		20-21	TILL. Light	grey SANDY S	SILT with Sh	ale rock frage	ments. Wet, tight,	, non-cohesive.
Drilling Contractor: Nothnagle Drilling, Inc.  Driller: Steve Loranty  WELL SPECIFICATIONS:  Diam. of casing: 2' Screen Interval: 9.5-19.5 0.01" Sand pack: 7.5-21' #00N Grout: NA  BOH: 21' Riser Interval: 0-9.5' Bentonite: 0-7.5' Cover: Flushmount  SOIL SAMPLE COLLECTED YES / NO  Samples Collected for		1/1			U				Refusal at 21	-ft. SHALE b	edrock			
Drilling Contractor: Nothnagle Drilling, Inc.  Driller: Steve Loranty  WELL SPECIFICATIONS:  Diam. of casing: 2' Screen Interval: 9.5-19.5 0.01" Sand pack: 7.5-21' #00N Grout: NA  BOH: 21' Riser Interval: 0-9.5' Bentonite: 0-7.5' Cover: Flushmount  SOIL SAMPLE COLLECTED YES / NO  Samples Collected for	Logged	bv.			Ine V	on Uderi	tz		Date:	25 Febru	ary 2008			
WELL SPECIFICATIONS:  Diam. of casing: 2' Screen Interval: 9.5-19.5 0.01" Sand pack: 7.5-21' #00N Grout: NA  BOH: 21' Riser Interval: 0-9.5' Bentonite: 0-7.5' Cover: Flushmount  SOIL SAMPLE COLLECTED YES / NO Samples Collected for			-	2/2				-						
Diam. of casing:         2'         Screen Interval:         9.5-19.5 0.01"         Sand pack:         7.5-21' #00N         Grout:         NA           BOH:         21'         Riser Interval:         0-9.5'         Bentonite:         0-7.5'         Cover:         Flushmount           SOIL SAMPLE COLLECTED YES / NO Samples Collected for         Samples Collected for         Samples Collected for         NA	-				othnag	le Drillin	g, Inc.	=	Driller:	Steve I	oranty	-		
BOH: 21' Riser Interval: 0-9.5' Bentonite: 0-7.5' Cover: Flushmount  SOIL SAMPLE COLLECTED YES / NO Samples Collected for	WE	LL SPEC	IFICATIONS	:										
SOIL SAMPLE COLLECTED YES / NO Samples Collected for	Diam. c	of casing:						19.5 0.01"				The second secon	4	
Samples Collected for	BOH:		21'		Riser	Interval:		0-9.5'	Bentonite:	0-7	7.5'	_ Cover:	Flu	shmount
Sample Depth: feet Sample Time: Sample Date:	SOIL S				S / NC	)								
			Sample Deni	th:		feet		Sample Tir	me:		Sam	iple Date	<u> </u>	

	<b>Y</b>	EA I	Engine	ering	, P.C.		Job. No. 14368.15 Drilling M	Client:	New York Sta Environment 4 1/4" hollow	al Conserva	ition	Jack's I	cation: Orycleaners ing Number:
			Science			ology					emmal is I		IW-07
ordi	nates:	LOG OF SO	OIL BO	RING			Sampling 1	Method:	2" Macro Cor	e by 4-ft len	gth	Sheet	1 of 1
	Elevatio	and the second											rilling
	Below Su nce Eleva						Water Lev.			шелі		Start	Finish
	ice Eleva ice Descr						Time					2/25/08 1245	2/25/2008 1330
w	Feet	Well	P	ID	Depth		Surface Co	nditions:	GRAVEL		The state of the	1,171	
nts lb)	Drvn/Ft.	Diagrai		ppb)	in	USCS			Sunny			Identify and the	Lacieta
10)	Recvrd		H	Nu	Feet	Log	Temperatu 0-1.5		30-F	race Limes	tone/Mudetone	rock fragments.	
					0		0-1.5		-cohesive. Mo		torie/ividustorie	TOCK Haginetits.	
					1		1.5-3	Grey brown	SANDY with tr	aco SII T	Looso non co	hosiva Moist	
	3/4			-	2		1.5-3	Gley blown	SANDT WILL	ace SILT.	Loose, non-co	nesive. Worst	111111
					3		3-3.1	Peat					
			# 90		3		3-3.1	reat			1		199-1
					4	THE ST	4-5	FILL. Light	brown SANDY	SILT with S	Shale rock frag	ments	
-	- 63				5		5-5.75	Peat. Top o	of Native soil	50	+ + +		
	4/4			- 3			5.75-6.5	Brown SAN	DY SILT. Tigh	t, non-cohe	sive. Moist	1	
-					6		6.5-8	Light grey b	rown mottled S	SILTY CLAY	with trace SA	ND. Tight, cohesiv	ve. Damp.
	-ke Kara				7			337					
-					8		8-9	Green brow	n SILTY CLAY	Tight coh	esive Moist		
7	3.75												
-					9	-	9-12	Light grey, I	ght brown mot	tled SILTY	CLAY. Tight, 0	Cohesive. Moist	
	4/4			77	10	in B Til				CINI			
			:::: <b>:</b>  _		11						1		
-	-				11								
					12	E LA	12-13	Green brow	n TILL	MG			
			⊞⊢	-	13	_	13-15	Light brown	SILTY CLAY.	Tight, Cohe	esve. Wet at 1	3.5-ft	
	4/4									,			
-					14	3074	The Ville	TOTAL STATE	150	N. FL			
					15		15-16	Light grey S	ILTY CLAY. T	ight, Cohes	ive. Wet		
_			:::: <b> </b> _		16		16-17	Light group	ILTY CLAY. T	ight Cohoo	ivo Mot		
-					16		10-17	Light grey S	ILIT CLAT. I	ight, Cones	ive. vvet		
			:::: <b>:</b> [		17		17-19	Shale Rock	Fragments wit	h medium t	o fine SAND.	Wet	
	3/3				18								-
				-	19		19-20.5	Shale Rock	Fragments wit	n medium to	o fine SAND.	Wet	
					20		20.5	Refusal. W	eathered SHAL	E bedrock.			
		3 12 18: 3: 30: 10:											
ged	by:	16		Joe Vo	on Uder	itz	A reput	Date:	25 Februa	ary 2008	purito nos		
ing	Contract	or:	Not	hnagl	e Drillin	ıg, Inc.	Mary July	Driller:	Steve L	oranty			
WEL	L SPEC	IFICATION	S:								÷	- 7	
	f casing:	20			n Interv		19.5 0.01"	Sand pack:			Grout:		NA hmount
H:		20	.5	KISEL	Interval:	-	0-9.5'	Bentonite:	0-7	.0	_ Cover:	Flus	hmount
		OLLECTED Collected to		/ NO									

	Y	EA Eng	gineerin	g, P.C.		14368.15	Client:	New York Sta Environment			Jack's	ocation: Drycleaners
		EA Sci	ence and	l Techn	ology	Drilling Me	thod:	4 1/4" hollow	stem auger	S Tradition (1)		ing Number: 1W-08
Coordi		LOG OF SOII				Sampling M	fethod:	2" Macro Cor	e by 4-ft leng	gth	Sheet	t 1 of 1
Vienes manement	Elevation	MANUAL CONTRACTOR OF THE PARTY					powarie willow (access	<del></del>				Prilling
	Below S ice Eleva			_	_	Water Lev. Time					Start	Finish
	ice Desci		101								2/25/08 1330	2/25/2008 1540
Blow	Feet	Well	PID	Depth		Surface Cor	nditions:	GRAVEL		1 10 10 10 10 10 10 10 10 10 10 10 10 10		
	Drvn/Ft.	Diagram	(ppb)	in		Weather:		Sunny	THE STATE OF			
(140-lb)	Recvrd		HNu	Feet	Log	Temperatui 0-1.5		30-F ravel and brov	m SAND E			
			0	0		0-1.5	Limestone	naver and brov	MI SAND. T	ice .		
	1.5-4		0	1	To part	4 3 1 1 mg	YORK NW	00/1002	TEST TO			
	1,5-4			2								
			et par	3				ford	THE T			
			:	4	_	4-4.5	Limostono	ravel and brov	n SAND E	11 1		
			0	1		4.5-5		ANDY SILT. T			AT)	
			. 0	5	100	5-6					nt, non-cohesive.	Wet at 7-ft
	2/4			6								
	- 57		1 (10)	7	ning a sun	71111111	min period V	no tanti				
												1 1 1
			0	8	a logge	8-10	Brown SAN	DY SILT with S	hale rock fra	agments. Tigl	nt, non-cohesive.	Moist
			0	9	1	geometri n	vene inpr	n) local	500			
	4/4		0	10		10-12	Light brown	fine SANDY S	ILT. Tight, S	Semi-Cohesiv	e. Wet at 11-ft	
				11								
			0	11								
			0	12		12-14	TILL. Brown	SANDY SILT	and SHALE	rock frageme	ents. Wet	
			0	13		Mar YAJ	S AL THE VA		191			
	2/2		0	14		14-15	TILL. Brown	SANDY SILT	and SHALE	rock frageme	ents. Wet	
			·:-	15			Refueal at 1	5-ft Shale Bed	rock			
				15			Neiusai at 1	3-It Offale Ded	OCK.			
				16			10 11 10 1	og 1-194.4	SI-SY			
			11000	17	0 (6 (0)	gen it with	angiltus.	1. 101	well -			
				18								
				10	11 31.30	And the state of						
	-			19								
				20	3.45		bioodnai V	In rollest	100	1 1 4		
Logged	by:	17/11	Ine V	on Uderi	tz		Date:	25 Februa	ary 2008			while
	Contrac	tor:	Nothnag		7	gia galana	Driller:	Steve L		Tapin to		
		IFICATIONS:	0									
Diam. o BOH:	f casing:	2" 15'		en Interv <u>a</u> Interval:	al: 5-1	0-5'	Sand pack: Bentonite:	3-15'		Grout: Cover:	Flu	NA shmount
		COLLECTED s Collected for		)								
		Sample Depth		_feet		Sample Tir	ne:		Samp	ole Date:		

		EA I	Engin	eerin	g, P.C.		Job. No. 14368.15	Client:	New York Sta Environment			Jack's I	cation: Orycleaners
		EA S	Scienc	ce and	l Techn	ology	Drilling Me	ethod:	4 1/4" hollow	stem augers	3		ing Number: IW-09
ordi	nates:	LOG OF SO					Sampling N	Method:	2" Macro Cor	e by 4-ft leng	;th		1 of 1
	Elevatio	n:				_		-				D	rilling
	Below St						Water Lev.					Start	Finish
	ice Eleva ice Descr					_	Time					2/26/08 700	2/26/2008 1000
w	Feet			PID	Depth		Surface Con	nditions:	GRAVEL				1 - 3 - A
ınts	Drvn/Ft.	Well Diagrai	m [	(ppb)	in	USCS	Weather:		Snowy	mill m		Market Company	and the same
)-lb)	Recvrd	Diagrai	Tile and a	HNu	Feet	Log	Temperatu		25-F				
				0	0		0-0.5 0.5-1.5		el and SAND fine SAND wit	n trace SILT.	Tight, non-c	ohesive. Moist to	wet
			April 1	0	1		1.5-2	PEAT	7.10	10	-		+
	2/4		-	0	2		1.0 2	, ,					
_					3	_	<u> </u>						
						8	Eveni ne	Civil too	it attitu	TEXT T			
				0	4		4-4.5					ohesive. Moist to	wet.
				0	5	mia 3	4.5-8	Light brown	grey Mottled S	ILTY CLAY.	right, cones	ive. Moist	
	4/4			-									
				0	6	-							
				0	7	ni I ahai	Street William			•			
				0	8		8-10.5	Light brown	grey Mottled S	ILTY CLAY.	Tight, cohes	ive. Moist	
				0	9								
	4/4		-		10				77	-1-			
				0			10.5-11.5	Light brown	grey Mottled S	ILTY CLAY	with some fine	SAND. Tight, Co	hesive. Moist
				0	11	all states	11.5-12	TILL Brown	SANDY SILT	with SHALE	rock fragmer	nts. Wet at 11.5-ft	
				0	12		12-16		SANDY SILT				
				0	13								
	4/4			0	14				9				* 1
				0	15								
				0	16	50(8)	16-18	TILL. Brown	SANDY SILT	with SHALE	rock fragmer	nts. Wet	
	-			0	17			35 V 15	[241,000]				
	2.5.2.5				18		18-18.5	TILL. Grev	SANDY SILT w	ith SHALE r	ock fragemen	ts. Wet	
				0	19				8.5-ft. SHALE			mpcii: 2577655	
					19			Treiusai at 1	U.U-II. ONALE	Deutock.			
					20								
ged	by:			Joe V	on Uderi	itz		Date:	26 Februa	ary 2008			100
ling	Contract	or:	No	othnag	le Drillin	g, Inc.	West Sta	Driller:	Steve L	oranty			
		IFICATIONS			900				The second	200-100-2			
m. o H:	f casing:	18			en Interval:		18' 0.01" 0-8'	Sand pack: Bentonite:	6-18.5'		Grout: Cover:		NA hmount
		-				7		. 2001110.				. 140	
	MULEC	OLLECTED	YES	s/NO	)								

		® EA Eng	ineerin	g, P.C.		Job. No. 14368.15	Client:		State Departr ental Conserv		- 1 months	cation: Orycleaners
-		EA Scie	nce and	l Techno	ology	Drilling Me	ethod:	Geoprobe	Hammer			ing Number: SB-01
Coordin		OG OF SOIL			- 67	Sampling N	Method:	2" Macro C	Core by 4-ft le	ngth	Sheet	1 of 1
	Elevation	1:			_	7					D	rilling
asing	Below Su	rface:				Water Lev.	N		(C		Start	Finish
	ce Elevati		C			Time					2/26/08	2/26/2008
eferen	ce Descrij	ption:			_	-			3007	-	700	1000
	Feet	Well	PID	Depth		Surface Co	nditions:	GRAVEL				
	Drvn/Ft.	Diagram	(ppb)	in	USCS	The second of th		Snowy	THE LEWIS CO.			
.0-10)	Recvrd		HNu	Feet	Log	Temperatu		25-F				
			0	0	_	0-1	Gravel	117 1117	200			
			0	1	7,18	1-2	Brown me	dium SAND.	Loose, non-c	ohesive. Dry		
	3/4		0	2		2-3	FILL. Brov	vn SAND and	Gravel			
			,	3								
						4-4.5	EII Dear	vn SAND and	Gravel			
			0	4		4.5-5.25	PEAT	wn SAND and	Gravei			
	0/4		0	5		5.25-6	Light brow	n SILTY CLA	Y. Tight, Coh	esive. Moist		
	2/4		0	6								
			0	7								
			0	8		8-9	TILL. Brow	vn SANDY SI	LT with Shale	Rock fragem	ents. Trace CLAY.	Moist
-			0	9		9-12	TILL. Brow	wn/green SAN	NDY SILT with	Shale rock fr	agments.	
	4/4		0	10								
	63.7		0	11	706	Transcu	(All yellow	THE PARTY OF	1,000			
			0	12	d de	12-16	TILL. Brov	vn/green SAN	NDY SILT with	Shale rock fr	agments. Wet 12-1	15
				13	a Jako	role Little	TOTAL DV	(0.10)				
	4/4		0	14	-							
			0	15								
			0			16 170	Dive see	TILL CHALE	and frames			
			2	16	n II win	16-17.3	WAS IN		rock fragmer	its		
	1.3/1.3		0	17			Refusal at	17.3-ft				
	1.5/ 1.5		2	18			Transit of	12 Out	Total I			
1				19		19. LV						
				20								
gged	by:		Joe V	on Uderit	z		Date:	26 Feb	ruary 2008			
illing	Contracto	127		le Drilling		hi nagiri	Driller:	DOM T	e Loranty	J. S. W.		an Fey
		FICATIONS:								0		
am. of DH:	f casing:			en Interv <u>a</u> · Interval:	I:	Harrist a six	Sand pack Bentonite:			Grout: Cover:		
		-			3(							

 Sample Depth:
 6
 feet
 Sample Time:
 1045
 Sample Date:
 2-26-08

 Sample Depth:
 17
 feet
 Sample Time:
 1100
 Sample Date:
 2-26-08

<sup>\*</sup> Duplicate Sample collected from 17-ft interval.

		® EA Eng	ineering	g, P.C.		Job. No. 14368.15	Client:	New York Sta Environment				cation: Orycleaners
		EA Scie			nology	Drilling Me	ethod:	Geoprobe Ha	mmer			ng Number: SV-01
rdi	nates:	LOG OF SOIL			ююду	Sampling M	Method:	2" Macro Cor	e by 4-ft len	ngth		1 of 1
	Elevation	ı: <u>-</u>			_	-					D	rilling
	Below Su			-	_	Water Lev.				T	Start	Finish
erer	ice Elevat ice Descri	ion:				Time					2/26/08 1130	2/26/2008 1140
1000	Feet	Well	PID	Depth		Surface Co	nditions:	GRAVEL				
nts lb)	Drvn/Ft. Recvrd	Diagram	(ppb) HNu	in Feet	USCS			Sunny 30-F				
,	Recvia		riivu	0	Log	Temperatu 0-0.5	Asphalt and			-		
			0			0.5-4.5		ravel and brov	vn SAND. F	FILL		
	4/4		0	1				78 				
	-/ -			2							A	
_	3			3								
			0	4								
			0	5								
	0.5/0.5			6								
			-	7								
			-	8								
				9								
			-	10								
	-		-	11						+++++		
				12								
				13								
				14								
				15								
				16								
				17					*			
-				18								
				19								
				20								
ed	by:		Joe V	on Uder	itz	Mary	Date:	25 Februa	ary 2008			- 31
	Contracto	and the second of the second o	Nothnag	le Drillir	ng, Inc.	al and sed	Driller:	Steve L	oranty	consult s		
	L SPECI f casing:	FICATIONS: 1 /4"	Soros	en Interv	al·	4-4.5'	Sand pack:	3-4.5'	#00N	Grout:		NA
i. 0	casing.	4.5'		Interval		0-4'	Bentonite:	0-3		Cover:		NA NA
. SA		OLLECTED Y	ES / NC	)								

		® EA Engi	ineerinį	g, P.C.		Job. No. 14368.15	Client:	New York Sta Environment				cation: Orycleaners
		EA Scie			nology	Drilling Mo	ethod:	Geoprobe Ha	mmer	enthalta.	Soil Bori	ng Number: SV-02
Coordi		LOG OF SOIL			BJ	Sampling N	Method:	2" Macro Cor	e by 4-ft len	ngth		1 of 1
	Elevatio	n:									D	rilling
Casing	Below Su	ırface:				Water Lev.					Start	Finish
	nce Elevat nce Descri			-		Time					2/26/08 1145	2/26/2008 1155
	Ir.a I		Ipin	Donth		Curfoco Co	ditions	CDAVE				
Blow Counts	Feet Drvn/Ft.	Well	PID (ppb)	Depth in		Surface Co Weather:	namons:	GRAVEL		7		
(140-lb)	Recvrd	Diagram	HNu	Feet	Log	Temperatu	re:	30-F				WIND TO
			0	0		0-4.5		gravel and brow	n SAND. I	FILL		
			0	1								
	4/4		************	2								
			-	3								
				4								
			0	5								
	0.5/0.5		0	6				<u> </u>				
				0								
-				7		<u> </u>	**			-		
				8								
				9								
1				10								
				11								
				12			102					
				13								
-	14			14			4	W				
			-	15		-						
				16								
				17								
				18								
			-	19								
				20		-						
ogged		-		on Uder		<u>Elegando</u>	Date:	25 Februa		- Marine		
	Contract	or:] FICATIONS:	Nothnagl	le Drillii	ng, Inc.	2,300,000	Driller:	Steve Lo	oranty	<del>-</del>		
	f casing:	1 /4"	Scree	en Interv	al:	4-4.5'	Sand pack:	3-4.5'	#00N	Grout:		NA
BOH:		4.5'		Interval		0-4'	Bentonite:	0-3		Cover:		NA
		OLLECTED Y	ES / NO								WINT VIEW	
		Sample Depth:_		_feet		Sample Tir	ne:		Sam	ple Date:		

	A 6		EA I	Engin	neering	z, P.C.	inqui)	Job. No. 14368.15	Client:		ork State De nmental Co	epartment of	Loca Jack's Dry	
(Table								Drilling Me	ethod:		nollow stem		Soil Boring	
	*	100				Techno	ology					ha gilah ya maya in sa	MW	
Coordi	inates:	LOG	OF S	OIL B	ORING			Sampling N	nethod:	NA			Sheet	1 of 1
Surface	e Elevatio												Dril	
Casing	Below S nce Eleva	urface	2:				_	Water Lev. Time					Start	Finish
	nce Bieva nce Desci		n:				-	THRE	T				1/25/2010	1/25/2010 1215
		45.11			DID	D. all		Combo C	Jin: -				900	1215
Blow Counts	Feet Drvn/Ft.		Well		PID (ppb)	Depth in	USCS	Surface Co Weather:	nattions:	Grass Rain	7 737			
(140-lb)	Recvrd	D	iagra	m	HNu	Feet	Log	Temperatu		55F	100 M			Land Cor.
					10	0	W 1000	0-19ft Strai					Well is replacement on tion) of former septi	
						1			IYO		- Budy	theo fexeure		
						2								
						2								
						3								
			- 1			4	-				-			
									R					
					- 30	5	K K Bis	A WILLY		10		++		
						6			7		- + -			
						7	-							
						8								
	-		YOU CO			9						++	*	
					F .									
					100 44	10		auge in	171 170					
				::::		11						TI		
						12			3					
-				::::		14			17.7		10			
						13					1			
					-1/	14	- House							
-					100	15					-		-	
	-					16								
					-	17								
						"			K.E.F	a laght an				
	77.7					18								
-		• • • • •				19							+	
						5 -	1000							
						20								
Logged	hv:				Dove	d Cranda	1	19.77	Date:		1-25-10		737	
	Contrac	tor:								-	reco Ven			
50.00			TION	-	aragon I	Environm	ental	Sheet S	Driller:		Stephen			
	LL SPEC				0	n lete-	ı. 0.4	0' (0 04")	Cond	ale	7.101/#0\	Consti	N.	^
Diam. 0	f casing:			2'	octee	n Interva	i. 9-1	9' (0.01")	Sand pag	JK	7-19' (#0)	Grout:	N	

	A G		EAE	ngir	perin	g, P.C.		Job. No. 14368.15	Client:	New York St Environment				ation:
			LAL		.cerin	5, 1, 0,			thod	40	The second secon	22-25-625-0		rycleaners
						l Techn	ology	Drilling Me		41/4" hollow		S		g Number: V-10
Coordi	nator	LOG	OF SC	OIL B	ORING	3		Sampling N	/lethod:	2" Split Sppo	n		Sheet	1 of 1
	nates: Elevati	n:	-				_			-			Dri	lling
	Below S		e: -				_	Water Lev.		The			Start	Finish
Referei	nce Eleva	tion:						Time						
Referei	nce Desc	ription	n: _		-								8/24/09	8/24/2009
Blow	Feet	SIIA!			PID	Depth		Surface Cor	nditions:	Grass				
Counts	Drvn/Ft.	г	Well Diagran		(ppb)	in	USCS	Weather:		Cloudy				141-14-140
(140-lb)	Recvrd	and the same of	nagran		HNu	Feet	Log	Temperatu:		65F				L. Series
						0		0-0.5 0.5-2	Grass and	Organics SILTY SAND.	Loose No	-Cohesive V	Vet @2.ft	119
						1	-	0.5-2	LIGHT BIOWI	SILTT SAND.	Loose, No	i-Conesive, v	vet @2-it	<del></del>
	]					2								
							-	Account to						
		SWED!		AUGUS (S		3					-			
						4								
				::::										
1	- 500				0	5	CL	5-7	Light Brown	SILTY CLAY,	Tight, Cohe	sive, Wet		
1	2/2				(1/2)		CL							
1					0	6	CL		,					
	-					7	CE	-						
						8								
	-													2
				:::		9	_							
1						10	CL	10-11.5	Brown SILT	Y CLAY with s	ome Light G	rev SILTY CL	AY (Mottled) Tid	ht, Cohesive, We
1	1.5/2				0		CL				<u>g</u>		(	,,
1	1.5/2				0	11	CL							ومناحب المالية
1			-				CL						1	
						12								
						13					1			-
	3					A.F							Jan Grand	
						14							Y I H	
1						10	- CI	15 15 5	Durnic Ox-	CLAV Timbs	Cohooliya	Not		7
1					0	15	CL			CLAY. Tight, Veathered Roo				
3	2/2				-	16		10.0 10	g.n. Oloy v	. Juliored 100	(01.17 (EE)	Julio Olavel.		
5					0	-								
-						17							i i land	
						10								
						18	_	*						
						19								
V				- [		On the								
						20								L.
		-	-	O.							لنسسيا			
Logged	by:				Joe V	on Uderi	z		Date:	8/24	/09			
Orilling	Contrac	tor:		Pa	ragon I	Environm	ental		Driller:	Robert E	Baldoze			
	L SPEC		- NONS	-								•		
					Carr	n Inton	d. E.E.4	E E (0.0411)	Cond	0 5 45	E (#0)	Cravit	74	10
Diam. o BOH:	f casing:		2' 15.			en Interval:	u. 0.5-1	5.5 (0.01") 0-5.5	Sand pack: Bentonite:	3.5-15.	5 (#0)	Grout:		kup

	A		EA	Engi	neering	z, P.C.	a'al h	Job. No. 14368.15	Client:	New York St Environment			Loca Jack's Dr	
								Drilling Me	ethod:	4 1/4" hollow			Soil Boring	Number:
		LOG			ice and		nology	Sampling N	Method:	Roller Bit NA			MW-	
Coordin Surface					27. 3. STOVES					That and	3117		Sheet	
Casing 1			2:	+			-	Water Lev.		T			Dril Start	ling Finish
Reference Reference				F				Time	70.00				1/27/2010	1/27/2010
Referen	ce Desci	iptioi					_						1245	1600
Statement L	Feet Drvn/Ft.		Well		PID (ppb)	Depth in	USCS	Surface Cor Weather:	nditions:	Grass/Brush Clear/Overcast/	Partly Sunny			
	Recvrd	L	Diagra	m	HNu	Feet	Log	Temperatur		30F	1111			
						0		0-20ft Hollo		ger into weathe ompleted in ove			ooon	
			-			1					- Tourden do			
						2								
	06													
						3	-							
						4								
	- 4					5								
						6								
			(10)			7		W. P. SAL	17 Va p. 271 ju	Carl.				
						8		5-1	-					
						9				-			-	
2.00														
						10					-			
	-					11					1			
						12					-			
	-					13		12.6	Top of Dade		131 7			
					390	13		13-ft	Top of Bedr	OCK				
			-			14								
					- 4	15					7-1-1			
		100000		Name of		16								
						17								
						18								
					-	19					+			
					10V A	20		20-30ft	Roller bit	ilizad to deill th	rough fra -t	urad badas -1	Moden - f-l- 1	and .
									competent b	edrock observe	ed during dr	illing activiti	<li>No signs of signifies. Due to previous</li>	difficulty
						21							ather shale and clay illed to depth of 15ft	
						22			00			6/- 51	a to acput of fort	
						23								
						24								
									4					
			JI gra			25				TA A. Y			r v ide	
			=			26	TO L	VII.		S4-1		-1-0-1	7	
						27	A Page				12.5		TYNA	- 14,000
			$\exists$											
				5-1	ران دار	28	33.0	well set at 2	81t - suspect	ed buckling of i	ractured ro	ck between 2	8 and 30 ft after rem	oving roller bit
				ı	-7-7	29			11 11					
					P	6	"							
ogged by			-	-		Cranda			Date:	1-27-				
Orilling C WELL	ontract		- PIONS		ragon Er	nvironn	nental	<i>E</i>	Driller:	Steph	ien			
Diam. of c		. IOA	2'		Screen	Interva	d: 1	8-28'	Sand pack:	16-28	(#O)	Grout:	NA	
BOH:		-	28			nterval:			Bentonite:	Surface		Cover:	Stick	

-	A <sup>®</sup>	EA Ens	gineerir	ıg, P.C.		Job. No. 14368.15	Client:		tate Departr			ntion: rycleaners
				d Techno	logy	Drilling Me	ethod:	4 1/4" hollo	w stem auge	ers	Soil Borin	g Number: V-11
C4:		LOG OF SOII			nogy	Sampling N	Method:	2" Split Spo	on			1 of 1
Coordi	nates: Elevatio				_							lling
	Below S				-	Water Lev.					Start	Finish
	ice Eleva				-	Time		-			,	7.1.021
	nce Descr										8/24/09	8/24/2009
Blow	Feet	Well	PID	Depth		Surface Co	nditions:	Grass				
Counts	Drvn/Ft.	Diagram	(ppb)	in	USCS	Weather:		Cloudy	` `			
(140-lb)	Recvrd		HNu	Feet	Log	Temperatu		65F				
-				0		0-0.5	Grass and	Organics				
				1		-						
			M									
				2								
							THT + COIL					
				3			Wet @3'					
				4	_							<del></del>
												1
1			. 0	5	CL	5-7	Light Brow	n/Blue Grey 1	Mottled SILT	Y CLAY. Tig	ght, Cohesive, Wet.	
1	2/2		::  <u> </u>		CL							
1	2.12		0	6	CL							
2			::	7	CL							
				/								
				8	-							
			::									
	2			9								
	111		::			20.20		-				
1			0	10	CL	10-12	Light Grey	/Brown SILTY	CLAY. Tig	ht, Cohesive,	Wet.	
1	2/2			11	CL							
1			0		CL							
				12								
			:		4							
				13		-						
	-		∷⊢—	14	_					-		
	1			14	-					rii -		
	1			15								
	Ş											
			414.2	16		Ve lawy	a odym -					
1				177	CI	17 10	Light Ca	Fat CLAY. Ti	aht Cahasin	a Wat		
1	ul(L)		•: 0	17	CL SM	17-18 18-18.5	Light Grey	/Red SANDY	SILT	e, wet.		
3	2/2			18	GIVI	18.5-19	Weathered					
4	1		0		1							
			_	19								
	1			20						M		
				20	+					-		
Logged	hv:		Ioc.'	Von Uderit	2		Date:	9/1	4/09	A + 1	TEXT 19.	11.11
		-	1414		1,605				22. 6.1	-		· v
1970	Contrac		Paragon	Environm	ental		Driller:	Robert	Baldoze			
WEI	L SPEC	IFICATIONS:										
	f casing:		Scre	een Interva	l: 7.5-1	7.5 (0.01")	Sand pack	: 5.5-1	8 (#0)	Grout:		IA .
BOH.		18.0	Dice	r Interval		0-7.5	Rentonito:	Δ.	5.5'	Cover	Ctiv	kun

Second   S	S	A B	EA Eng	gineerin	g, P.C.		Job. No. 14368.15	Client:	New York Sta Environment		339		ation: rycleaners
Sampling Method: 2° Spit Sppon	HT C		EA Sci	ence and	i Techno	ology	Drilling M	ethod:	4 1/4" hollow	stem augers		Soil-Borin	ng Number:
West   Lev.   Start   Finist   Finist	oordi					- 07	Sampling 1	Method:	2" Split Sppor	n		-	1
Pin					Tr.				The Later			Dri	
Secret   S	asing	Below St	urface:		0							Start	Finish
							Time					8/24/09	8/24/2009
Diagram   Diag	low	Feet	TAZ-11	PID	Depth	W. Land	Surface Co	nditions:	Grass		THE		
				(ppb)		_					7		A STATE OF THE PARTY OF THE PAR
	(U-1D)	Recvrd		HNu		Log	The state of the s						
14	1 3 3 3 3 4 7 11 11			0	11	CL CL CL			n Gray Tile (Sha				et.
15													
16		-			17								
17				-	15		15	Top of Roc	k (Auger Refusa	ıl)			
18		W.C.			16				100				
19		-			17		EAVE ST						
ged by:					18								
ged by:					19								
ged by:					20								
ling Contractor: Paragon Environmental Driller: Robert Baldoze  NELL SPECIFICATIONS:  n. of casing: 2' Screen Interval: 4-14 (0.01") Sand pack: 2-4 (#0) Grout: NA	gged	by:		Ioe V	on Uderit	z			8/24	/09			
NELL SPECIFICATIONS:  n. of casing: 2' Screen Interval: 4-14 (0.01") Sand pack: 2-4 (#0) Grout: NA			tor:			100		COMMENT.					
	WEL	L SPEC	IFICATIONS:						19				
	am. of DH:	f casing:				l: 4-1			2-4 (	#0)			

SOIL SAMPLE COLLECTED YES / NO

EA Engineering B.C.						Job. No. Client: New York State Department of					Location:		
	EA Engineering, P.C.				14368.15 Environmental Conservation  Drilling Method: 4 1/4" hollow stem augers					Jack's Drycleaners Soil Boring Number:			
			EA Scie			ology						MW-13	
Coordi		LOG	OF SOIL	BORING			Sampling M	Sampling Method: 2" Split Sppon				Sheet	1 of 1
Surface	Elevation												lling
	Below Si nce Eleva					_	Water Lev. Time					Start	Finish
	ice Eleva		: =				Time	<u> </u>				8/24/09	8/24/2009
Disease	Feet		ACCESS TO A	PID	Depth		Surface Cor	ditions: Gras					
Blow Counts	Drvn/Ft.	1000000	Well iagram	(ppb)	in	USCS	Weather:	Clou					
(140-lb)	Recvrd	V-22-01	lagrant	HNu	Feet	Log	Temperatur 0-0.5	FILL. Gravel and	CAND				
				0	0		0.5-1.5			ith trace SII	T. Tight, non-	cohesive. Moist to	o wet
				0	1		1.5-2	PEAT		E.M.			-
	2/4			0	2		1.5-2	TEAT		100			
					3								
				0	4		4-4.5					cohesive. Moist to	o wet.
				0	5		4.5-8	Light brown grey	Mottled	SILI I CLA	1. Tight, cones	sive. Moist	
	4/4	111			6								
	100		1	0	0								
	2.01			0	7			a riversea might		erl L			
				0	8		8-10.5	Light brown grey	Mottled	SILTY CLA	Y. Tight, cohes	sive. Moist	
					0								
	4/4			0	9								
4	4/4			0	10		105 11 5	( label basses asses	Matthad	CILTY CLA	V with some fi	as CANID Tight	Cabasina
				0	11			Moist	Mottled	SILI I CLA	1 with some in	ne SAND. Tight,	Conesive.
		Laster.					11.5-12 12-16					nts. Wet at 11.5-f	t
	B 2			0	12		12-16	FILL. Brown SA	ND1 SILI	WILLSHA	LE rock fragme	nts. wet	
				0	13	7.							
	4/4			0	14								
					15								
				0	15								
				0	16		16-17	TILL. Brown SAM	IDY SILT	with SHALI	E rock fragmen	ts. Wet	
				0	17		17.5-18	Grayish Red Dolo	mite				
					18		18-18.5 18.5-19	Grey Shale Weathered Grey	Shale				
	7	agruence.	30000	0	10		HEI STELL	RQD = 0% Very I					
-				0	19		19.5-24.5	Light Grey Shale Broken Shale 23-	24'				
	-			0	20			RQD = 8" / 60" (		y Poor			
				-	21								
				0									
	-			0	22				+				
				. 0	23						1.0		
				1	24								
	-500-0			1 °		a Na	24.5-26.5	Gray Shale		ATEL	4 A		
4-4-4	-			0	25			4.00					
				0	26	i rijik	26 5 27	ight Cray CLAY			78.75		
				0	27		26.5-27 27-29.5	Light Gray CLAY Light Grey SHALI	E. 28-29.	5 More brol	cen (1" thick pie	eces)	
						RQD = 12" / 60 (F	Poor)						
	d.			0.0	28	(PE)		- And Mary			The spendings		
	ALIC .			3000	29	100		THE PARTY OF					
Logged	byr	_		Joo V	on Uderii	<u> </u>	-	Date:	0/24	/00		4	17 587 174
	Contract	lor:	-	Paragon E				Date:	8/24	-	-		
	L SPEC		anno de la companya della companya d	a aragon E	avnoun	emai	•	ormer.	Robert E	zanioze	-		
	f casing:		2'	Scree	n Interva	l: 19-	29 (0.01")	Sand pack:	18.5-2	9 (#0)	Grout:	N	A
вон:			29.5		Interval:	-	0-19'	Bentonite:	0-18		Cover:	Stic	

EA Engineering, P.C.						Job. No. Client: New York State Department of 14368.15 Environmental Conservation				Location: Jack's Drycleaners		
	EA Scie			anles:	Drilling Me					Soil Boring Number: MW-14		
Coordinates	LOG OF SOIL			lology	Sampling M	Sampling Method: 2" Split Spoon					1 of 1	
Coordinates: Surface Elevation:										Dril	lling	
Casing Below Surface:										Start	Finish	
eference Elev eference Des				_	Time					1/25/2010 1330	1/26/2010 1030	
low Feet	T 10 11	PID	Depth		Surface Co	nditions:	Grass			1550	1000	
ounts Drvn/F	Well Diagram	(ppb)	in	USCS	Weather:		Cloudy					
0-lb) Recvrd	-	HNu	Feet	Log	Temperatu 0-2ft	re: Top soil/Or	65F / 35 f					
			0		0-210	Top son/ Or	garacs					
	55 55	-0	1						74-15			
_				-	-							
			2						-			
		4	3									
		:		_								
-		1	4					-		-		
		0	5	CL-ML	5-6ft	Brown silty	clay (very den	se, some plac	ticity, cohesive,	wet)		
2/2			4	CL-ML							14-14	
,		0	0	CL-ML								
			7								PMI	
		;										
		1	•									
			9									
			40	CI M	10 100	Daniel alle	.1 / 1		Haller askerders			
		0	10	CL-ML	10-12ft	brown sitty	ciay (very den	se, some piac	ticity, cohesive,	wetj	5.54	
2/1.5		. 0	11	CL-ML								
		1	12	CL-ML								
		1	12	-				-				
-			13		E -						100	
-		-	14			*						
		9 0	15	CL-ML	15-17ft	Brown silty	clay (very den	se, some plac	ticity, cohesive,	wet)		
2/1		1	16	CL-ML								
	J:::: <del>                                  </del>	0		CL-ML								
		1	17									
			18									
		1		14					Jan 1			
		1	19	-				-1			-	
	1:::: :::	0	20		20-21.5ft	Brown silty	clay (very den	se, some plac	ticity, cohesive,	wet)		
2/1		1	21	CL-ML					7.1			
5		0	21	CL-ML	21.5-22ft	Brown-gray	silty slay with	weathered sl	hale fragments (	(wet stiff)		
			22									
=	100	1	23	-			-		-1			
	*	100	24									
17		0	25	101	25-26ft	Brown-grav	silty slay with	weathered sh	hale fragments (	wet stiff)		
28 1/1		, ,										
			26		26ft	Refusal - Co	mpetent Bedro	ock				
			27									
			20									
0.1		W 57	28			-			JIP TO LEWA			
			29									
			لــــا		L						(/m - 2 - 2 - 2	
ged by:		Davi	d Crand	all		Date:	1-26	-10				
ling Contra	ctor:	Paragon I	Environ	nental		Driller:	Step	hen				
WELL SPE	CIFICATIONS:											
n. of casing	: 2'	Scree	n Interv		23' (0.01")	Sand pack:	11-23		Grout:	N	Α	
H:	23'		Interval		face - 13'	Bentonite:	9-1		Cover:	Stic	kup	

EA Engineering, P.C.						Job. No. Client: New York State Department of Environmental Conservation				Location: Jack's Drycleaners						
				Techno	lngv	Drilling Method: 4 1/4" hollow stem augers					Soil Boring Number: MW-14BR					
	ь.	LOG OF SOIL	BORING	i	106)	Sampling 1	Method:	NQ Cores			Sheet 1 of 2					
Coordi					_						Drilling					
	Elevatio Below St				-	Water Lev.				<del></del>	Start	Finish				
	nce Eleva			_	-	Time						7				
	nce Descr							THE P			1/26/2010 1100	1/27/2010 1600				
Di	Feet		PID	Depth		Surface Co	nditions:	Grass								
Blow Counts	Drvn/Ft.	Well	(ppb)	in	USCS	Surface Conditions: Grass Weather: Cloudy										
	Recvrd	Diagram	HNu	Feet 0	Log	Temperatu		30F								
						0-23ft	Hollow S	em Auger in	to weathered	d bedrock. No	split spoon					
				ļ. —	-		sampling	completed in	overburden	soils						
			<u> </u>	1												
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			1000	3												
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Logged	by:		Joe V	on Uderitz		MANUEL VILLE	Date:	1	-27-10			Red -				
4200	Contrac	tor:		Environme		190	Driller:	. J.	tephen							
100		IFICATIONS:														
			0	en Interval	. 20	38' (0.01")	Cond ac-	b. 00	38' (#0)	Crouds	N	^				
BOH:	f casing:	2' 38'		Interval:		face - 28'	<ul> <li>Sand pac Bentonite</li> </ul>	:	-38' (#0) 0-26'	Grout: Cover:	Stic					

	·A'	F A	Engi	neerin	σ.P.C		Job. No. 14368.15	Client:	New York St			Loca Jack's Dr				
EA Engineering, P.C.							14368.15 Environmental Conservation  Drilling Method: 4 1/4" hollow stem augers				Jack's Drycleaners Soil Boring Number:					
		EA	Scien	ice and	l Techn	ology					15	Soil Boring MW-				
	10000040000	LOG OF	SOIL B	BORING	3		Sampling N	Method:	NQ Cores			Sheet	2 of 2			
Coordi		m.	-		-	_	-		-			Dril				
Surface Elevation: Casing Below Surface:							Water Lev.					Start	Finish			
Referei	nce Eleva	tion:			1.1	_	Time					e sun librario	The Charles of the Control of the Co			
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Blow Counts	Feet Drvn/Ft.	We				USCS	Surface Co Weather:	namons:	Grass Cloudy							
(140-lb)	Recvrd	Diag	ram	HNu	Feet	Log	Temperatu	ire:	30F							
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	1/4 T		<b>-</b>  ∷∷		29		29ft	Shale	100		7					
			ווון⊏				29.5-30ft	Weathered	shale and gray							
			<b>-</b>		30	Sussia	30-38ft	Roller bit to	38ft. No com	petent rock	encountered	during drilling activ	rities			
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Drilling	Contrac	tor:	P	aragon l	Environm	ental		Driller:	Step	hen						
WEI	LL SPEC	IFICATIO	NS:													
Diam. o	f casing:		2'	Scree	en Interva	al: 28-3	38' (0.01")	Sand pack:			Grout:	N.				
0011			201	D.	Industrial.	0	f 001		- 0 (	201	0	Ctic	and the same of th			

EA Engineering, P.C.							Job. No.	Job. No. Client: New York State Department of 14368.15 Environmental Conservation					Location: Jack's Drycleaners		
						24		Drilling Method: 4 1/4" hollow stem augers					Soil Boring Number:		
EA Science and Technology LOG OF SOIL BORING						ology	Sampling I	Method:	2" Split Spoo	MW-15 - Sheet 1 of 1 - Drilling					
Coordinates: Surface Elevation:															
	Below S					_	Water Lev					Start	Finish		
	nce Eleva nce Desci					_	Time					1/27/2010	1/28/2010		
								nditions:	Grace/Brush			1630	1030		
Blow	Feet Drvn/Ft.	We Diag		(ppb)	in	USC	S Weather:								
(140-1ь)	Recvrd	2001	7889	HNu	Feet 0	Log	Temperatu 0-2ft	re: Top soil/0	30F Organics						
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6	2/2		Ⅎ∷	0	5	CL-M	L 5-7ft	Brown sill	y clay (very der	ise, some pi	acticity, cones	ive, moist)			
8 11	212		-	0 -	6										
			7		7				100						
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7			7	0	10	CL-M	L 10-11.5ft	Brown silt	y clay (very der	ise, some pl	acticity, cohes	ive, moist to wet a	: 11ft)		
7	2/1.5		וווו	0	11		UKS. FE								
14			וווי		12	CL-M	L 11.5-12ft	Brown sar	ndy clay (dense,	some placti	city, cohesive	, wet)			
			Ⅎ∷												
-	_		∃∷		13		<del></del>								
			7		14										
8				0	15	CL-M			ndy clay (dense,						
12 19	2/2				16	_	15.5-17ft		ny silty slay witl nto weathered r						
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Logged		**************************************			d Crand		-	Date:	)/I	8/10	-				
- 27	Contrac		_	aragon l	Environi	nental	-	Driller:	Ste	ohen	-		6		
	LL SPEC f casing:	IFICATIO	NS: 2'	Scree	en Interv	al 55	15.5' (0.01")	Sand non	k 35.15	.5' (#0)	Grout:	N	IA		
BOH:	, casing.		15.5'		Interval		Inface - 5.5'	Bentonite		e - 3.5'	Cover:		kup		

Dalling Method: 4 1/4* bollow stem augres   Soil Buring Manufer   MW-38m8   Source Development   Soil Buring Method: NA   Sheet 1 of 1   Sheet Source Development   Soil Buring Method: NA   Sheet 1 of 1   Sheet Source Development   Soil Buring Method: NA   Sheet 1 of 1   Sheet Source Development   Soil Buring Method: NA   Sheet 1 of 1   Sheet Soil Buring Method: NA   Sheet 1 of 1   Sheet Soil Buring Method: NA   Sheet 1 of 1   Sheet Soil Buring Method: NA   Sheet 1   1/38/7300   Sheet Soil Buring Method: Na   1/38/7300   Sheet Soil Buring Me	EA Engineering, P.C.						Job. No. 14368.15				Location: Jack's Drycleaners				
Suppling Method: NA										Soil Boring Number:					
Surface Elevation:   Surface   Surface   Surface   Flight   Surface   Surf						nogy	Sampling M	Sampling Method: NA							
Wester   Wester   Water   Wa	The control of the co	n:				_						Drilling			
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Control   Cont			_			_	Time								
Could Diggram Hills Rect Log Free prestature 387  Diggram Hill Rect Log Diggram Hill Rec	ne Trace			IDID	Donth		Surface Co.	nditions	Cases / Passah			7.5.0			
First   Feet   Log   Insulation   Feet   Log	Counts Drvn/Ft.					USCS	Weather: Clear/Light to Heavy Snow								
1	(140-lb) Recvrd	Diagra	In	HNu		Log					1: 0.0014				
		SI DE			0	-	0-15ft	Straight Ho	llow Stem Aug	er - no sam	pling (MW-1	5 overburden previo	ously screened)		
					1										
gged by:  David Crandall  Date: 1/28/2010  Paragon Environmental  Driller: Slephen  WELL SPECIFICATIONS:					2		-								
gged by:  David Crandall  Date: 1/28/2010  Paragon Environmental  Driller: Slephen  WELL SPECIFICATIONS:					3										
gged by:  David Crandall  Date: 1/28/2010  Paragon Environmental  Driller: Slephen  WELL SPECIFICATIONS:						+									
gged by:  David Crandall  Date: 1/28/2010  Paragon Environmental  Driller: Slephen  WELL SPECIFICATIONS:					4										
gged by:  David Crandall  Date: 1/28/2010  Paragon Environmental  Driller: Slephen  WELL SPECIFICATIONS:					5										
gged by:  David Crandall  Date: 1/28/2010  Paragon Environmental  Driller: Slephen  WELL SPECIFICATIONS:					6		6ft	Obstruction	at 6ft. Moved	location to	Northeast an	d restarted with H.S	S.A		
B   9   10   10   11   11   12   13   15   15   30 ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    15												91			
B   9   10   10   11   11   12   13   15   15   30 ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    15					/				45 A						
15					8			Chara.							
13   15   15-30ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    17					9	+							2		
13   15   15-30ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    17															
12   13   15   15-30ft   Roller bit utilized to drill through fractured bedrock. No signs of significant   15   15-30ft   Roller bit utilized to drill through fractured bedrock. No signs of significant   15   15   15   15   15   15   15   1					10										
13   14   15   15-30ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    17					11			1300-1							
13   14   15   15-30ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    17															
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15   15-30ft Roller bit utilized to drill through fractured bedrock. No signs of significant competent bedrock observed during drilling activities. Due to previous difficulty coring, no cores were collected during drilling (weather shale and clay previously clogged core barrels repeatedly during coring). Drilled to depth of 15ft into rock.    18					13										
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17					16			coring, no c	ores were coll	ected during	g drilling (we	ather shale and clay	previously		
18					17			clogged cor	e barrels repe	itedly durin	g coring). Di	rilled to depth of 15	t into rock.		
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David Crandall   Date: 1/28/2010					27	-									
David Crandall   Date: 1/28/2010     David Crandall   Driller: Stephen     Stephen     Stephen     Stephen     Stephen     Stephen     Stephen     Stephen	1 1				28							y: It is a second			
David Crandall   Date: 1/28/2010     David Crandall   Driller: Stephen     Stephen     Stephen     Stephen     Stephen     Stephen     Stephen     Stephen				-	29										
Drilling Contractor:         Paragon Environmental         Driller:         Stephen           WELL SPECIFICATIONS:         Driller:         Stephen           Diam. of casing:         2'         Screen Interval:         20-30' (0.01")         Sand pack:         18-30' (#0)         Grout:         NA					-										
Orilling Contractor:         Paragon Environmental         Driller:         Stephen           WELL SPECIFICATIONS:         Diam. of casing:         2'         Screen Interval:         20-30' (0.01")         Sand pack:         18-30' (#0)         Grout:         NA	Logged by:			Davi	d Crandal	l		Date:	1/28,	/2010			•		
WELL SPECIFICATIONS:  Diam. of casing: 2' Screen Interval: 20-30' (0.01") Sand pack: 18-30' (#0) Grout: NA		or:	_ P					Driller:							
							-								
	Diam. of casing:														