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May 12, 2017

Mr. David P. Locey  
Project Manager  
New York State Dept. of Environmental Conservation  
270 Michigan Avenue  
Buffalo, NY 14203-7226

Dear Mr. Locey:

On behalf of Jo Lyn Enterprises, Ltd., BioRemedial Technologies, Inc. (BRT) is providing a revised Remedial Action Work Plan (RAWP), Pilot Test (only) for your review. BRT is prepared to move forward with the RAWP upon NYSDEC's permission to proceed.

The purpose of the revised RAWP is to include an additional 5 baseline and Pilot Test completion sampling locations, as you suggested, in order to better evaluate the progress of anaerobic reductive dechlorination (ARD).

The schedule for implementing the RAWP and report submittal to NYSDEC on the findings is provided in Section 8.0 of the plan.

BRT looks forward to working with you on this project. Please feel free to contact me if you have any questions regarding the Work Plan at (724) 981-1994 or [brichnafsky@bioremedial.com](mailto:brichnafsky@bioremedial.com).

Respectfully Submitted,

A handwritten signature in blue ink that reads "Albert M. Richnafsky".

Albert M. Richnafsky, PG  
Qualified Environmental Professional

cc: Jo Lyn Enterprises, Ltd.  
Mr. David Flynn, Esq.



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**REMEDIAL ACTION WORK PLAN  
PILOT TEST ONLY  
(Revised)**

**For**

**Site: Jo Lyn Enterprises, Ltd.  
13 West Lake Road  
Mayville, New York 14757**

**NYSDEC Designation & Identification  
Standard Portable Site Number C907030**

**Prepared By:  
BioRemedial Technologies, Inc.  
2700 Kirila Drive  
Hermitage, PA 16148  
(724) 981-1994  
Contact: Albert M. Richnafsky, PG  
Qualified Environmental Professional**

**May 1, (Revised May 12), 2017**

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## **1.0 Introduction / Purpose**

This Remedial Action Work Plan (RAWP) describes a Pilot Test (PT) being proposed by BioRemedial Technologies, Inc. (BRT) to demonstrate the effectiveness of Anaerobic Reductive Dechlorination (ARD), a remedial method that has been shown in literature and BRT's direct field experience to be an effective method for the complete degradation of chlorinated solvents that results in the end product Ethene, an environmentally non-toxic gas. This RAWP addresses only the PT.

The PT will focus on remediating groundwater impacted by Trichloroethene (TCE), also commonly referred to as Trichloroethylene, and associated "daughter" compound formed by the decomposition of TCE.

Spent TCE was reportedly stored in an underground septic tank adjacent to the building, near the location of PT testing/injection point SB-22 (Figures 3 and 4). This is considered the "Point of Release" (POR) of the TCE.

Soil and soil vapor/indoor air quality are not being addressed by this RAWP.

May 12, 2017 revisions to this RAWP Pilot Test work plan, as suggested by NYSDEC, are provided in blue. Five additional baseline sampling locations have been added so that the effectiveness of ARD can be more thoroughly evaluated outside of the area of oxygen and nutrient injections. The five added baseline sampling locations are shown in Figure 4. They may be modified somewhat if the locations are not accessible (at this time they have not been field checked). Baseline groundwater samples will be collected prior to the first injection event, prior to any disturbance.

## **2.0 Site Location and Description**

The Jo Lyn Enterprises, Ltd. Site (the "Site") is located in the Village of Mayville, Chautauqua County, New York. The address of the Site is 13 West Lake Road (formerly 21 Valley Street), Mayville, New York 14757. The location of the property and topographic contours are shown in Figure 1. The boundary of the property being considered by this PT is shown in Figures 2 through 5. The Site consists of four separate parcels as shown in an Environmental Easement survey map produced by FoitAlbert Associates dated March 31, 2015. For the purpose of this RAWP, the entire property is considered as one entity.

Jo Lyn Enterprises, Ltd. (Jo Lyn) is the current owner of the Site, having purchased the facility in 1996 from the previous owner Standard Portable. A "due diligence" investigation at the time Jo Lyn purchased the property identified a septic tank that was used to store spent TCE by former manufacturers operating at the Site. The septic tank was removed in 1996. Spent TCE waste

generated by Jo Lyn after that time was containerized and transported off-site for disposal. It appears that TCE in soil and groundwater in the vicinity of the former septic tank was discovered during a Phase II due diligence investigation by a potential buyer in 2002.

Figure 2 provides an aerial view of the Site and surrounding land use. The Site is bordered to the north and northwest by one residential unit and a commercial/manufacturing facility; to the east by NY Route 394 and a park bordering Chautauqua Lake; to the south by vacant land and residential units; and to the west-southwest by a wastewater treatment facility. A stream flowing into Chautauqua Lake is present to the south of the wastewater treatment facility.

The area of concern for this Site is served by municipal water and sewer. The primary environmental concern at this Site appears to be the potential for impacted groundwater discharge to storm-water conveyance channels and potentially to Chautauqua Lake.

### **3.0 Physical Setting and Groundwater Conditions**

The Site is nearly level to gently sloping to the east-southeast in the direction of Chautauqua Lake. Surface water flows predominately into a man-made drainage channel just beyond the east border of the property that apparently discharges into Chautauqua Lake (this has not been confirmed by BRT).

Drilling records show that underlying a thin layer of organic silty-sandy loam, silty sand and gravelly sand is present to a depth of approximately 12 to 15 feet, which is underlain by silty clay. Fill materials are reported at some locations within the silty sand and gravelly sand interval. It appears that the silty clay serves as a limiting horizon that would restrict the downward movement of dense non-aqueous phase liquids (DNAPLs), as is the case with TCE and its daughter compounds. These compounds being heavier than water have a tendency to “sink” in groundwater.

Site investigation activities extended to a depth of approximately 20 feet, based on the information available to BRT. Unconsolidated materials are believed to extend much deeper based on available geologic information. Bedrock conditions do not have a bearing on investigations or remedial actions at this Site.

Groundwater measurements obtained by BRT on April 5, 2017, at the time the original 5 baseline groundwater samples were collected, showed depth to groundwater ranged from 1.4 to 2.7 feet below ground level.

Figure 5 shows a groundwater contour map produced by Hazard Evaluations, Inc. based on data from June 2016. Figure 5 shows that groundwater flow, with local variation, is to the east-southeast toward Chautauqua Lake, as would be expected. The *Off-Site Soil and Groundwater Investigation Report* (March 17, 2010) by Op-Tech Environmental Services, Inc. states that groundwater also flows to the northeast. This conclusion is likely influenced by a preferred groundwater flow

pathway along the municipal sewer line. It appears the sewer line also has a bearing on the distribution of constituents of concern (COC).

#### **4.0 Constituents of Concern (COC) Concentration**

Figure 3 shows TCE iso-concentration values from samples collected by Hazard Evaluations, Inc. during April 2013. Figure 4 shows TCE iso-concentrations from samples collected during July 2015. TCE values from baseline samples collected by BRT are shown in each of these two figures. Both figures indicate that highest COC concentrations are present from the POR and eastward to the eastern boundary of the property, in the direction of Chautauqua Lake, with a possible northeasterly extension due to the influence of the sewer line.

The Pilot Test being described in this RAWP is intended to evaluate and demonstrate the effectiveness of ARD. BRT's experience is that ARD has been effective at the COC concentrations encountered at the Site.

#### **5.0 Baseline Testing**

BRT collected five (5) "baseline" groundwater samples on April 5, 2017 from the locations shown in Figures 3 and 4. The samples were collected from monitoring wells SB-8, SB-12, SB-13, SB-14 and SB-22 (Figure 4). Depth to groundwater was also measured at these 5 locations plus SB-19 prior to disturbance. Five additional baseline groundwater samples will be collected as suggested by NYSDEC, at hydraulically down-gradient locations from the original 5 baseline sampling locations (Figure 4) in order to more fully evaluate the affect of the pilot test on a greater area of the plume. Four of the five additional sample locations are within the area previously identified in TCE isoconcentration maps as having high concentrations, while one location is near the northeast edge of the TCE plume. All baseline groundwater samples will be tested at a laboratory registered in New York (Phoenix Environmental Laboratories, Inc., NY Lab Registration No. 11301). Samples will be collected utilizing accepted methods, and handled and transported on ice under chain-of-custody protocol. The first 5 samples were collected using a low flow sampling technique. A total of 5 gallons or less of purge water was generated, which was filtered through granular activated carbon and allowed to evaporate on a paved surface. Baseline laboratory results are provided in Table 1 and laboratory certificates-of-analysis are provided in Appendix A.

At the time of the April 5 groundwater sample collection, BRT also recorded physical data, including pH, temperature, dissolved oxygen (DO), conductivity and oxygen reduction potential (ORP). The baseline analytical values and the physical data will be used to "fine tune" the materials to be applied by BRT.

BRT's test results show TCE ranged from 9.3 ug/l (ppb) at SB-8 to 140,000 ug/l at SB-22. SB-8 appears to represent the north fringe of the dissolved TCE plume in groundwater. SB-22 is located

near the POR. Figure 4 compares the baseline values with TCE values from samples collected during July 2015.

## **6.0 Pilot Test Method - Anaerobic Reductive Dechlorination**

The Pilot Test will utilize Anaerobic Reductive Dechlorination (ARD) as the remedial method. Based on BRT's direct experience, enhanced in-situ anaerobic bioremediation by means of ARD has shown to be an effective method for the complete degradation of chlorinated solvents including all of the compounds that are the focus of this project, including vinyl chloride (VC), the last chlorinated compound of the ARD degradation process, prior to decomposing into the environmentally non-toxic gas Ethene as the end product. Ethene gas has a low solubility and quickly dissipates in groundwater. Typically, the ARD process shows a decrease in TCE and an increase in daughter products, and finally a decrease in daughter products. At the start of the ARD process, an increase in Dichloroethene (DCE) and decrease in TCE shows the process is working. VC will appear farther along in the process as DCE begins to decrease.

ARD involves the delivery of an organic substrate and nutrients into the aquifer to stimulate microbial growth, create an anaerobic treatment zone, and generate hydrogen via fermentation. Hydrogen is then utilized by bacteria capable of performing ARD, which consists of sequential removal of chlorine ions. BRT uses a site specific approach and formulation, determined by assaying the intrinsic microbial population to optimize this reaction.

ARD has been applied in a variety of hydrogeologic settings, from low permeability silts and clays to high permeability alluvial sand and gravel deposits, to fractured bedrock. The silty gravelly sand found at the Site lends well to the process.

To enhance the anaerobic conditions at the Site and promote ARD without bio-fouling of the injection points, BRT proposes amendment of the aquifer with a substrate (electron donor) that is a mixture of soluble fast acting and slow release substrate. The dual approach helps minimize microbial lag times associated with fermentation ultimately creating a more uniform anaerobic environment in the subsurface. BRT proposes using this proprietary substrate blend for its high solubility, efficiency and effective cost.

BRT will supply a water soluble anaerobic nutrient supplementation as metabolic stimulants to enhance the kinetics and the efficiency of the biological system. This nutrient blend containing up to 13 compounds targets only the beneficial bacteria with metabolic enhancers, vitamins and various food grade extracts, to name a few, in order to increase replication rates of specific bacteria to promote a major beneficial population shift in the subsurface.

The substrate / nutrient dilution will be purged with nitrogen prior to injection to replace the dissolved oxygen. This substrate blend has also been effective in increasing contaminant solubility especially in areas with DNAPL. A proprietary anaerobic nutrient blend will be applied with the substrate to promote microbial growth and help buffer fermentation in-situ.

## 7.0 Field Application and Evaluation

TCE, DCE, VC and other intermediary decomposition products have been identified in groundwater at the Site. Progress will be evaluated by the change in these COC from the baseline sampling event with the final sampling event after the completion of the injection period.

BRT will provide a minimum of 200 gallons of its proprietary substrate materials and nutrient blend during each of the three proposed injection events, once per month. The injection amount has been determined by BRT based on past experience as being sufficient to show that ARD is working by an increase in daughter products in proportion to TCE concentration. The amount being injected may be increased after the first injection event as Site conditions allow.

BRT will inject its proprietary substrate and nutrient blend by means of gravity feed into the five locations from which the original 5 baseline samples were collected. Upon completion of the 3-month injection period, BRT will allow one month for the injected material to equilibrate before collecting the final samples. These five locations and the additional 5 locations described in this RAWP revision will be used to compare before and after TCE and daughter product concentrations, in order to develop an appropriate plan to address the whole Site and evaluate the effectiveness of ARD. BRT's conclusions will be based on changes at all baseline testing locations. The results will demonstrate the spacing of injection points that will be needed to address the entire plume for a full scale remedial action.

BRT has had success with ARD at sites that have TCE concentrations that are high enough for non-aqueous phase (NAPL) to be present.

## 8.0 Schedule

As the baseline groundwater sampling and testing has been completed, BRT is in a position to perform the first injection event within 10 days of NYSDEC approval to proceed. The following schedule is based on receiving approval from NYSDEC to conduct the Pilot Test in time for the first injection event to occur on May 16, 2017.

- May 16, 2017 – Conduct first substrate and nutrient injection event;
- June 19, 2017 – Conduct second injection event;
- July 20, 2017 – Conduct third and final injection event;
- August 22, 2017 – Collect final groundwater samples;
- September 1, 2017 – Receive groundwater analytical results;
- September 29, 2017 – Complete report on Pilot Test results and submit to client for review;
- October 10, 2017 – Submit Pilot Test report to NYSDEC with recommendations.



### **9.0 Qualified Environmental Professional**

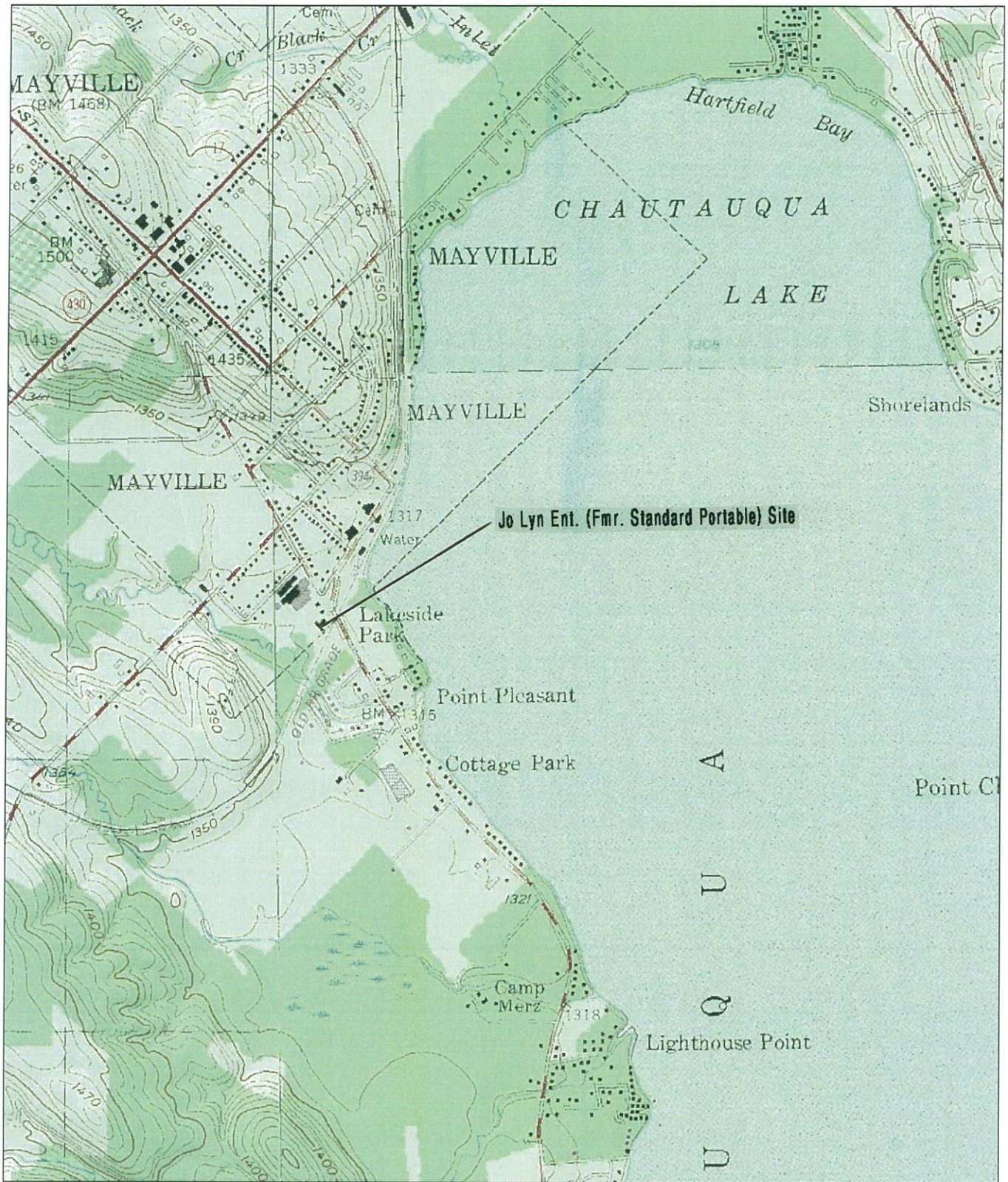
The project will be directly supervised by Albert M. Richnafsky, PG (PA), LRS (WV), CPG (AIPG), whom will be responsible for the technical correctness of work performed. Mr. Richnafsky has over 35 years experience in site investigations and remedial actions, including extensive experience with NYSDEC. Contact information is: Phone – (724) 981-1994; E-mail – brichnafsky@ces-env.com.

Biological evaluation will be conducted and evaluated by BRT's in-house Laboratory Manager Tammy Miller, MS and Amy Ashe, PhD Microbiology.

This RAWP for an ARD Pilot Test has been prepared by Albert M. Richnafsky, PG



# FIGURES



Map provided by MyTopo.com

**Figure 1 - Location Map**  
**Jo Lyn Enterprises Site**  
13 West Lake Road  
Mayville, NY 14757  
NYSDEC BCP Site No. C907030



**Figure 2 – Property Boundary Map**

**Jo Lyn Enterprises Site**  
 13 West Lake Road  
 Mayville, NY 14757  
 NYSDEC BCP Site No. C907030  
 April 24, 2017

**KEY**

- SB#6: Soil Boring and monitoring well completed by HEI in 2006
- △ IW4: Injection well completed by HEI in 2007
- EW-1: Extraction well completed by HEI in 2007

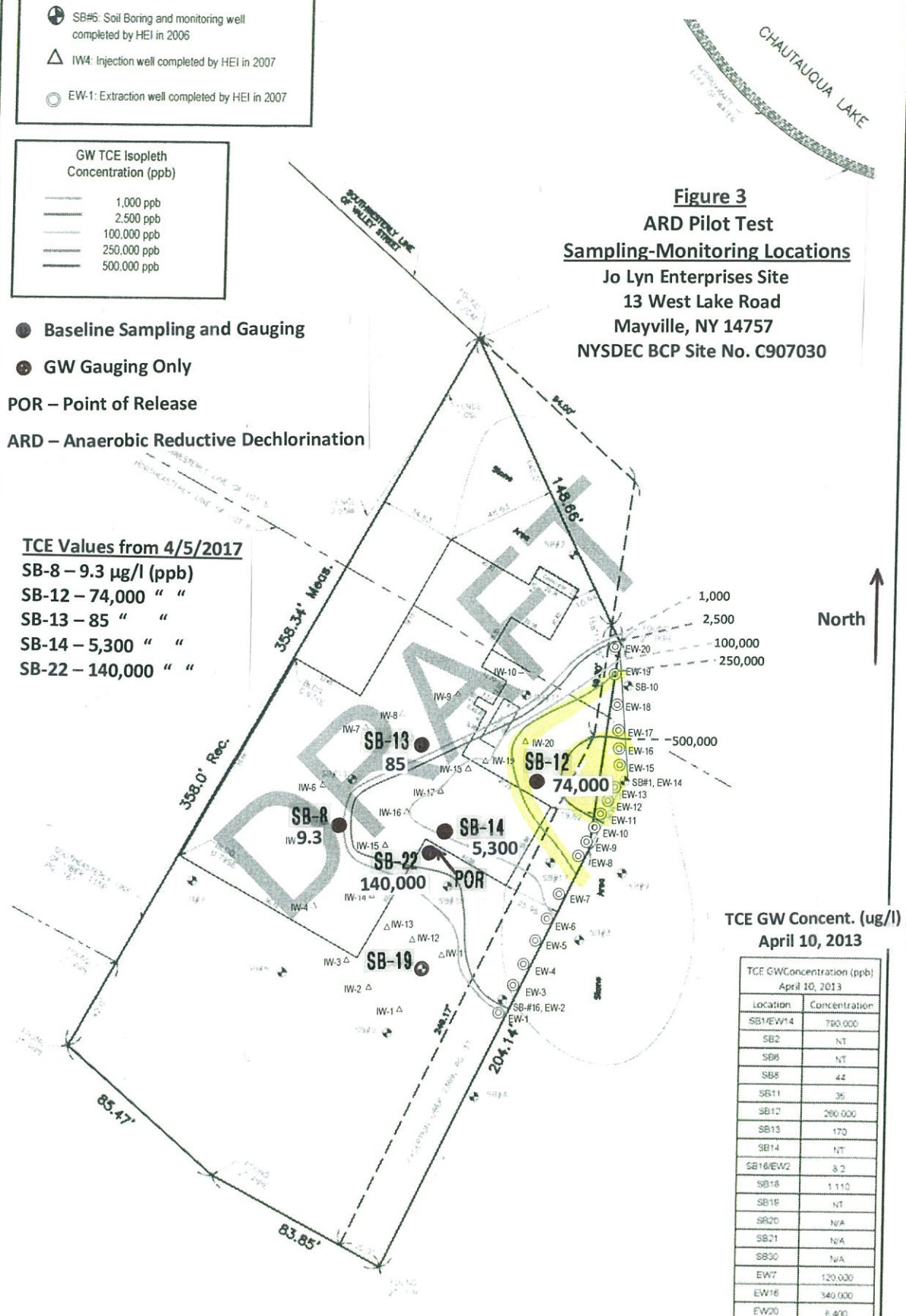
**GW TCE Isoleth Concentration (ppb)**

- 1,000 ppb
- 2,500 ppb
- 100,000 ppb
- 250,000 ppb
- 500,000 ppb

- Baseline Sampling and Gauging
  - GW Gauging Only
- POR – Point of Release  
ARD – Anaerobic Reductive Dechlorination

**TCE Values from 4/5/2017**  
 SB-8 – 9.3 µg/l (ppb)  
 SB-12 – 74,000 " "  
 SB-13 – 85 " "  
 SB-14 – 5,300 " "  
 SB-22 – 140,000 " "

**Figure 3**  
**ARD Pilot Test**  
**Sampling-Monitoring Locations**  
 Jo Lyn Enterprises Site  
 13 West Lake Road  
 Mayville, NY 14757  
 NYSDEC BCP Site No. C907030



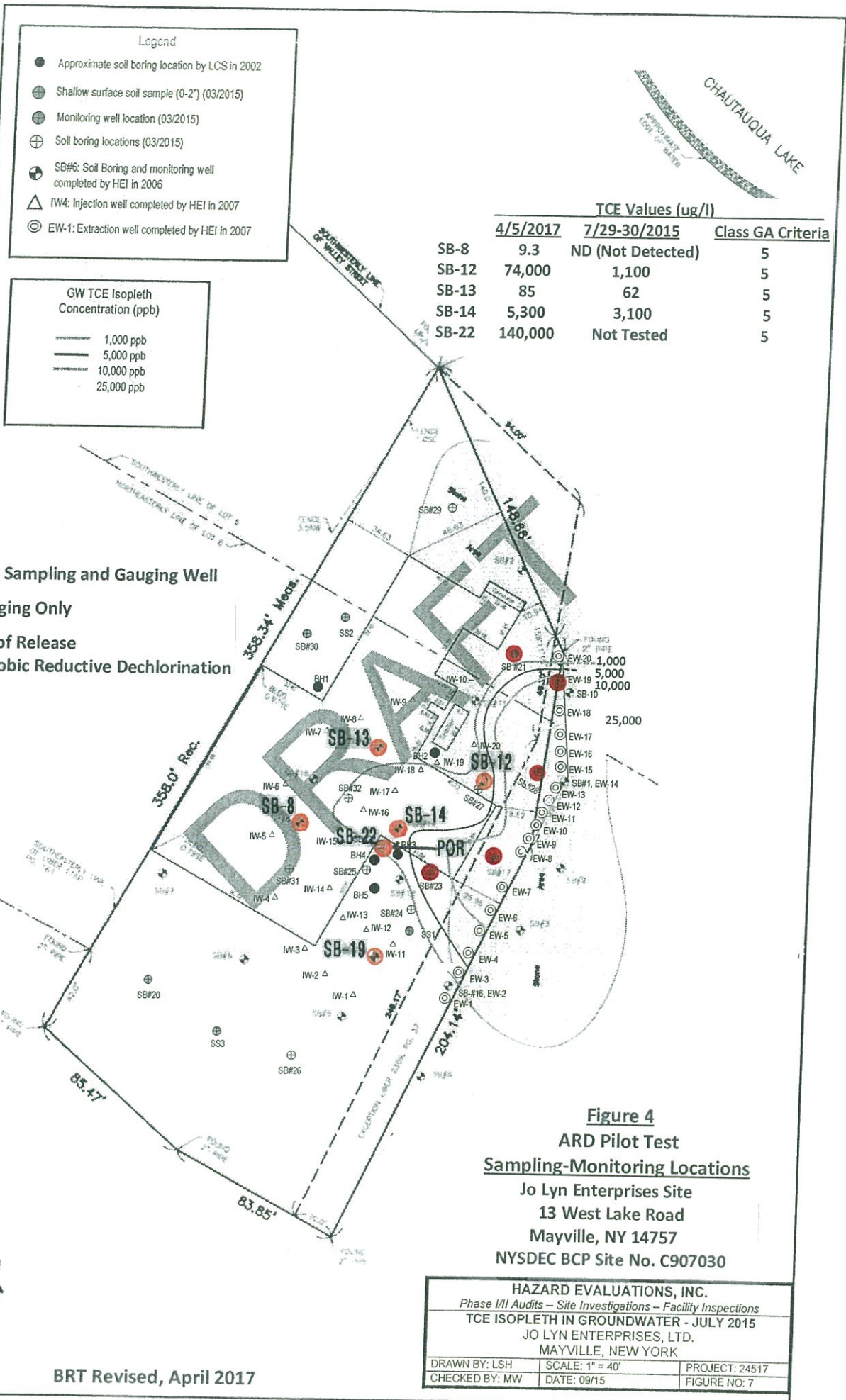
**TCE GW Concent. (ug/l)**  
**April 10, 2013**

Location	Concentration
SB1/EW14	790,000
SB2	NT
SB6	NT
SB8	44
SB11	35
SB12	290,000
SB13	170
SB14	NT
SB16/EW2	3.2
SB18	1,110
SB19	NT
SB20	N/A
SB21	N/A
SB30	N/A
EW7	120,000
EW16	340,000
EW20	6,400

\*Concentrations are in ppb

**HAZARD EVALUATIONS, INC.**  
 Phase I/II Audits – Site Investigations – Facility Inspections  
**TCE ISOPLETH IN GROUNDWATER – APRIL 2013**  
 JO LYN ENTERPRISES, LTD.  
 MAYVILLE, NEW YORK

DRAWN BY: LSH	SCALE: 1" = 40'	PROJECT: 24517
CHECKED BY: MW	DATE: 09/15	FIGURE NO. 5



- Legend**
- Approximate soil boring location by LCS in 2002
  - ⊕ Shallow surface soil sample (0-2") (03/2015)
  - ⊗ Monitoring well location (03/2015)
  - ⊕ Soil boring locations (03/2015)
  - ⊗ SB#: Soil Boring and monitoring well completed by HEI in 2006
  - △ IW#: Injection well completed by HEI in 2007
  - ⊙ EW-1: Extraction well completed by HEI in 2007

**GW TCE Isopleth Concentration (ppb)**

- 1,000 ppb
- 5,000 ppb
- 10,000 ppb
- 25,000 ppb

	TCE Values (ug/l)		Class GA Criteria
	4/5/2017	7/29-30/2015	
SB-8	9.3	ND (Not Detected)	5
SB-12	74,000	1,100	5
SB-13	85	62	5
SB-14	5,300	3,100	5
SB-22	140,000	Not Tested	5

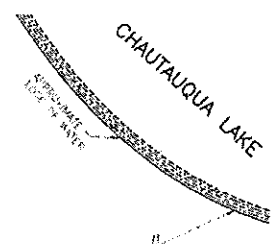
- ⊕ Baseline Sampling and Gauging Well
- ⊕ GW Gauging Only
- POR – Point of Release
- ARD – Anaerobic Reductive Dechlorination

**Figure 4**  
**ARD Pilot Test**  
**Sampling-Monitoring Locations**  
 Jo Lyn Enterprises Site  
 13 West Lake Road  
 Mayville, NY 14757  
 NYSDEC BCP Site No. C907030

HAZARD EVALUATIONS, INC.		
Phase III Audits – Site Investigations – Facility Inspections		
TCE ISOPLETH IN GROUNDWATER - JULY 2015		
JO LYN ENTERPRISES, LTD.		
MAYVILLE, NEW YORK		
DRAWN BY: LSH	SCALE: 1" = 40'	PROJECT: 24517
CHECKED BY: MW	DATE: 09/15	FIGURE NO: 7

BRT Revised, April 2017

- Approximate soil boring location by LCS in 2002
- ⊕ Shallow surface soil sample (0-2") (03/2015)
- ⊕ Monitoring well location (03/2015)
- ⊕ Soil boring locations (03/2015)
- ⊕ SB#6: Soil Boring and monitoring well completed by HEI in 2006
- △ IW4: Injection well completed by HEI in 2007
- ⊙ EW-1: Extraction well completed by HEI in 2007



Groundwater Elevations  
June 2016

Well	Groundwater Elevation
SB-2	93.59
SB-4	96.00
SB-4	84.90
SB-11	95.03
SB-12	97.03
SB-13	95.49
SB-13	95.10
SB-18	84.77
SB-19	97.23
SB-20	95.75
SB-21	94.41
SB-30	95.08
EW-7 (SB-10)	94.64
EW-7	95.11
EW-14 (SB-7)	95.67
EW-19	93.55
EW-20	93.86

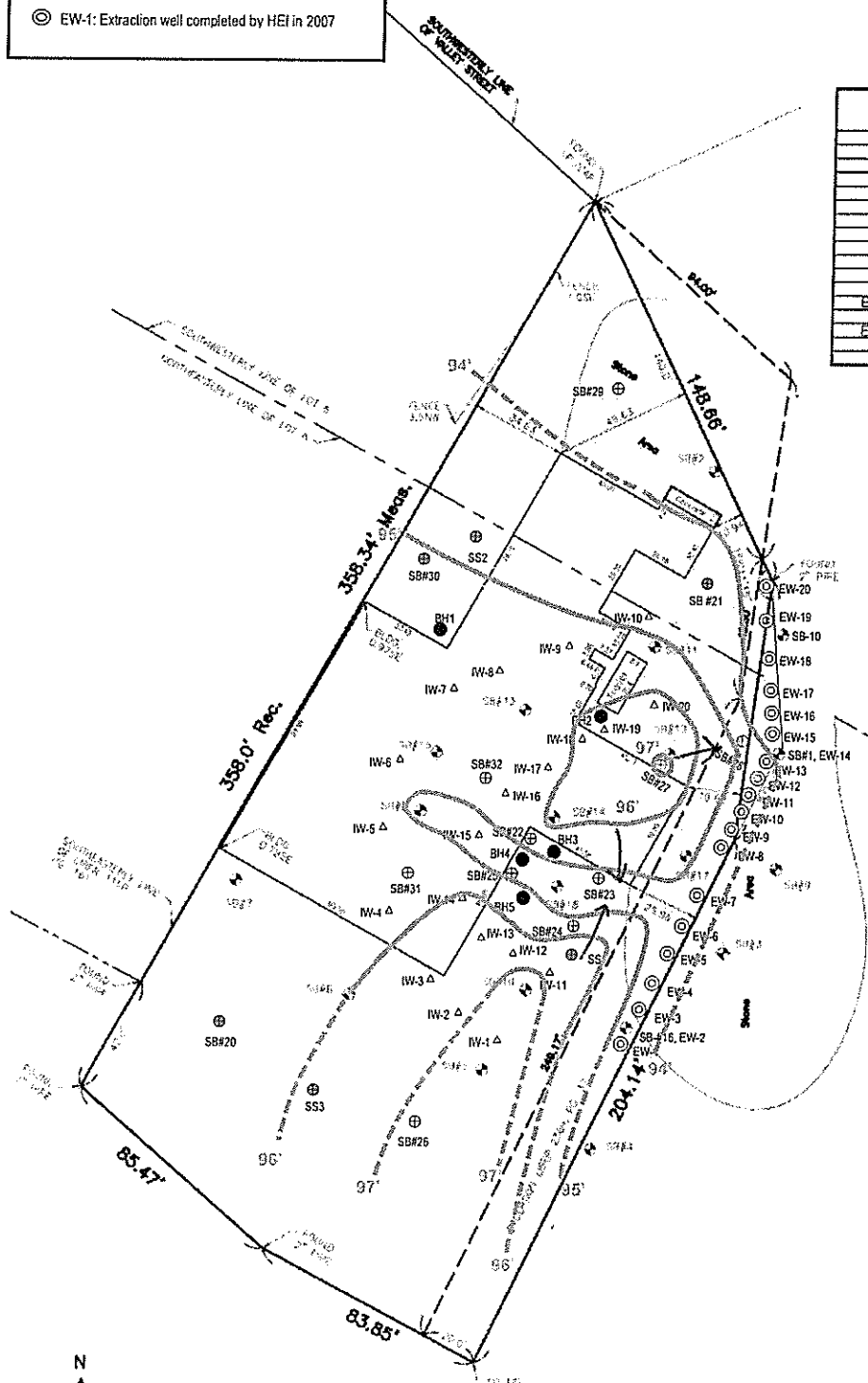


Figure 5 – ARD Pilot Test

**HAZARD EVALUATIONS, INC.**  
*Phase III Audits – Site Investigations – Facility Inspections*  
**GROUNDWATER CONTOUR MAP – JUNE 2016**  
 JO LYN ENTERPRISES, LTD.  
 MAYVILLE, NEW YORK

DRAWN BY: LSH	SCALE: 1" = 40'	PROJECT: 24521
CHECKED BY: EB	DATE: 07/16	FIGURE NO: 3

# TABLE



**Table 1**  
**Groundwater Analytical Results**  
**Jo Lyn Enterprises Site**  
 21 Valley Street  
 Mayville, Chautauqua County, New York  
 NYDEC Site No. C907030

Sample Date	Parameter	*NYSDEC Class GA Standard ug/l	Sample Location				
			SB-8 ug/l	SB-12 ug/l	SB-13 ug/l	SB-14 ug/l	SB-22 ug/l
4/5/2017	Tetrachloroethene (PCE)	5.0	ND	ND	2.8	ND	ND
	Trichloroethene (TCE)	5.0	9.3	74000	85.0	5300	140000
	cis-1,2-Dichloroethene	5.0	450	8300	34.0	3900	11000
	trans-1,2-Dichloroethene	5.0	15.0	ND	ND	41.0	ND
	1,1-Dichloroethane	5.0	ND	ND	ND	ND	ND
	Vinyl Chloride	2.0	15.0	ND	ND	89.0	ND
	Cyclohexane	NA	58.0	ND	ND	ND	ND
	Methylcyclohexane	NA	15.0	ND	ND	ND	ND
	2-Hexanone	50.0	ND	ND	ND	ND	ND
	Methyl ethyl ketone	50.0	ND	ND	ND	ND	ND
	Acetone	50.0	5.5	ND	ND	ND	ND
	Benzene	1.0	23.0	ND	ND	ND	ND
	Chloroform	7.0	ND	ND	ND	ND	ND

\* From Table 5 NYS GW Effluent Limitations (Class GA), NYS TOGS Series 1.1.1 (6/1998)

NA- No standard or guidance values is currently available.

ND - Not Detected (below the test method reporting limit).

Shaded values are above the NYSDEC Class GA Standard

All samples were tested according to EPA Method SW8260C

**APPENDIX A**  
**LABORATORY ANALYTICAL RESULTS**



Thursday, April 13, 2017

Attn: Mr. Bert Richnatsky  
Bioremedial Technologies, Inc  
2700 Kirila Drive  
Hermitage, PA 16148

Project ID: JOLYN ENTERPRISES  
Sample ID#s: BY01083 - BY01087

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

A handwritten signature in black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller  
Laboratory Director

NELAC - #NY11301  
CT Lab Registration #PH-0618  
MA Lab Registration #MA-CT-007  
ME Lab Registration #CT-007  
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003  
NY Lab Registration #11301  
PA Lab Registration #68-03530  
RI Lab Registration #63  
VT Lab Registration #VT11301



Environmental Laboratories, Inc.  
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045  
 Tel. (860) 645-1102 Fax (860) 645-0823



# Analysis Report

April 13, 2017

FOR: Attn: Mr. Bert Richnatsky  
 Bioremedial Technologies, Inc  
 2700 Kirila Drive  
 Hermitage, PA 16148

## Sample Information

Matrix: GROUND WATER  
 Location Code: BIOTECH  
 Rush Request: Standard  
 P.O.#: 040517

## Custody Information

Collected by: AR  
 Received by: LB  
 Analyzed by: see "By" below

Date: 04/05/17 12:10  
 04/08/17 11:57

## Laboratory Data

SDG ID: GBY01083  
 Phoenix ID: BY01083

Project ID: JOLYN ENTERPRISES  
 Client ID: SB-8 GW

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
<b>Volatiles (TCL)</b>							
1,1-Dichloroethane	ND	2.0	ug/L	2	04/11/17	MH	SW8260C
2-Hexanone	ND	5.0	ug/L	2	04/11/17	MH	SW8260C
Acetone	5.5	S 5.0	ug/L	2	04/11/17	MH	SW8260C
Benzene	23	1.4	ug/L	2	04/11/17	MH	SW8260C
Chloroform	ND	2.0	ug/L	2	04/11/17	MH	SW8260C
cis-1,2-Dichloroethene	450	20	ug/L	20	04/10/17	MH	SW8260C
Cyclohexane	58	2.0	ug/L	2	04/11/17	MH	SW8260C
Methyl ethyl ketone	ND	5.0	ug/L	2	04/11/17	MH	SW8260C
Methylcyclohexane	15	2.0	ug/L	2	04/11/17	MH	SW8260C
Tetrachloroethene	ND	2.0	ug/L	2	04/11/17	MH	SW8260C
trans-1,2-Dichloroethene	15	2.0	ug/L	2	04/11/17	MH	SW8260C
Trichloroethene	9.3	2.0	ug/L	2	04/11/17	MH	SW8260C
Vinyl chloride	15	2.0	ug/L	2	04/11/17	MH	SW8260C
<b>QA/QC Surrogates</b>							
% 1,2-dichlorobenzene-d4	100		%	2	04/11/17	MH	70 - 130 %
% Bromofluorobenzene	99		%	2	04/11/17	MH	70 - 130 %
% Dibromofluoromethane	90		%	2	04/11/17	MH	70 - 130 %
% Toluene-d8	98		%	2	04/11/17	MH	70 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
-----------	--------	------------	-------	----------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL  
BRL=Below Reporting Level  
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

**Comments:**

Volatile Comment:  
Elevated reporting limits for volatiles due to the presence of target and/or non-target compounds.

S - Laboratory solvent, contamination is possible.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.  
This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director

April 13, 2017

Reviewed and Released by: Phyllis Shiller, Laboratory Director



Environmental Laboratories, Inc.  
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045  
 Tel. (860) 645-1102 Fax (860) 645-0823



# Analysis Report

April 13, 2017

FOR: Attn: Mr. Bert Richnatsky  
 Bioremedial Technologies, Inc  
 2700 Kirila Drive  
 Hermitage, PA 16148

## Sample Information

Matrix: GROUND WATER  
 Location Code: BIOTECH  
 Rush Request: Standard  
 P.O.#: 040517

## Custody Information

Collected by: AR  
 Received by: LB  
 Analyzed by: see "By" below

## Date

04/05/17 12:43  
 04/08/17 11:57

## Time

## Laboratory Data

SDG ID: GBY01083  
 Phoenix ID: BY01084

Project ID: JOLYN ENTERPRISES  
 Client ID: SB-13 GW

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
<b><u>Volatiles (TCL)</u></b>							
1,1-Dichloroethane	ND	1.0	ug/L	1	04/10/17	MH	SW8260C
2-Hexanone	ND	2.5	ug/L	1	04/10/17	MH	SW8260C
Acetone	ND	2.5	ug/L	1	04/10/17	MH	SW8260C
Benzene	ND	0.70	ug/L	1	04/10/17	MH	SW8260C
Chloroform	ND	1.0	ug/L	1	04/10/17	MH	SW8260C
cis-1,2-Dichloroethene	34	1.0	ug/L	1	04/10/17	MH	SW8260C
Cyclohexane	ND	1.0	ug/L	1	04/10/17	MH	SW8260C
Methyl ethyl ketone	ND	2.5	ug/L	1	04/10/17	MH	SW8260C
Methylcyclohexane	ND	1.0	ug/L	1	04/10/17	MH	SW8260C
Tetrachloroethene	2.8	1.0	ug/L	1	04/10/17	MH	SW8260C
trans-1,2-Dichloroethene	ND	1.0	ug/L	1	04/10/17	MH	SW8260C
Trichloroethene	85	2.0	ug/L	2	04/10/17	MH	SW8260C
Vinyl chloride	ND	1.0	ug/L	1	04/10/17	MH	SW8260C
<b><u>QA/QC Surrogates</u></b>							
% 1,2-dichlorobenzene-d4	100		%	1	04/10/17	MH	70 - 130 %
% Bromofluorobenzene	99		%	1	04/10/17	MH	70 - 130 %
% Dibromofluoromethane	96		%	1	04/10/17	MH	70 - 130 %
% Toluene-d8	99		%	1	04/10/17	MH	70 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL

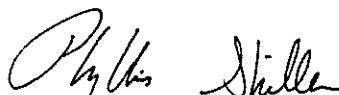
BRL=Below Reporting Level

QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

**Comments:**

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 13, 2017

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# Analysis Report

April 13, 2017

FOR: Attn: Mr. Bert Richnatsky  
 Bioremedial Technologies, Inc  
 2700 Kirila Drive  
 Hermitage, PA 16148

## Sample Information

Matrix: GROUND WATER  
 Location Code: BIOTECH  
 Rush Request: Standard  
 P.O.#: 040517

## Custody Information

Collected by: AR  
 Received by: LB  
 Analyzed by: see "By" below

Date            Time  
 04/05/17        13:25  
 04/08/17        11:57

## Laboratory Data

SDG ID: GBY01083  
 Phoenix ID: BY01085

Project ID: JOLYN ENTERPRISES  
 Client ID: SB-14 GW

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
<b><u>Volatiles (TCL)</u></b>							
1,1-Dichloroethane	ND	40	ug/L	40	04/11/17	MH	SW8260C
2-Hexanone	ND	100	ug/L	40	04/11/17	MH	SW8260C
Acetone	ND	100	ug/L	40	04/11/17	MH	SW8260C
Benzene	ND	28	ug/L	40	04/11/17	MH	SW8260C
Chloroform	ND	40	ug/L	40	04/11/17	MH	SW8260C
cis-1,2-Dichloroethene	3900	40	ug/L	40	04/11/17	MH	SW8260C
Cyclohexane	ND	40	ug/L	40	04/11/17	MH	SW8260C
Methyl ethyl ketone	ND	100	ug/L	40	04/11/17	MH	SW8260C
Methylcyclohexane	ND	40	ug/L	40	04/11/17	MH	SW8260C
Tetrachloroethene	ND	40	ug/L	40	04/11/17	MH	SW8260C
trans-1,2-Dichloroethene	41	40	ug/L	40	04/11/17	MH	SW8260C
Trichloroethene	5300	400	ug/L	400	04/10/17	MH	SW8260C
Vinyl chloride	89	40	ug/L	40	04/11/17	MH	SW8260C
<b><u>QA/QC Surrogates</u></b>							
% 1,2-dichlorobenzene-d4	99		%	40	04/11/17	MH	70 - 130 %
% Bromofluorobenzene	97		%	40	04/11/17	MH	70 - 130 %
% Dibromofluoromethane	89		%	40	04/11/17	MH	70 - 130 %
% Toluene-d8	98		%	40	04/11/17	MH	70 - 130 %



Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL  
BRL=Below Reporting Level  
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

**Comments:**

Volatile Comment:  
Elevated reporting limits for volatiles due to the presence of target and/or non-target compounds.  
If there are any questions regarding this data, please call Phoenix Client Services at extension 200.  
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Phyllis Shiller, Laboratory Director

April 13, 2017

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# Analysis Report

April 13, 2017

FOR: Attn: Mr. Bert Richnatsky  
 Bioremedial Technologies, Inc  
 2700 Kirila Drive  
 Hermitage, PA 16148

## Sample Information

Matrix: GROUND WATER  
 Location Code: BIOTECH  
 Rush Request: Standard  
 P.O.#: 040517

## Custody Information

Collected by: AR  
 Received by: LB  
 Analyzed by: see "By" below

Date      Time  
 04/05/17      14:10  
 04/08/17      11:57

## Laboratory Data

SDG ID: GBY01083  
 Phoenix ID: BY01086

Project ID: JOLYN ENTERPRISES  
 Client ID: SB-12 GW

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
<b><u>Volatiles (TCL)</u></b>							
1,1-Dichloroethane	ND	400	ug/L	400	04/10/17	MH	SW8260C
2-Hexanone	ND	1000	ug/L	400	04/10/17	MH	SW8260C
Acetone	ND	1000	ug/L	400	04/10/17	MH	SW8260C
Benzene	ND	280	ug/L	400	04/10/17	MH	SW8260C
Chloroform	ND	400	ug/L	400	04/10/17	MH	SW8260C
cis-1,2-Dichloroethene	8300	400	ug/L	400	04/10/17	MH	SW8260C
Cyclohexane	ND	400	ug/L	400	04/10/17	MH	SW8260C
Methyl ethyl ketone	ND	1000	ug/L	400	04/10/17	MH	SW8260C
Methylcyclohexane	ND	400	ug/L	400	04/10/17	MH	SW8260C
Tetrachloroethene	ND	400	ug/L	400	04/10/17	MH	SW8260C
trans-1,2-Dichloroethene	ND	400	ug/L	400	04/10/17	MH	SW8260C
Trichloroethene	74000	1000	ug/L	1000	04/10/17	MH	SW8260C
Vinyl chloride	ND	400	ug/L	400	04/10/17	MH	SW8260C
<b><u>QA/QC Surrogates</u></b>							
% 1,2-dichlorobenzene-d4	99		%	400	04/10/17	MH	70 - 130 %
% Bromofluorobenzene	98		%	400	04/10/17	MH	70 - 130 %
% Dibromofluoromethane	93		%	400	04/10/17	MH	70 - 130 %
% Toluene-d8	98		%	400	04/10/17	MH	70 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL

BRL=Below Reporting Level

QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

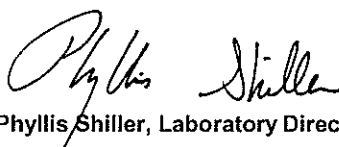
**Comments:**

**Volatile Comment:**

Elevated reporting limits for volatiles due to the presence of target and/or non-target compounds.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 13, 2017

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# Analysis Report

April 13, 2017

FOR: Attn: Mr. Bert Richnatsky  
 Bioremedial Technologies, Inc  
 2700 Kirila Drive  
 Hermitage, PA 16148

## Sample Information

Matrix: GROUND WATER  
 Location Code: BIOTECH  
 Rush Request: Standard  
 P.O.#: 040517

## Custody Information

Collected by: AR  
 Received by: LB  
 Analyzed by: see "By" below

Date            Time  
 04/05/17        15:00  
 04/08/17        11:57

## Laboratory Data

SDG ID: GBY01083  
 Phoenix ID: BY01087

Project ID: JOLYN ENTERPRISES  
 Client ID: SB-22 GW

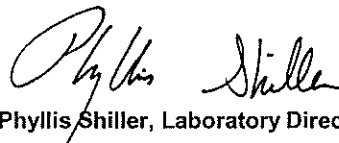
Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
<b><u>Volatiles (TCL)</u></b>							
1,1-Dichloroethane	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
2-Hexanone	ND	2500	ug/L	1000	04/10/17	MH	SW8260C
Acetone	ND	2500	ug/L	1000	04/10/17	MH	SW8260C
Benzene	ND	700	ug/L	1000	04/10/17	MH	SW8260C
Chloroform	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
cis-1,2-Dichloroethene	11000	1000	ug/L	1000	04/10/17	MH	SW8260C
Cyclohexane	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
Methyl ethyl ketone	ND	2500	ug/L	1000	04/10/17	MH	SW8260C
Methylcyclohexane	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
Tetrachloroethene	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
trans-1,2-Dichloroethene	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
Trichloroethene	140000	2000	ug/L	2000	04/10/17	MH	SW8260C
Vinyl chloride	ND	1000	ug/L	1000	04/10/17	MH	SW8260C
<b><u>QA/QC Surrogates</u></b>							
% 1,2-dichlorobenzene-d4	101		%	1000	04/10/17	MH	70 - 130 %
% Bromofluorobenzene	97		%	1000	04/10/17	MH	70 - 130 %
% Dibromofluoromethane	97		%	1000	04/10/17	MH	70 - 130 %
% Toluene-d8	99		%	1000	04/10/17	MH	70 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL  
BRL=Below Reporting Level  
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

**Comments:**

Volatile Comment:  
Elevated reporting limits for volatiles due to the presence of target and/or non-target compounds.  
If there are any questions regarding this data, please call Phoenix Client Services at extension 200.  
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Phyllis Shiller, Laboratory Director

April 13, 2017

Reviewed and Released by: Phyllis Shiller, Laboratory Director



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 Tel. (860) 645-1102 Fax (860) 645-0823



# QA/QC Report

April 13, 2017

## QA/QC Data

SDG I.D.: GBY01083

Parameter	Blk		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	RL								

QA/QC Batch 382237 (ug/L), QC Sample No: BY01084 (BY01083 (20X) , BY01084 (1X, 2X) , BY01085 (400X) , BY01086 (400X, 1000X) , BY01087 (1000X, 2000X) )

### Volatiles - Ground Water

1,1-Dichloroethane	ND	1.0	81	81	0.0				70 - 130	30
2-Hexanone	ND	5.0	95	97	2.1				70 - 130	30
Acetone	ND	5.0	86	91	5.6				70 - 130	30
Benzene	ND	0.70	85	84	1.2				70 - 130	30
Chloroform	ND	1.0	75	70	6.9				70 - 130	30
cis-1,2-Dichloroethene	ND	1.0	80	77	3.8				70 - 130	30
Cyclohexane	ND	5.0	76	78	2.6				70 - 130	30
Methyl ethyl ketone	ND	5.0	94	95	1.1				70 - 130	30
Methylcyclohexane	ND	1.0	83	85	2.4				70 - 130	30
Tetrachloroethene	ND	1.0	84	85	1.2				70 - 130	30
trans-1,2-Dichloroethene	ND	1.0	82	81	1.2				70 - 130	30
Trichloroethene	ND	1.0	84	85	1.2				70 - 130	30
Vinyl chloride	ND	1.0	70	70	0.0				70 - 130	30
% 1,2-dichlorobenzene-d4	98	%	100	100	0.0				70 - 130	30
% Bromofluorobenzene	96	%	102	101	1.0				70 - 130	30
% Dibromofluoromethane	102	%	98	100	2.0				70 - 130	30
% Toluene-d8	100	%	100	100	0.0				70 - 130	30

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%.

QA/QC Batch 382448 (ug/L), QC Sample No: BY01825 (BY01083 (2X) , BY01085 (40X) )

### Volatiles - Ground Water

1,1-Dichloroethane	ND	1.0	100	105	4.9				70 - 130	30
2-Hexanone	ND	5.0	91	90	1.1				70 - 130	30
Acetone	ND	5.0	98	94	4.2				70 - 130	30
Benzene	ND	0.70	97	96	1.0				70 - 130	30
Chloroform	ND	1.0	84	85	1.2				70 - 130	30
cis-1,2-Dichloroethene	ND	1.0	94	99	5.2				70 - 130	30
Cyclohexane	ND	5.0	87	91	4.5				70 - 130	30
Methyl ethyl ketone	ND	5.0	93	92	1.1				70 - 130	30
Methylcyclohexane	ND	1.0	90	90	0.0				70 - 130	30
Tetrachloroethene	ND	1.0	93	97	4.2				70 - 130	30
trans-1,2-Dichloroethene	ND	1.0	100	101	1.0				70 - 130	30
Trichloroethene	ND	1.0	96	96	0.0				70 - 130	30
Vinyl chloride	ND	1.0	90	94	4.3				70 - 130	30
% 1,2-dichlorobenzene-d4	100	%	100	99	1.0				70 - 130	30
% Bromofluorobenzene	98	%	100	101	1.0				70 - 130	30
% Dibromofluoromethane	94	%	99	102	3.0				70 - 130	30
% Toluene-d8	100	%	100	99	1.0				70 - 130	30

## QA/QC Data

SDG I.D.: GBY01083

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
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Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%.

---

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference

LCS - Laboratory Control Sample


LCSD - Laboratory Control Sample Duplicate

MS - Matrix Spike

MS Dup - Matrix Spike Duplicate

NC - No Criteria

Intf - Interference

  
Phyllis Shiller, Laboratory Director  
April 13, 2017

Thursday, April 13, 2017

# Sample Criteria Exceedances Report

Criteria: None

State: NY

GBY01083 - BIOTECH

SampleNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
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\*\*\* No Data to Display \*\*\*

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.





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## Analysis Comments

April 13, 2017

SDG I.D.: GBY01083

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The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



**Environmental Laboratories, Inc.**  
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Tel. (860) 645-1102 Fax (860) 645-0823



## **NY Temperature Narration**

April 13, 2017

SDG I.D.: GBY01083

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The samples in this delivery group were received at 3.2°C.  
(Note acceptance criteria is above freezing up to 6°C)



## NY/NJ CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040  
 Email: info@phoenixlabs.com Fax (860) 845-0823  
 Client Services (860) 845-8728

**PHOENIX**  
 Environmental Laboratories, Inc.  
 1000 Main St., Inc.  
 Herkimer, NY 13359

Customer: Heritage Pa  
 Address: 2108 Kruza Blvd  
Heritage Pa 16148

Coolant:  EPK  ICE  No  Yes

Temp: 22.2 °C Pg. 1 of 1

Contact Options:  
 Fax: 724-981-9080  
 Phone: 724-343-1990  
 Email: brl@phoenixlabs.com

Project P.O.: 040527  
 Report to: John Entenpreis  
 Invoice to: Pat Richardsky  
San Horacio

Client Sample - Information - Identification

Sampler's Signature: Pat Richardsky Date: 4/5/17

Matrix Code: \_\_\_\_\_

DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water  
 RW=Raw Water SE=Segment SL=Sludge S=Soil SD=Solid W=Wipe  
 OIL=Oil B=Bulk L=Liquid

PHOENIX ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
01083	SB-8 GW	GW	4-5-17	12:10 PM
01084	SB-13 GW		"	12:45 PM
01085	SB-14 GW		"	1:25 PM
01086	SB-12 GW		"	2:10 PM
01087	SB-22 GW		"	3:00 PM

Analysis Request: PAHs, PCBs, TOC

Turnaround:  
 1 Day  
 2 Days  
 3 Days  
 5 Days  
 10 Days  
 Other

Criteria:  
 NJ:  Res. Criteria  
 Non-Res. Criteria  
 Impact to GW Sol  
 Cleanup Criteria  
 GW Criteria  
 NY:  TAGM 4046 GW  
 TAGM 4046 SOIL  
 Use Soil  
 NYS75 Unrestricted Soil  
 NYS75 Residential Soil  
 Restricted/Residential Commercial  
 Industrial

Data Format:  
 Phoenix Std Report  
 Excel  
 PDF  
 GISKey  
 EQAS  
 NJ Hazmat EDD  
 NY E2 EDD (ASP)  
 Other

Data Package:  
 NJ Reduced Dtlv.  
 NY Enhanced (ASP B)  
 Other

Requisitioned by: Pat Richardsky Accepted by: Tim Allen Date: 4/7/17 Time: 3:17

Comments, Special Requirements & Regulations: Analytes to Report: 1,1-Dichloroethane; 2-Butenol; 2-Hexanone; ACETONE; Benzene; cis-1,2-Dichloroethane; Chloroform; Cyclohexane; Methyl Cyclohexane; TETRACHLOROETHANE; Trans-1,2-Dichloroethane; Trichloroethane; Vinyl Chloride.

2 HCL Vials were received for each sample