ALPHA
GEOSCIENCE
Geology
Hydrology
Remediation
Water Supply

February 13, 2004

Mr. Ramanand Pergardia, P.E.
NYSDEC Region 3
21 South Putt Corners Road
New Paltz, New York 12561-1696

Re: Hydrogen Releasing Compound (HRC) Injection Report
New Paltz Plaza
Index No. V000873
New Paltz, New York

Dear Mr. Pergardia:

This report presents the results of the injection of hydrogen releasing compounds (HRCs) at the former Revonak dry cleaners site (NYSDEC Site No. 356021) in New Platz, New York. The work was conducted on November 14 and 14, 2003, in general accordance with the NYSDEC-approved Contingency Plan, dated April 22, 2002. HRCs were injected into the subsurface to stimulate the degradation of chlorinated solvents in soil and ground water. Alpha Geoscience (Alpha) personnel directed and documented the injection of HRC into the subsurface and collected ground water samples from selected wells to monitor parameters that will indicate the onset of chemical changes in the subsurface environment.

A Geoprobe Model 54DT track-mounted hydraulic-push drilling rig, owned and operated by Zebra Environmental Corporation (Zebra), was used to bore 27 injection points. The locations of the injection points were measured from fixed features (eg. building corners) and are shown on Figure 1. The boring spacing for the HRC injection was approximately 10 feet or less (5 foot radius) based on the permeability of the subsurface materials and location of utilities. The borings were drilled to the top of bedrock or to the point of probe refusal and ranged from eight to twelve feet deep. Table 1 summarizes the boring depths.

Alpha used a proprietary spreadsheet from the HRC manufacturer (REGENESIS) to calculate the recommended volume of HRC at each injection location. The spreadsheet is presented in Attachment No. 1. The HRC was injected into each boring starting at the bottom of the boring and extending to a depth of approximately 2 feet below grade. The amount of HRC injected ranged from 24 pounds to 40 pounds (Table 1) with a total of 746 pounds injected into the area of treatment. Approximately one foot of bentonite chips was placed above the HRC as a seal and the surface was completed with asphalt patch in the parking/traffic area.

Alpha personnel collected ground water samples from monitoring wells MW-2, MW-3, and MW-6 to establish baseline concentrations for indicator compounds, including nitrate, sulfate, total organic carbon, total iron, and dissolved iron, as recommended by REGENSIS. Changes in these indicator parameters will occur as the HRC begins to react in the subsurface and will be apparent before substantial variations in the concentration of volatile organic compounds in the ground water are evident. The samples were analyzed by Severn Trent Laboratories and the results are summarized in Table 2. The laboratory reports are presented in Attachment No. 2.

Ground water samples will be collected from wells MW-2, MW-3, and MW-6 in May 2004, six months after the HRC injection. Samples from these wells will be analyzed for the indicator compounds and volatile organic compounds. The results will be forwarded to the NYSDEC. The next annual ground water sampling event is scheduled for August 2004. Results of the annual ground water monitoring will be submitted to the NYSDEC in the annual ground water monitoring report.

Please feel free to contact me with any questions you have regarding this information.

Sincerely,
Alpha Geoscience

Thomas M. Johnson
Hydrogeologist

TMJ/bms

attachments

cc: P. Kempner
J. Rashak (NYSDEC)
R. Rusinko (NYSDEC)
F. Navratil (NYSDOH)
K. Young, Esq.

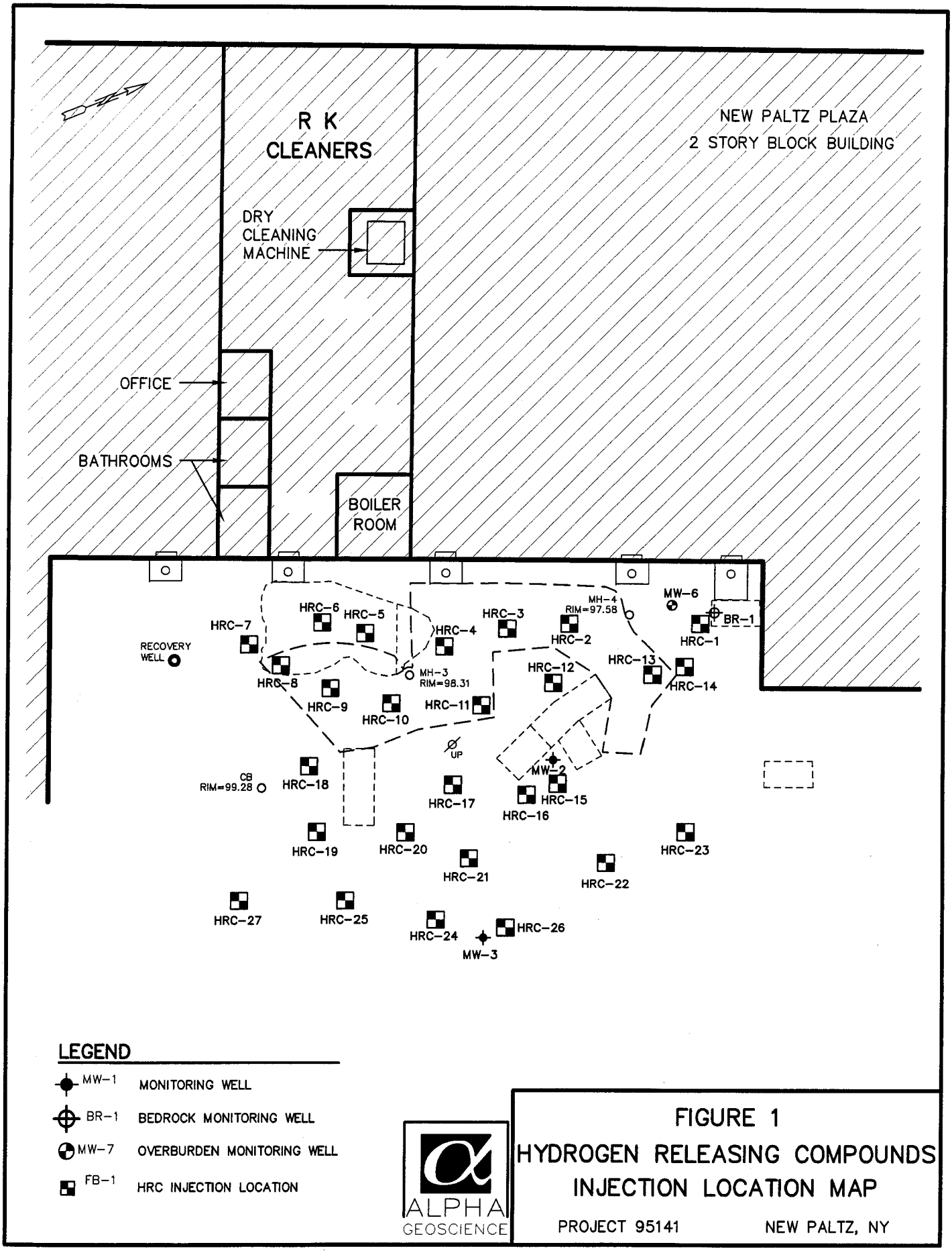
E:\projects\1995\95141-npplaza\Reports\HRC injection report.wpd

Table 1
New Paltz Plaza
Alpha No. 95141
Hydrogen Releasing Compound (HRC)
Injection Record

Date	Boring ID	Total Depth Boring (feet)	Injection Interval (feet)	Total HRC Injected (pounds)
11/14/2003	HRC-1	10.0	2.0-10.0	32.0
11/14/2003	HRC-2	12.0	2.0-12.0	40.0
11/14/2003	HRC-3	9.0	2.0-9.0	28.0
11/14/2003	HRC-4	8.0	2.0-8.0	24.0
11/14/2003	HRC-5	9.0	2.0-9.0	28.0
11/14/2003	HRC-6	8.0	2.0-8.0	24.0
11/13/2003	HRC-7	8.0	2.0-8.0	24.0
11/13/2003	HRC-8	8.0	2.0-8.0	24.0
11/13/2003	HRC-9	8.0	2.0-8.0	24.0
11/13/2003	HRC-10	8.0	2.0-8.0	24.0
11/14/2003	HRC-11	9.0	2.0-9.0	28.0
11/14/2003	HRC-12	8.0	2.0-8.0	24.0
11/14/2003	HRC-13	9.0	2.0-9.0	28.0
11/14/2003	HRC-14	8.0	2.0-8.0	24.0
11/14/2003	HRC-15	9.0	2.0-9.0	28.0
11/14/2003	HRC-16	9.0	2.0-9.0	28.0
11/14/2003	HRC-17	8.0	2.0-8.0	24.0
11/13/2003	HRC-18	8.0	2.0-8.0	24.0
11/13/2003	HRC-19	10.0	2.0-10.0	40.0
11/13/2003	HRC-20	8.0	2.0-8.0	24.0
11/13/2003	HRC-21	8.0	2.0-8.0	24.0
11/14/2003	HRC-22	8.0	2.0-8.0	24.0
11/14/2003	HRC-23	8.0	2.0-8.0	24.0
11/13/2003	HRC-24	11.0	2.0-11.0	36.0
11/13/2003	HRC-25	10.5	2.0-10.5	34.0
11/14/2003	HRC-26	8.0	2.0-8.0	30.0
11/14/2003	HRC-27	12.0	2.0-12.0	30.0

Table 2
Summary of Groundwater Sampling Analytical Results
Hydrogen Releasing Compound (HRC) Injection
New Paltz Plaza
Alpha No. 95141
November 13-14, 2003

		MW-2	MW-3	MW-6
Total Organic Carbon	mg/L	4.68	3.56	714
Nitrate	mg/L	ND<0.20	ND<0.20	0.27
Sulfate	mg/L	39.2	51.8	15.5
Total Iron	ug/L	12200	4280	11700
Dissolved Iron	ug/L	ND<100	ND<100	ND<100



LEGEND

- MW-1 — MONITORING WELL
- BR-1 — BEDROCK MONITORING WELL
- MW-7 — OVERBURDEN MONITORING WELL
- FB-1 — HRC INJECTION LOCATION

ALPHA GEOSCIENCE

FIGURE 1
HYDROGEN RELEASING COMPOUNDS INJECTION LOCATION MAP

PROJECT 95141 NEW PALTZ, NY

95141-30.DWG

ATTACHMENT I
HRC Dosing Calculations

HRC Design Software for Plume Area/Grid Treatment

US Version 3.1

Regenesis Technical Support: USA (949) 366-8000, www.regenesis.com

Site Name:
Location:
Consultant:

Site Conceptual Model/Extent of Plume Requiring Remediation

Width of plume (intersecting gw flow direction)	50	ft			
Length of plume (parallel to gw flow direction)	50	ft	=	2,500	sq. ft.
Depth to contaminated zone	2	ft			
Thickness of contaminated saturated zone	8	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay)	silt				
Total porosity	0.4		Eff. porosity:	0.25	
Hydraulic conductivity	2.73	ft/day	=	9.6E-04	cm/sec
Hydraulic gradient	0.12	ft/ft			
Seepage velocity	478.3	ft/yr	=	1.310	ft/day,
Treatment Zone Pore Volume	8,000	ft^3	=	59,848	gallons

Dissolved Phase Electron Donor Demand

	Contaminant Conc (mg/L)	Contaminant Mass (lb)	Stoich. (wt/wt) contam/H_2
Tetrachloroethene (PCE)	2.00	1.0	20.7
Trichloroethene (TCE)	0.35	0.2	21.9
cis-1,2-dichloroethene (DCE)	0.40	0.2	24.2
Vinyl Chloride (VC)	0.03	0.0	31.2
Carbon tetrachloride	0.00	0.0	19.2
Chloroform	0.00	0.0	19.9
1,1,1-Trichloroethane (TCA)	0.03	0.0	22.2
1,1-Dichlorochloroethane (DCA)	0.00	0.0	24.7
Hexavalent Chromium	0.00	0.0	17.3
User added, also add stoichiometric demand	0.00	0.0	0.0
User added, also add stoichiometric demand	0.00	0.0	0.0

Sorbed Phase Electron Donor Demand

Soil bulk density	1.76	g/cm^3 =	110	lb/cf
Fraction of organic carbon: foc	0.005	range: 0.0001 to 0.01		

(Values are estimated using Soil Conc=foc*Koc*Cgw)
(Adjust Koc as nec. to provide realistic estimates)

	Koc (L/kg)	Contaminant Conc (mg/kg)	Contaminant Mass (lb)	Stoich. (wt/wt) contam/H_2
Tetrachloroethene (PCE)	263	2.63	5.8	20.7
Trichloroethene (TCE)	107	0.19	0.4	21.9
cis-1,2-dichloroethene (DCE)	80	0.16	0.4	24.2
Vinyl Chloride (VC)	2.5	0.00	0.0	31.2
Carbon tetrachloride	110	0.00	0.0	19.2
Chloroform	34	0.00	0.0	19.9
1,1,1-Trichloroethane (TCA)	183	0.03	0.1	22.2
1,1-Dichlorochloroethane (DCA)	183	0.00	0.0	24.7
User added, also add stoichiometric demand	0	0.00	0.0	0.0
User added, also add stoichiometric demand	0	0.00	0.0	0.0

Competing Electron Acceptors

	Electron Acceptor Conc (mg/L)	Electron Acceptor Mass (lb)	Stoich. (wt/wt) elec acceptor/H_2
Oxygen	5.00	2	8.0
Nitrate	5.00	2	12.4
Est. Mn reduction demand (potential amt of Mn2+ formed)	5.00	2	27.5
Est. Fe reduction demand (potential amt of Fe2+ formed)	50.00	25	55.9
Estimated sulfate reduction demand	50.00	25	12.0

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	3	Recommend 1-4x

Injection Point Spacing and Dose:

Injection spacing within rows (ft)	10.0	# points per row:	5	
Injection spacing between rows (ft)	10.0	# of rows:	5	
Advective travel time bet. rows (days)	8	Total # of points:	25	
		Minimum req. HRC dose per foot (lb/ft)	4.0	<-Minumum Dose

Project Summary				
Number of HRC delivery points (adjust as nec. for site)			25	
HRC Dose in lb/foot (adjust as nec. for site)			4.0	<-Minumum Dose Override
Corresponding amount of HRC per point (lb)			32	
Number of 30 lb HRC Buckets per injection point			1.1	
Total Number of 30 lb Buckets			27	
Total Amt of HRC (lb)			810	
HRC Cost		$	7.50	
Total Material Cost		**$**	**6,075**	
Shipping and Tax Estimates in US Dollars				
Sales Tax	rate: 8%	$	456	
Total Matl. Cost		$	6,531	
Shipping of HRC (call for amount)		$	-	
Total Regenesis Material Cost		**$**	**6,531**	

ATTACHMENT II
Ground Water Analytical Data

ANALYTICAL REPORT

JOB NUMBER: 230674

Prepared For:

Alpha Geoscience
679 Plank Road
Clifton Park, NY 12065

Attention: Tom Johnson

Date: 12/08/2003

Signature

Date 12/8/03

Name: Richard E. Bayer

Title: Project Manager

E-Mail: rickbayer@stl-inc.com

315 Fullerton Avenue
Newburgh, NY 12550

PHONE: (845) 562-0890
FAX..: (845) 562-0841

SAMPLE INFORMATION
Date: 12/08/2003

Job Number.: 230674
Customer...: Alpha Geoscience
Attn.....: Tom Johnson

Project Number.....: 20000452
Customer Project ID....: NEW PALTZ PLAZA PROJ 95
Project Description....: Alpha Geoscience

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
230674-1	MW-3	AQUEOUS	11/13/2003	17:10	11/18/2003	10:20
230674-2	MW-2	AQUEOUS	11/13/2003	17:50	11/18/2003	10:20
230674-3	MW-6	AQUEOUS	11/14/2003	13:00	11/18/2003	10:20

STL Newburgh
315 Fullerton Avenue
Newburgh, NY 12550
Tel (845) 562-0890
Fax (845) 562-0841

LABORATORY TEST RESULTS

Job Number: 230674 Date: 12/08/2003

CUSTOMER: Alpha Geoscience PROJECT: NEW PALTZ PLAZA PROJ ATTN: Tom Johnson

Customer Sample ID: MW-2
Date Sampled.....: 11/13/2003
Time Sampled.....: 17:50
Sample Matrix.....: AQUEOUS

Laboratory Sample ID: 230674-2
Date Received.....: 11/18/2003
Time Received.....: 10:20

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	REPORTING LIMIT	UNITS	ANALYZED	TECH
LAC 11107041A	Nitrate + Nitrite as N	0.200	U		0.200	mg/L	11/20/03	jpp
EPA 200.7	Metals Analysis (ICAP)							
	Iron (Fe)	12200			100	ug/L	12/04/03	rmc
	Iron (Fe), Diss.	100	U		100	ug/L	12/04/03	rmc
EPA 300.0	Ion Chromatography Analysis							
	Sulfate	39.2			5.00	mg/L	11/21/03	bg
SM18 5310C	Total Organic Carbon (TOC)							
	Organic Carbon, Total (TOC)	4.68			1.00	mg/L	12/02/03	smo

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 230674 Date: 12/08/2003

CUSTOMER: Alpha Geoscience PROJECT: NEW PALTZ PLAZA PROJ ATTN: Tom Johnson

Customer Sample ID: MW-3
Date Sampled.....: 11/13/2003
Time Sampled.....: 17:10
Sample Matrix.....: AQUEOUS

Laboratory Sample ID: 230674-1
Date Received.....: 11/18/2003
Time Received.....: 10:20

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	REPORTING LIMIT	UNITS	ANALYZED	TECH
LAC 11107041A	Nitrate + Nitrite as N	0.200	U		0.200	mg/L	11/20/03	jpp
EPA 200.7	Metals Analysis (ICAP)							
	Iron (Fe)	4280			100	ug/L	12/04/03	rmc
	Iron (Fe), Diss.	100	U		100	ug/L	12/04/03	rmc
EPA 300.0	Ion Chromatography Analysis							
	Sulfate	51.8			10.0	mg/L	11/21/03	bg
SM18 5310C	Total Organic Carbon (TOC)							
	Organic Carbon, Total (TOC)	3.56			1.00	mg/L	12/02/03	smo

* In Description = Dry Wgt.

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LABORATORY TEST RESULTS

Job Number: 230674 Date: 12/08/2003

CUSTOMER: Alpha Geoscience PROJECT: NEW PALTZ PLAZA PROJ ATTN: Tom Johnson

Customer Sample ID: MW-6
Date Sampled.....: 11/14/2003
Time Sampled.....: 13:00
Sample Matrix.....: AQUEOUS

Laboratory Sample ID: 230674-3
Date Received.....: 11/18/2003
Time Received.....: 10:20

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	REPORTING LIMIT	UNITS	ANALYZED	TECH
LAC 11107041A	Nitrate + Nitrite as N	0.270			0.200	mg/L	11/20/03	jpp
EPA 200.7	Metals Analysis (ICAP)							
	Iron (Fe)	11700			100	ug/L	12/04/03	rmc
	Iron (Fe), Diss.	100	U		100	ug/L	12/04/03	rmc
EPA 300.0	Ion Chromatography Analysis							
	Sulfate	15.5			5.00	mg/L	11/21/03	bg
SM18 5310C	Total Organic Carbon (TOC)							
	Organic Carbon, Total (TOC)	714			10.0	mg/L	12/03/03	smo

* In Description = Dry Wgt.

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LABORATORY CHRONICLE

Job Number: 230674 Date: 12/08/2003

CUSTOMER: Alpha Geoscience PROJECT: NEW PALTZ PLAZA PROJ ATTN: Tom Johnson

Lab ID: 230674-1 Client ID: MW-3 Date Recvd: 11/18/2003 Sample Date: 11/13/2003

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
EPA 200.7	Acid Digestion,Total Recoverable(ICAP)	1	57039		11/19/2003	1000	
EPA 300.0	Ion Chromatography Analysis	1	57383		11/21/2003	1428	2
EPA 200.7	Metals Analysis (ICAP)	1	58267	57039	12/04/2003	1831	
EPA 200.7	Metals Analysis (ICAP)	1	58267	57039	12/04/2003	1835	
LAC 11107041A	Nitrate-Nitrite	1	57594		11/20/2003	0000	
SM18 5310C	Total Organic Carbon (TOC)	1	58270		12/02/2003	0000	

Lab ID: 230674-2 Client ID: MW-2 Date Recvd: 11/18/2003 Sample Date: 11/13/2003

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
EPA 200.7	Acid Digestion,Total Recoverable(ICAP)	1	57039		11/19/2003	1000	
EPA 300.0	Ion Chromatography Analysis	1	57383		11/21/2003	1232	
EPA 200.7	Metals Analysis (ICAP)	1	58267	57039	12/04/2003	1839	
EPA 200.7	Metals Analysis (ICAP)	1	58267	57039	12/04/2003	1843	
LAC 11107041A	Nitrate-Nitrite	1	57183		11/20/2003	0000	
SM18 5310C	Total Organic Carbon (TOC)	1	58270		12/02/2003	0000	

Lab ID: 230674-3 Client ID: MW-6 Date Recvd: 11/18/2003 Sample Date: 11/14/2003

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT #(S)	DATE/TIME ANALYZED		DILUTION
EPA 200.7	Acid Digestion,Total Recoverable(ICAP)	1	57039		11/19/2003	1000	
EPA 300.0	Ion Chromatography Analysis	1	57383		11/21/2003	1243	
EPA 200.7	Metals Analysis (ICAP)	1	58267	57039	12/04/2003	1903	
EPA 200.7	Metals Analysis (ICAP)	1	58267	57039	12/04/2003	1907	
LAC 11107041A	Nitrate-Nitrite	1	57183		11/20/2003	0000	
SM18 5310C	Total Organic Carbon (TOC)	1	58272		12/03/2003	0000	10

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QUALITY ASSURANCE METHODS

REFERENCES AND NOTES

Report Date: 12/08/2003

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements will be noted in a case narrative.
Report Comments

1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.

2) Soil, sediment and sludge sample results are reported on a "dry weight" basis.

3) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

Glossary of flags and qualifiers.

Inorganic Qualifiers (Q-Column)

U	Indicates that the compound was analyzed for but not detected.
1	Result fails applicable drinking water standards.
*	Duplicate analysis not within control limits.
N	Spiked sample recovery not within control limits.
E	Indicates an estimated value because of the presence of interferences.
W	Post digestion spike for furnace AA analysis is out of the control limits (85-115%) while sample absorbance is less than 50% of spike absorbance.
+	Correlation coefficient for the MSA is less than 0.995
B	The reported value is less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

Organic Qualifiers (Q-Column)

U	Indicates that the compound was analyzed for but not detected.
J	Indicates an estimated value. This compound meets the identification criteria, but the result is less than the specified detection limit.
B	Indicates that the analyte was found in both the sample and its associated laboratory blank.
D	Indicates all compounds identified in an analysis at a secondary dilution factor.
E	Indicates that the analyte in an analysis has exceeded the linear calibration range.

Glossary of Terms

Surrogates (Surrogate Standards) - an organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process. For semi-volatiles, volatiles and pesticides/Arochlors, surrogate compounds are added to every blank, sample, matrix sample, matrix spike, matrix sample duplicate, matrix spike blank, and standard. These are used to evaluate analytical efficiency by measuring recovery. Poor surrogate recovery may indicate a problem with the sample composition.

Matrix Spike - an aliquot of a sample (water or soil) fortified (spiked) with known quantities of specific compounds (target analytes) and subjected to the entire analytical procedure in order to indicate the appropriateness of the method for the matrix by measuring recovery. The spiking occurs prior to sample preparation and analysis. Poor spike recovery may indicate a problem with the sample composition.

Internal Standards - an organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process. For GC/MS semi-volatiles and volatiles, internal standards are added to every blank, sample, matrix spike, matrix spike duplicate, matrix spike blank, and standard. Internal standard responses outside of established limits will adversely affect the quantitation and final concentration of target compounds.

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Chain of Custody Record

SEVERN TRENT SERVICES — Severn Trent Laboratories, Inc.

230674

STL-4124 (0901)

Client: Alpha Geoscience	Project Manager: Thomas Johnson	Date: 11/17/03	Chain of Custody Number: 170615
Address: 679 Plank Road	Telephone Number (Area Code)/Fax Number: 518-348-6995	Lab Number:	Page 1 of 1
City: Clifton Park / State: NY / Zip Code: 12065	Site Contact:	Lab Contact:	
Project Name and Location (State): New Paltz Plaza, New Paltz NY	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.: Project # 95141			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: TOC	Nitrate	Sulfate	Dissolved Fe	Total Fe	Special Instructions/ Conditions of Receipt
MW-3	11/13/03	17:10		X			1		2	2			X	X	X	X	X	5 Bottles
MW-2	11/13/03	17:50		X			1		2	2			X	X	X	X	X	" "
MW-6	11/14/03	13:00		X			1		2	2			X	X	X	X	X	" "

Possible Hazard Identification: [X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison B [ ] Unknown

Sample Disposal: [ ] Return To Client [X] Disposal By Lab [ ] Archive For ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: [ ] 24 Hours [ ] 48 Hours [ ] 7 Days [ ] 14 Days [ ] 21 Days [ ] Other Standard

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: Thomas D. Johnson	11/17/03	13:50	1. Received By: STL-NW	11/18/03	10:20 A
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments: Rec. Temp 7.4°

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy