

**FOURTH QUARTER  
GROUNDWATER MONITORING**

Mac's One Hour Cleaners  
10825 SE 176<sup>th</sup> Street  
Renton, Washington

**TRI WESTERN SYNDICATED  
INVESTMENTS, INC.**

# ENVIRONMENTAL ASSOCIATES, INC.

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December 28, 2012

JN-20209-5

Mr. Colin Radford  
Tri Western Syndicated Investments, Inc.  
10423 Main Street, Suite #4  
Bellevue, Washington 98004

**RE:           FOURTH QUARTER - GROUNDWATER MONITORING**  
**Mac's One Hour Cleaners**  
**10825 SE 176<sup>th</sup> Street**  
**Renton, Washington**

Dear Mr. Radford:

Environmental Associates, Inc. (EAI) has completed the fourth of four (4) planned quarterly groundwater monitoring events as provided for in accordance with our proposal, dated August 17, 2011. All nine (9) monitoring wells (five on-site and four off-site) were sampled during this event.

## **Project Background**

A dry-cleaners has operated as a tenant on the subject property since the 1960s. In 2009, the Client / property owner (Tri-Western Syndicated Investments) received notice from the west/southwest adjacent property owner (Bayview) that dry-cleaning solvents (tetrachloroethene or "perc" / PCE) had been discovered on their parcel and that they (Bayview) suspected that the source was the dry-cleaner on the subject property. In January / February 2010, four (4) initial groundwater monitoring wells (MW-1 through MW-4) were installed on the subject parcel to make a preliminary assessment of subsurface environmental conditions. That exploration confirmed the presence of PCE in both soil and groundwater at the subject property at concentrations above Washington State Department of Ecology (WDOE) target compliance levels for unrestricted land use. That preliminary assessment also identified the on-site dry-cleaner as a potential source for the encountered contaminants.



Through the Spring / Summer of 2010, several additional phases of environmental study were performed on the Tri-Western parcel. These activities included geophysical surveys, sewer-line closed-circuit TV surveys, and additional phases of soil and groundwater assessment both within the dry-cleaners and in exterior areas of the property. These efforts identified two (2) suspected "source" areas of impacts by dry-cleaning solvent, including an area along a side sewer line along the western side of the building, and a less well defined area along a section of sewer pipe north-northeast of the subject building.

Prior to selection of a potential remediation approach, the next step in the remediation feasibility study process was to further assess the extent of the environmental impact. To facilitate this next phase of work, an access agreement was worked out between the two parcel owners over the Summer / Fall of 2010. One (1) additional monitoring well (MW-5) was installed on-site and four (4) monitoring wells (MW-6 through MW-9) were installed off-site on the adjoining "Bayview" parcel during November and December of 2010.

Following installation and sampling of the additional monitoring wells, the feasibility of several remediation and risk management approaches was evaluated. By mid Summer 2011, the approach favored by the Tri Western team was to initially perform active remediation by excavating a trench along the length of the western sanitary sewer line that served a floor drain inside of Mac's Cleaners. Leakage along the sewer line was suspected to be a primary source for the groundwater plume. The trench was anticipated to both physically remove some of the PCE-impacted soil at the source area and provide a means of applying remediation stimulating chemicals to hopefully reduce the mass of contamination both at the source and in down-gradient areas on and off the subject property.

In October 2011, the above-referenced trench was constructed and an initial application of remediation products intended to stimulate and enhance anaerobic bio-degradation was applied to the open trench. A network of perforated piping was set within the trench during the backfilling process to allow for future re-application of remediation products. Details regarding the trench construction and remediation product application were previously presented to the client under separate cover.

### **Scope of Work**

To evaluate the performance of the initial application of remediation products, the following scope of work was adopted for execution on a quarterly basis (every three months) for four (4) consecutive quarters):

- Measure current depths to groundwater in all nine (9) study area monitoring wells (MW-1 through MW-9). Utilize the data to prepare an updated water table survey and groundwater flow interpretive map.

- Collect representative groundwater samples from each monitoring well using a low-flow micro-purging technique with a peristaltic pump. During well purging, a multi-parameter meter and flow through cell is used to collect basic geo-chemical data on groundwater conditions such as pH, temperature, conductance, dissolved oxygen, and oxidation/reduction potential.
- Submit all recovered groundwater samples to the project laboratory with analysis for chlorinated volatile organic compounds (CVOCs) by EPA test method 8260. Groundwater samples from MW-3 and MW-5 (nearest to the remediation trench) may also be analyzed for other parameters of interest such as chemical and biological oxygen demand, dissolved gases, and inorganic chemistry such as dissolved iron, nitrogen, and sulfate concentrations, which can be used to evaluate the effectiveness and down-gradient influence of the remediation products applied at the trench.
- Prepare a written summary report documenting field methods, observations, findings, and conclusions. Reports for the first, second, and third quarters will be brief with very little discussion and interpretation of the interim findings. At the conclusion of the fourth quarter, a more detailed report is intended to provide an expanded in-depth data analysis and project review.

### **Water Table Survey**

The fourth quarter of groundwater monitoring was performed over a two-day period during October 23<sup>rd</sup> and 24<sup>th</sup>, 2012. Prior to micro-purging, the depth to groundwater below the top of each well casing was measured. These depths to groundwater along with the corresponding deduced elevations of the water table at each well location are recorded in Table 1.

Chart 1, attached, provides a hydrograph (i.e plotted water table elevation changes over time) for all nine (9) monitoring wells. Since quarterly groundwater monitoring began in December 2011, the hydrograph depicts a typical site-wide rise in water table elevations during the wetter winter and spring months, and falling water table elevations during the dryer summer and early fall months. Since the Spring of 2012, average groundwater elevations across the study site have continued to decline as visually discernable on Chart 1. At the time of the Fourth Quarter monitoring event average groundwater levels appeared to be at the lowest elevations since monitoring began in 2010.

Plate 3, Water Table Survey, presents a graphical representation of the shallow water table and deduced groundwater flow directions based upon the current geometry of monitoring wells. Examining Plate 3, groundwater flow appears to be westward with a slight northwesterly flow component in the vicinity of monitoring wells MW-7 and MW-9.

The groundwater flow regime appears generally consistent with prior surveys.

### **Groundwater Sampling - October 2012**

The nine (9) monitoring wells were sampled between October 23<sup>rd</sup> and 24<sup>th</sup>, 2012. Prior to that, the monitoring wells were last sampled in June 2012.

Each monitoring well was first “micro-purged” utilizing a peristaltic pump equipped with a flow-through cell instrumented to monitor a variety of parameters including pH, water temperature, conductivity, dissolved oxygen, and redox-potential. Micro-purging continued until consecutive readings of the above parameters stabilized (i.e. varied less than 10 percent). The final readings for the above parameters for each monitoring well are presented in Table 2.

Once that the above measured parameters suggested that the extracted groundwater was representative of ambient conditions, groundwater samples were then transferred directly to laboratory-prepared glassware.

### **Laboratory Results - October 2012**

The nine (9) groundwater samples were analyzed by the project laboratory for chlorinated volatile organic compounds by EPA test method 8260B. The laboratory results are presented in Table 3. Additionally, concentrations of PCE in groundwater are graphically presented on Plate 4.

During this current sampling event, PCE was detected in eight (8) of the nine (9) samples. Only five (5) contained PCE at concentrations above the Washington State Department of Ecology’s 5 parts per billion (ppb) target compliance level. PCE was not detected in the groundwater sample recovered from MW-1 at concentrations above the laboratory’s minimum detection limit. Wells MW-4, MW-8 and MW-9 contained detectable concentrations of PCE that were below the WDOE’s target level.

During the current sampling event, the highest concentrations of PCE were observed in the “core-of-the-plume” monitoring wells MW-2, MW-3, MW-6, and MW-7, in which concentrations of PCE in the groundwater ranged between 130 to 170 ppb. The concentrations of PCE at these four (4) locations were all higher than the previous sampling event. Additional discussion regarding this observation is presented in the Fourth Quarter Annual Review section of this report.

In regard to VOC detections in groundwater at MW-5, cis-DCE continues to be present for the second consecutive quarter, while the concentration of PCE has remained relatively unchanged from the prior sampling event. Additionally, the redox-potential measured during the groundwater sample collection at MW-5 has remained negative, suggestive of a “reducing environment.” These observations combined appear to suggest that the remediation products applied in the nearby “remediation trench” have extended the area of activity to include the vicinity of MW-5. The presence of degradation products such as cis-DCE further suggests that a reduction in contaminant mass of PCE is occurring at the suspected source area.

As summarized in Table 3, while groundwater samples from MW-1, MW-4, and MW-8 have contained detections of PCE (past or present), none have been in excess of the Washington State Department of Ecology's (WDOE's) target compliance level of 5 parts per billion (ppb). Monitoring wells MW-1 and MW-8 are both located along the southern margin of the study area. As such, monitoring well's MW-1 and MW-8 appear to continue to establish a partial southern limit of the PCE groundwater plume, as depicted on Plate 4, PCE In Groundwater as a red "dashed" line.

#### **Fourth Quarter Annual Review - Summary and Discussion**

Upon completion of the first full year of quarterly groundwater monitoring the following observations and expanded discussion are offered:

- In general dissolved contaminant concentrations across the study area are lower upon at the end of the four quarters than they were at the beginning.
- Within the past year the dry-cleaning facility operator removed the PCE-based dry-cleaning machine and has installed a newer "green-machine" that no longer uses chlorinated solvents. This facility operations detail would appear to significantly reduce the likelihood of ongoing or future releases of PCE contributing to the presently known environmental impairment.
- Concentrations of PCE within the "core" of the plume (measured at MW-2, MW-3, MW-6, and MW-7) were higher at the fourth quarter than they were during the prior third quarter sampling event. It is unclear at present if the increased concentrations were due to "stagnation" or "rebounding" which, if true, would signal the need to re-apply remediation products and perhaps consider expanding the treatment regime. Alternatively, the apparent "rebounding" in dissolved concentrations may simply be an artifact of the substantial loss of water in the groundwater system due to the unusually dry summer and fall experienced this past year. In short, the loss of water-table elevation may have acted to concentrate the residual dissolved contaminant mass, thus producing groundwater samples with higher contaminant concentrations. Continuing with regularly scheduled quarterly monitoring should resolve this uncertainty.
- Groundwater conditions in the vicinity of MW-5 appear to have become slightly reducing in terms of oxidation-reduction potential, a condition that is supportive of the strains of anaerobic bacteria that tend to enhance bio-degradation of chlorinated compounds. This appears to be a positive sign that the remediation products applied at the source area trench are beginning to expand the active zone of treatment down-gradient from the main trench alignment. The detection of degradation products such as cis-DCE in the groundwater at MW-5 beginning during the 3<sup>rd</sup> quarter further suggest that bio-degradation of the source area contaminant mass is occurring and ongoing at present.

- Three (3) of the nine (9) groundwater monitoring wells have now completed four (4) consecutive quarters of groundwater monitoring, in which contaminant concentrations have remained non-detect and/or below the Washington State Department of Ecology's target levels. These monitoring wells include MW-1, MW-4, and MW-8. With the completion of four (4) consecutive quarters of compliance at MW-1 and MW-8, it may be reasonable to infer that in regard to the "Bayview parcel" the lateral extent of the PCE groundwater plume appears to be limited to the northern most drive lane and does not appear to underflow the auto parts building or areas of the "Bayview" parcel further south.
- Although dissolved contaminant concentrations appear to generally be declining, the concentrations of PCE in groundwater at MW-6 and MW-7 over the past four (4) quarters demonstrate that a portion of the groundwater plume likely encroaches onto the Bank parcel. It remains unknown as to how far the "plume" has migrated along its longitudinal axis, or what portions of the Bank parcel may be impacted. As an additional consideration, from past historical research the Bank parcel appears to have historically been occupied by a gasoline service station, which may conceivably have contributed to environmental impairments on that parcel. At present, EAI is not aware of any prior environmental work performed on the Bank parcel. It is EAI's understanding that ownership of the Bank parcel desires Tri Western to expand site assessment activities onto their parcel. Additional discussions in that regard are included in the Recommendations Section below.

## **Recommendations**

In recognition of the above summary of findings, the following recommendations are offered in moving forward:

- Continue with quarterly groundwater monitoring: EAI recommends continuing with regularly scheduled quarterly groundwater monitoring. Acknowledging that the wells were last sampled in late October 2012, the next proposed sampling event should be scheduled for late January 2013. In regard to monitoring wells MW-1, MW-4, and MW-8 which have all demonstrated four (4) consecutive quarters of "compliance" monitoring, it may be justifiable to reduce the sampling frequency of those wells to semi-annually (twice a year).
- Assessment of Current Environmental Conditions on the Bank Parcel. Further exploration on the Bank parcel is warranted in an effort to further resolve the lateral limit of the PCE plume. Additionally, EAI has been advised that the Bank property ownership has expressed a concern regarding indoor air environmental quality as it may relate to vapor intrusion. To begin to address the Bank property ownership's concerns, EAI recommends the following actions:

- Installation of approximately three (3) permanent groundwater monitoring wells to be positioned around the bank parcel to augment the existing network of monitoring wells.
- Prepare a proposed scope of work for evaluating potential indoor-air quality issues within the Bank building, beginning with soil vapor sampling.
- Request that bank property ownership provide copies of any prior environmental studies performed on or referencing their parcel, particularly since the bank parcel was reportedly historically occupied by a gasoline service station.
- Develop Feasibility Plan for Augmenting or Expanding Remediation Approach: In particular, as discussed with the Client during the recent December 20<sup>th</sup> 2012 meeting, if the January 2013 monitoring event demonstrates a return to typical groundwater elevation levels and contaminant concentrations have not resumed their prior rate of decline, EAI would then recommend implementing the feasibility study to evaluate potential additional remedial measures including the construction of one or more additional remediation “trenches” or a site-wide “grid” injection program. The feasibility study would essentially consist of completing a series of borings, across the study area. Recovered soil and groundwater samples would be used to estimate average “sorbed” and dissolved contaminant masses so that recommended volumes of remediation product could be calculated. Additionally, the collected contaminant mass data would be used to evaluate potential placements of additional interceptor/injector trenches, soil disposal options and cost projections.
- At a minimum, regardless of the concentration trend at the time of the January 2013 monitoring event, EAI recommends reapplying remediation product to the existing infiltration trench, to ensure continued degradation of contaminant mass at the suspected source area.

### **Limitations**

This report has been prepared specific application to this project in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. This document is for the exclusive of Tri Western Syndicated Investments, Inc., along with its members and appointed representatives. Commentary with respect to subsurface environmental conditions relies solely upon the results of sampling and testing conducted at separated sampling localities and environmental conditions may vary between those localities or at other locations, depths, and/or media. No other warranty, expressed or implied, is made here. If new information is acquired or developed in future site work Environmental Associates, Inc., must be retained to reevaluate the conclusions of this letter report and to provide amendments as required.



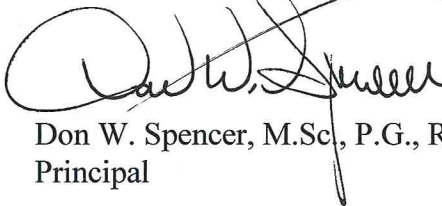
We appreciate the opportunity to be of service on this project and trust that the information provided here is fully responsive to your needs. If you have any questions or we may be of additional service, please do not hesitate to contact us.

Respectfully submitted,  
ENVIRONMENTAL ASSOCIATES, INC.



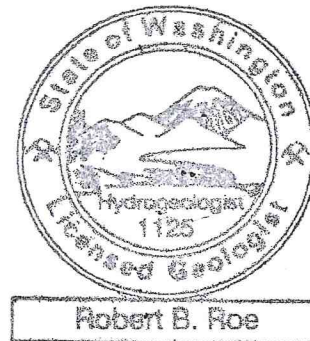
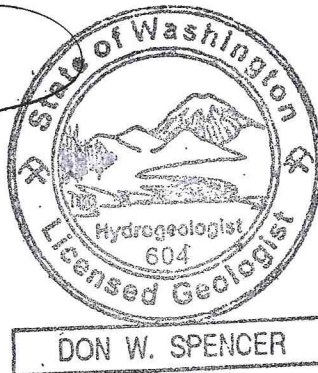
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**Attachments:**

Table 1 - Water Table Survey  
Table 2 - General Water Quality Parameters  
Table 3 - Chlorinated VOCs - Groundwater Sampling Results

Chart 1: Hydrograph (MW-1 through MW-9)  
Chart 2: PCE Concentration Trends

Plate 1 - Vicinity / Topographic Map  
Plate 2 - Study Area - Overview  
Plate 3 - Water Table Survey  
Plate 4 - PCE In Groundwater

Appendix-A: Laboratory Reports

<b>TABLE 1</b> <b>Water Table Survey</b> <b>(feet)</b>					
Monitoring Well Number	Ground Surface Elevation	TOC Elevation	Depth to Water Below TOC	Net Change	Elevation of Water Table
<b>MW-1</b>					
1/20/2010	408.09	407.69	5.11		402.58
12/28/2010		407.69	5.38	-0.27	402.31
12/5/2011			5.47	-0.09	402.22
3/22/2012			5.50	-0.03	402.19
6/29/2012			5.47	0.03	402.22
10/23/2012			5.57	-0.10	402.12
<b>MW-2</b>					
1/20/2010	408.68	408.44	5.36		403.08
12/28/2010		408.44	5.24	0.12	403.20
12/6/2011			6.26	-1.02	402.18
3/23/2012			4.86	1.40	403.58
6/28/2012			5.83	-0.97	402.61
10/24/2012			6.88	-1.05	401.56
<b>MW-3</b>					
1/20/2010	409.16	408.84	5.55		403.29
12/28/2010		408.86	5.39	0.16	403.47
12/5/2011			6.65	-1.26	402.21
3/23/2012			4.76	1.89	404.10
6/28/2012			6.05	-1.29	402.81
10/24/2012			7.54	-1.49	401.32
<b>MW-4</b>					
1/20/2010	413.11	412.74	5.65		407.09
12/28/2010		412.77	5.53	0.12	407.24
12/6/2011			7.24	-1.71	405.53
3/23/2012			4.65	2.59	408.12
6/29/2012			6.45	-1.80	406.32
10/24/2012			8.03	-1.58	404.74
<b>MW-5</b>					
12/28/2010		410.09	7.06		403.03
12/5/2011			8.16	-1.10	401.93
3/23/2012			5.40	2.76	404.69
6/29/2012			7.47	-2.07	402.62
10/24/2012			8.98	-1.51	401.11
<b>MW-6</b>					
12/28/2010		407.83	6.48		401.35
12/6/2011			7.42	-0.94	400.41
3/22/2012			5.94	1.48	401.89
6/28/2012			6.88	-0.94	400.95
10/23/2012			8.36	-1.48	399.47

<b>MW-7</b>					
12/28/2010		407.41	5.25		402.16
12/5/2011			5.64	-0.39	401.77
3/22/2012			4.75	0.89	402.66
6/28/2012			5.62	-0.87	401.79
10/23/2012			6.65	-1.03	400.76
<b>MW-8</b>					
12/28/2010		406.22	4.39		401.83
12/5/2011			4.75	-0.36	401.47
3/22/2012			4.14	0.61	402.08
6/29/2012			4.59	-0.45	401.63
10/23/2012			5.01	-0.42	401.21
<b>MW-9</b>					
12/28/2010		403.23	1.94		401.29
12/6/2011			2.05	-0.11	401.18
3/22/2012			1.90	0.15	401.33
6/28/2012			2.07	-0.17	401.16
10/24/2012			3.32	-1.25	399.91
<b>Notes:</b>					
(1) TOC. Top of well casing elevation.					
(2) Elevations based upon assigning the concrete walkway surface at the northeast corner of the subject property building an approximate elevation of 412.00 feet above sea-level.					

**TABLE 2 - General Water Quality Parameters  
Readings Taken at Time of Sampling**

Monitoring Point	pH	Conductivity mS/m	Temperature (Celsius)	Oxidation-Reduction Potential mV	Dissolved Oxygen mg/L
<b>MW-1</b>					
January 20, 2010	7.29	15.3	13.0	-93	3.69
December 15, 2010	5.9	9.1	12.6	110	7.12
December 5, 2011	6.36	5.4	13.7	89	2.34
March 22, 2012	6.16	8.1	9.87	321	8.76
June 29, 2012	6.45	11.3	16.73	127	8.56
October 23, 2012	6.29	3.7	15.7	446	2.97
<b>MW-2</b>					
January 20, 2010	6.55	12.2	14.3	37	2.52
December 15, 2010	5.43	12.7	14.9	223	6.64
December 5, 2011	6.35	7.5	15.5	209	5.17
March 23, 2012	5.19	13.1	10.89	306	8.03
June 28, 2012	6.12	13.1	17.00	251	6.91
October 24, 2012	6.28	11.0	19.1	473	5.24
<b>MW-3</b>					
January 20, 2010	6.63	21.8	14.2	200	5.56
December 15, 2010	5.54	21.9	14.9	225	7.49
December 5, 2011	6.19	16.8	15.4	217	6.13
March 23, 2012	5.71	23.7	11.47	311	7.91
June 28, 2012	5.95	28.8	16.82	269	8.22
October 24, 2012	6.24	25.0	18.3	473	5.06
<b>MW-4</b>					
January 20, 2010	6.86	33.4	13.5	221	5.88
December 15, 2010	5.64	31.1	14.0	216	6.64
December 5, 2011	6.31	20.3	14.1	220	5.05
March 23, 2012	5.76	40.5	11.01	356	7.86
June 29, 2012	6.08	29.7	15.87	199	8.71
October 24, 2012					
<b>MW-5</b>					
December 15, 2010	5.72	14.7	15.3	219	6.77
December 5, 2011	6.30	9.3	15.3	198	4.67
March 23, 2012	5.81	31.7	11.08	261	4.13
June 29, 2012	6.49	180	15.35	-92	10.44
October 24, 2012	6.74	9.8	17.7	-89	0.33
<b>MW-6</b>					
December 15, 2010	6.03	19.7	13.9	217	6.68
December 5, 2011	6.59	15.9	14.4	197	6.81
March 22, 2012	5.35	16.6	10.35	323	7.97
June 28, 2012	6.24	18.8	15.41	251	8.78
October 23, 2012	6.53	19.8	15.8	422	8.93
<b>MW-7</b>					
December 15, 2010	6.15	23.0	13.7	139	7.22
December 5, 2011	6.68	14.0	13.3	164	5.51
March 22, 2012	6.20	19.6	10.41	308	9.32
June 28, 2012	6.62	22.1	15.67	236	9.34
October 23, 2012	6.59	20.0	16.4	437	8.63
<b>MW-8</b>					
December 15, 2010	5.74	27.9	12.7	191	6.16
December 5, 2011	6.08	17.4	12.1	183	7.92
March 22, 2012	5.94	22.0	9.95	335	3.02
June 29, 2012	6.33	24.7	16.35	285	7.67
October 23, 2012	6.41	23.6	16.8	446	3.24
<b>MW-9</b>					
December 15, 2010	5.88	11.8	11.0	184	9.41
December 5, 2011	7.11	8.3	12.8	160	8.37
March 22, 2012	6.14	7.1	9.43	322	10.97
June 28, 2012	6.55	12.6	17.04	242	6.35
October 24, 2012	6.59	4.70	17.50	439	8.39

**TABLE 3 - Chlorinated VOCs - Groundwater Sampling Results**  
**All results and limits in parts per billion (ppb)**

Monitoring Well	Tetrachloroethene (PCE)	Trichloroethene (TCE)	(cis) 1,2 Dichloroethene	(trans) 1,2 Dichloroethene	Vinyl Chloride	Chloroform
MW-1						
1/20/2010	1.5	<1	<1	<1	<0.2	<1
12/15/2010	1.5	<1	<1	<1	<0.2	<1
12/5/2011	<1	<1	<1	<1	<0.2	NA
3/22/2012	<1	<1	<1	<1	<0.2	NA
6/29/2012	1.1	<1	<1	<1	<0.2	NA
10/23/2012	<1	<1	<1	<1	<0.2	NA
MW-2						
1/20/2010	<b>860</b>	1.7	<1	<1	<0.2	<b>8.5</b>
12/16/2010	<b>480</b>	1.7	<1	<1	<0.2	<b>9.7</b>
12/6/2011	<b>160</b>	<1	<1	<1	<0.2	NA
3/23/2012	<b>100</b>	<1	<1	<1	<0.2	NA
6/28/2012	<b>77</b>	<1	<1	<1	<0.2	NA
10/24/2012	<b>140</b>	<1	<1	<1	<0.2	NA
MW-3						
1/20/2010	<b>1,500</b>	1.4	<1	<1	<0.2	1.4
12/16/2010	<b>770</b>	1.7	<1	<1	<0.2	1.3
12/5/2011	<b>240</b>	<1	<1	<1	<0.2	NA
3/23/2012	<b>150</b>	<1	<1	<1	<0.2	NA
6/28/2012	<b>110</b>	<1	<1	<1	<0.2	NA
10/24/2012	<b>130</b>	<1	<1	<1	<0.2	NA
MW-4						
1/20/2010	2.6	<1	<1	<1	<0.2	5.0
12/16/2010	<b>6.8</b>	<1	<1	<1	<0.2	6.4
12/6/2011	3.6	<1	<1	<1	<0.2	NA
3/23/2012	3.6	<1	<1	<1	<0.2	NA
6/29/2012	2.9	<1	<1	<1	<0.2	NA
10/24/2012	2.6	<1	<1	<1	<0.2	NA
MW-5						
12/16/2010	<b>230</b>	1.9	<1	<1	<0.2	<1
12/5/2011	<b>150</b>	<1	<1	<1	<0.2	NA
3/23/2012	<b>84</b>	<1	<1	<1	<0.2	NA
6/29/2012	<b>15</b>	3	<b>120</b>	<1	<0.2	NA
10/24/2012	<b>13</b>	<1	<b>90</b>	<1	<0.2	NA

Monitoring Well	Tetrachloroethene (PCE)	Trichloroethene (TCE)	(cis) 1,2 Dichloroethene	(trans) 1,2 Dichloroethene	Vinyl Chloride	Chloroform
MW-6						
12/16/2010	<b>250</b>	1.1	<1	<1	<0.2	<b>8.1</b>
12/6/2011	<b>210</b>	<1	<1	<1	<0.2	NA
3/22/2012	<b>120</b>	<1	<1	<1	<0.2	NA
6/28/2012	<b>95</b>	<1	<1	<1	<0.2	NA
10/23/2012	<b>160</b>	<1	<1	<1	<0.2	NA
MW-7						
12/15/2010	<b>280</b>	1.8	<1	<1	<0.2	<b>3.6</b>
12/5/2011	<b>230</b>	<1	<1	<1	<0.2	NA
3/22/2012	<b>130</b>	<1	<1	<1	<0.2	NA
6/28/2012	<b>110</b>	<1	<1	<1	<0.2	NA
10/23/2012	<b>170</b>	1	<1	<1	<0.2	NA
MW-8						
12/15/2010	1.8	<1	<1	<1	<0.2	<1
12/5/2011	<1	<1	<1	<1	<0.2	NA
3/22/2012	<1	<1	<1	<1	<0.2	NA
6/29/2012	<1	<1	<1	<1	<0.2	NA
10/23/2012	1.5	<1	<1	<1	<0.2	NA
MW-9						
12/15/2010	<b>50</b>	<1	<1	<1	<0.2	<1
12/06/2011	<b>10</b>	<1	<1	<1	<0.2	NA
3/22/2012	<b>12</b>	<1	<1	<1	<0.2	NA
6/28/2012	<b>15</b>	<1	<1	<1	<0.2	NA
10/24/2012	4.3	<1	<1	<1	<0.2	NA
Reporting Limit <sup>3</sup>	1	1	1	1	0.2	1
Existing Cleanup Level <sup>4</sup>	5 (A)	5 (A)	80 (B)	160 (B)	0.2 (A)	7.2 (B)

## Notes:

1 - "ND" denotes analyte not detected at or above listed Reporting Limit.

2- "NA" denotes sample not analyzed for specific analyte.

3- "Reporting Limit" represents the laboratory lower quantitation limit.

4- Method A or B groundwater cleanup levels as published in the Model Toxics Control Act (MTCA) 173-340-WAC, amended 2/12/01.

Bold and Italics denotes concentrations above existing MTCA Method A groundwater cleanup levels.

CHART 1: Hydrograph

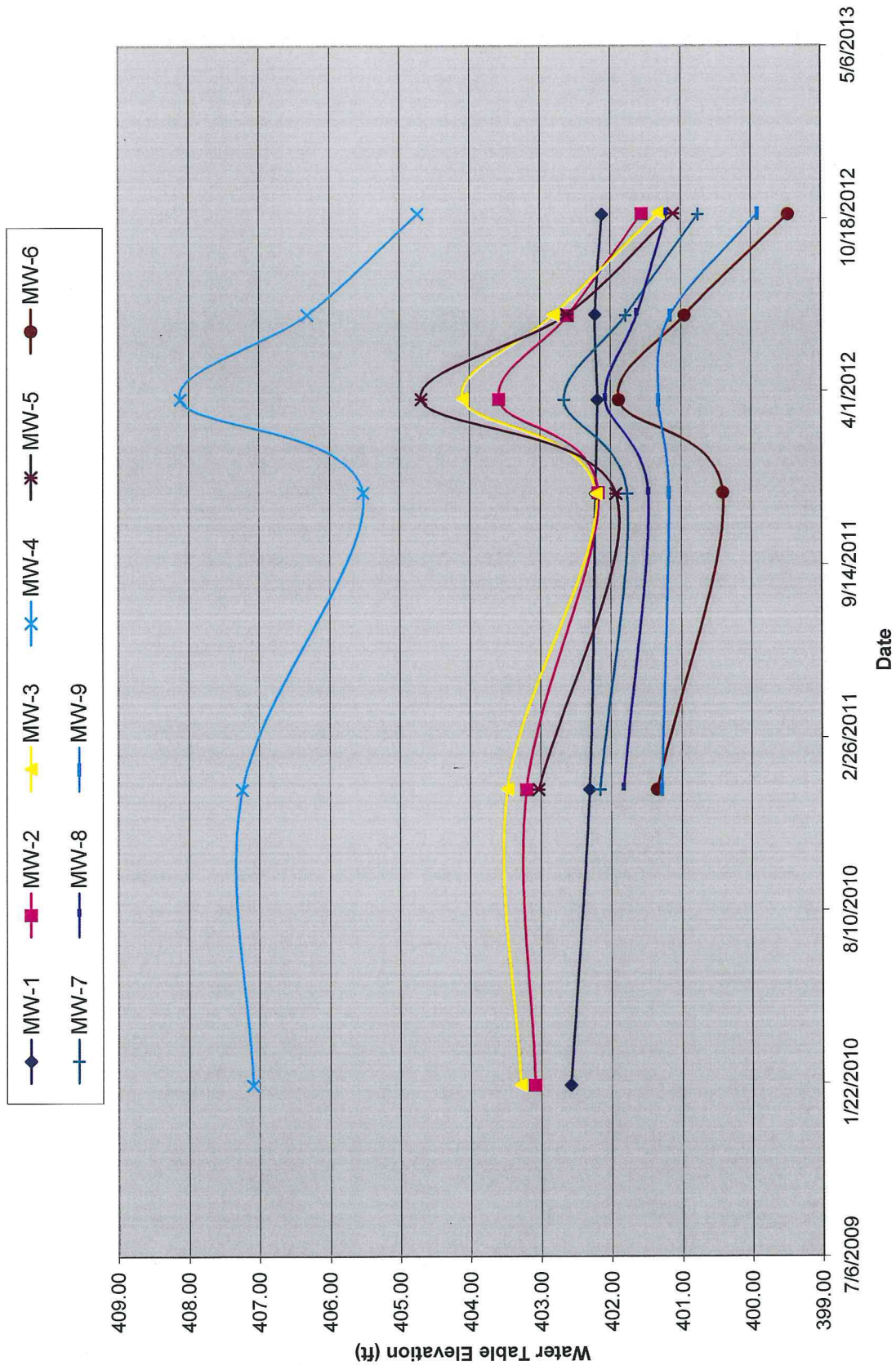
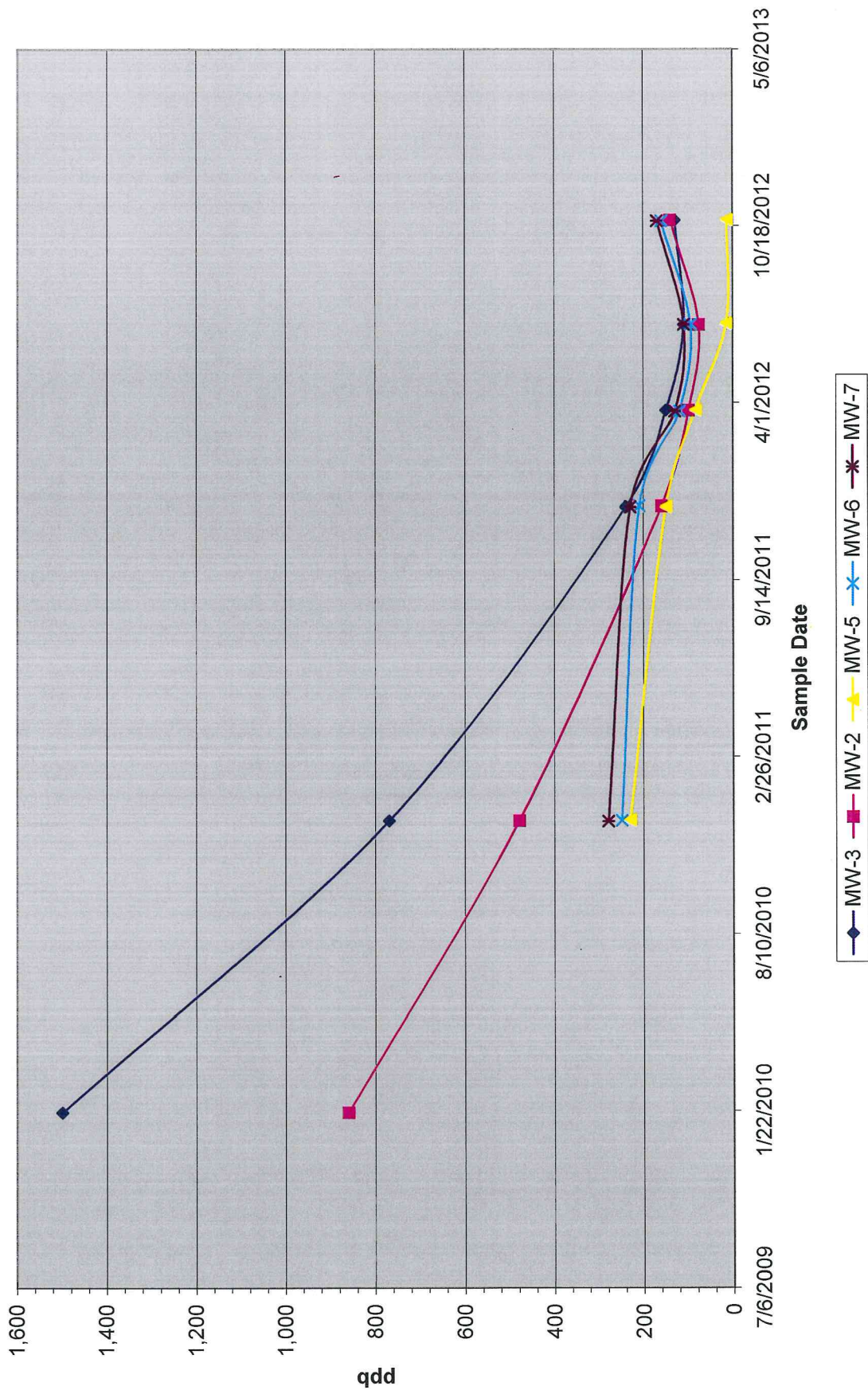
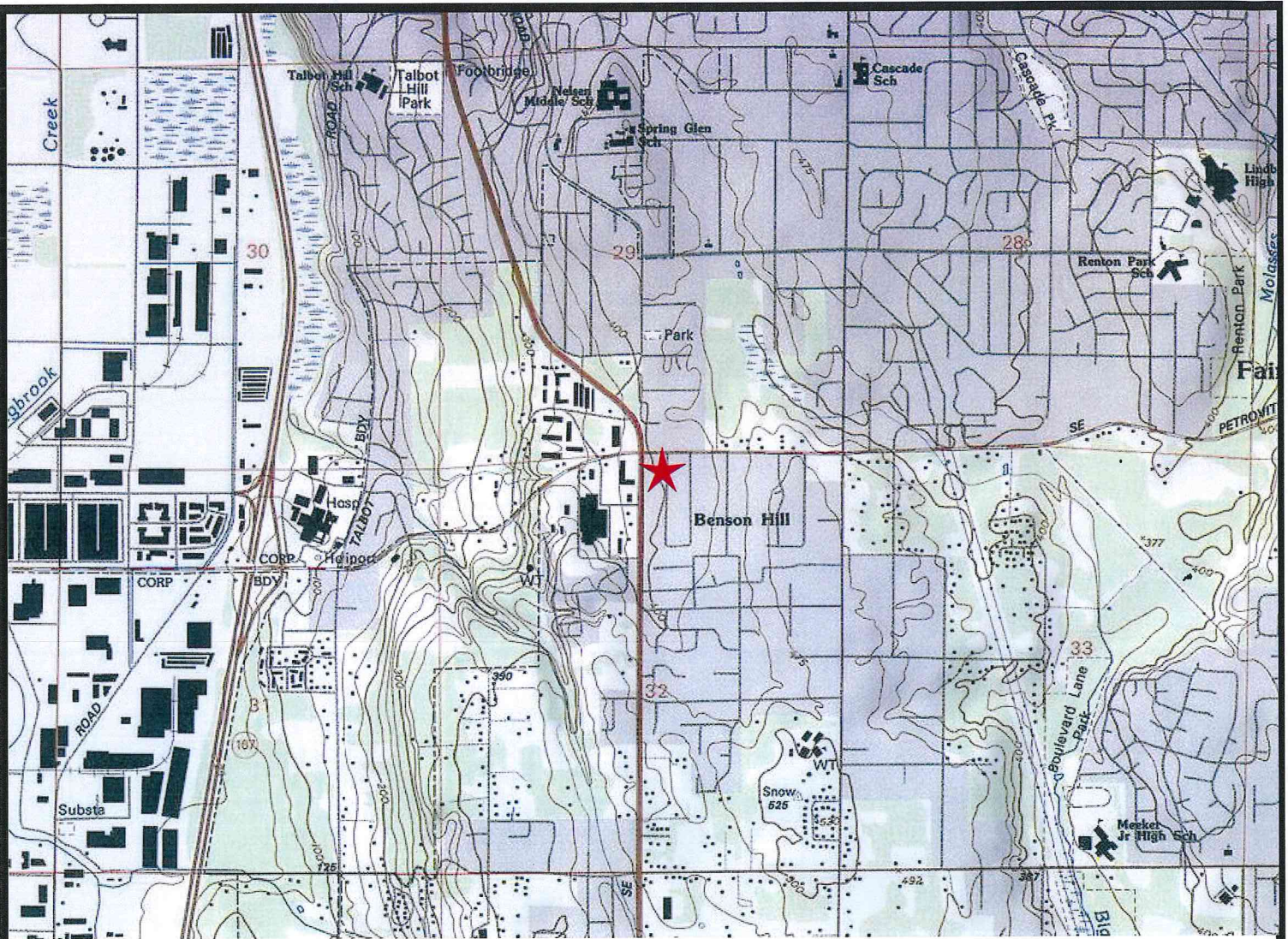




CHART 2: PCE Concentration Trends







USGS: 7.5 Minute Quadrangle: Renton, Washington

Contour Interval: 25 feet

Scale

1/2 Mile



Subject Property Location



Inferred groundwater flow direction based upon the local topographical gradient in the vicinity of the subject property.



**ENVIRONMENTAL  
ASSOCIATES, INC.**

1380 - 112th Avenue NE, Suite 300  
Bellevue, Washington 98004

## VICINITY / TOPOGRAPHIC MAP

Mac's One Hour Cleaners  
10825 SE 176th Street  
Renton, Washington

Job Number:

JN-20209-5

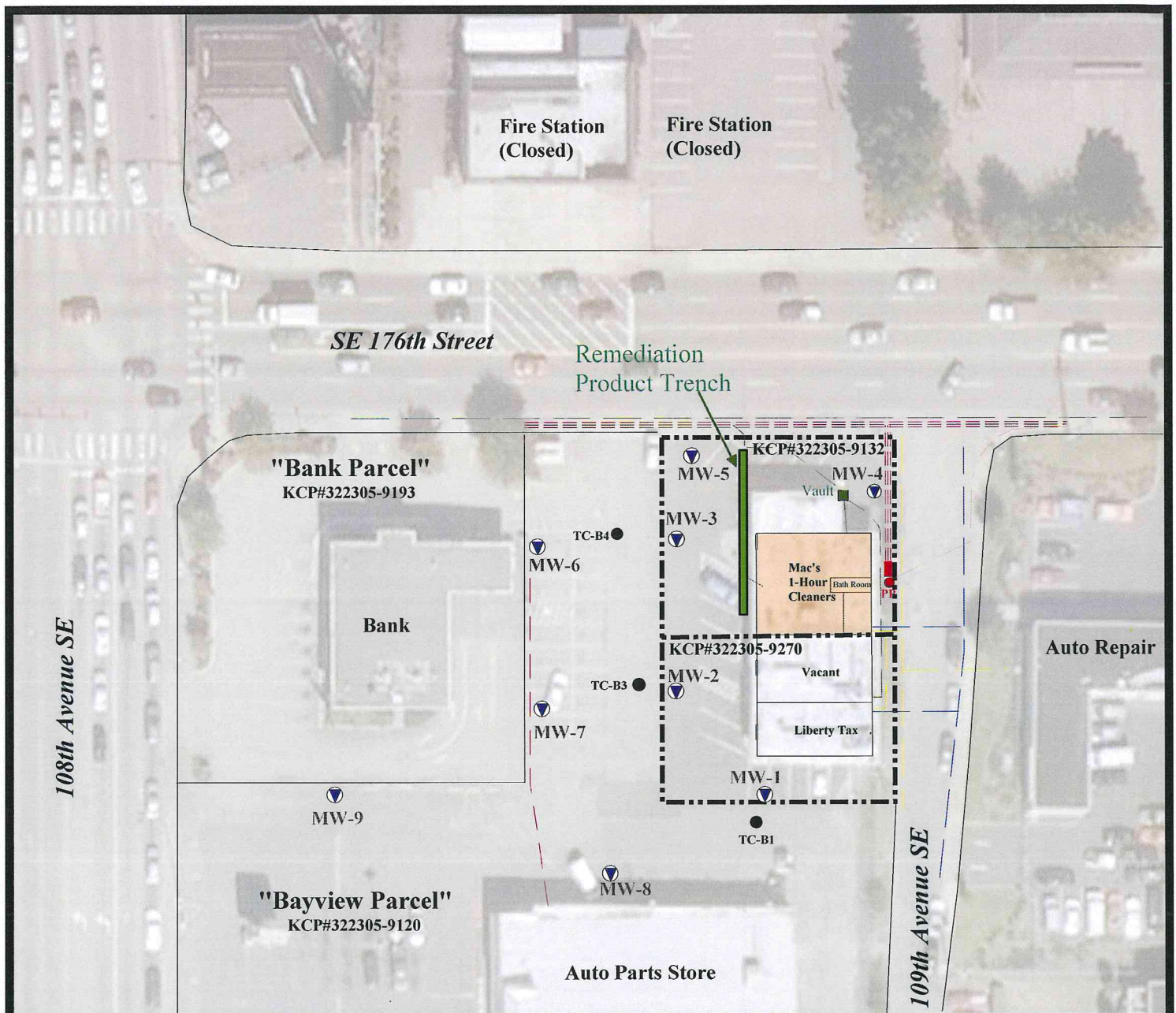
Date:

October 2012

Plate:

1





Approximate border of Subject Parcel.

KCP#: King County tax parcel numbers.



Existing Monitoring wells installed by EAI.



Approximate locations of borings made by Terracon (TC) on the adjacent property.



Approximate locations of underground utilities: Power (red), water (blue), natural gas (yellow), phone (orange), and sanitary sewer / storm drain (green).



## ENVIRONMENTAL ASSOCIATES, INC.

1380 112th Avenue N.E., Ste. 300  
Bellevue, Washington 98004

## STUDY AREA - OVERVIEW

Mac's One Hour Cleaners  
10825 SE 176th Street  
Renton, Washington

Job Number:

JN-20209-5

Date:

October 2012

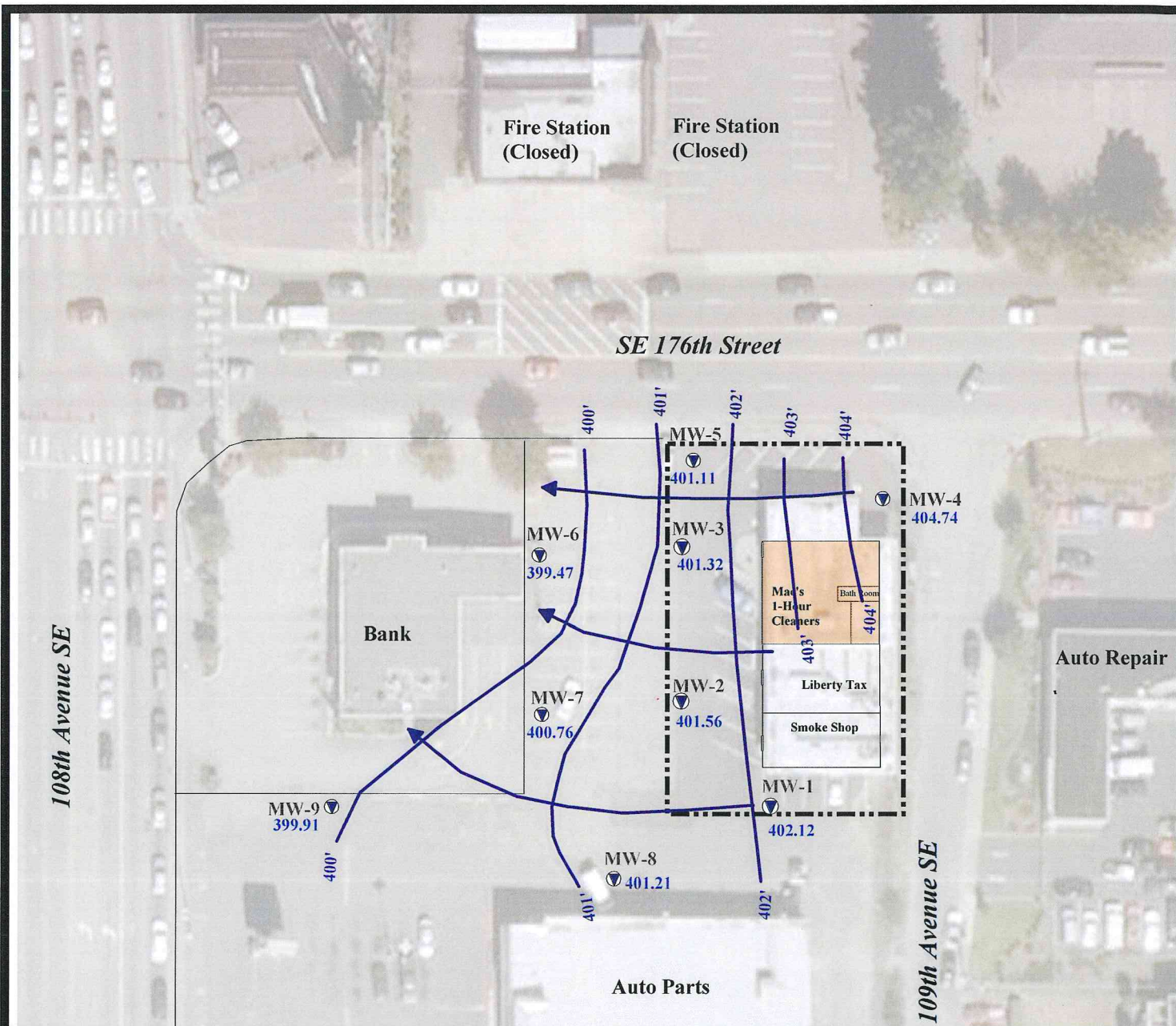
Scale:

1"=80'

Plate:

2





Approximate border of Subject Property



Water Table equal elevation contour lines and inferred groundwater flow direction.



Existing monitoring well locations.



**ENVIRONMENTAL  
ASSOCIATES, INC.**

1380 112th Avenue N.E., Ste. 300  
Bellevue, Washington 98004

## WATER TABLE SURVEY

Mac's One Hour Cleaners  
10825 SE 176th Street  
Renton, Washington

Job Number:

JN-20209-3

Date:

October 2012

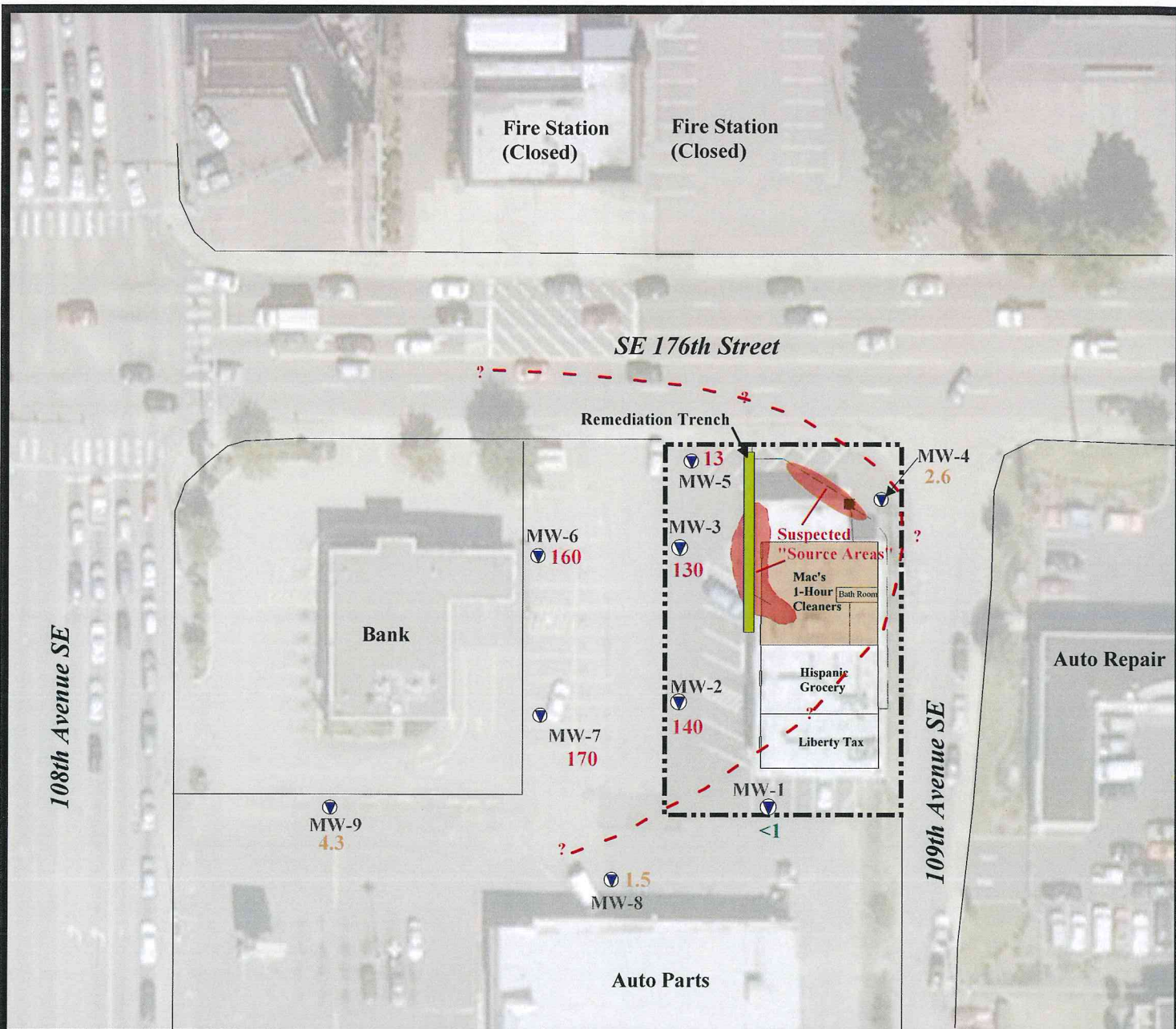
Scale:

1"=80'

Plate:

3





Approximate border of Subject Property



Preliminary conceptualization of chlorinated solvent (PCE) groundwater plume. The WDOE target compliance level for PCE in groundwater is 5 parts per billion (ppb).



Existing monitoring well locations.



## ENVIRONMENTAL ASSOCIATES, INC.

1380 112th Avenue N.E., Ste. 300  
Bellevue, Washington 98004

## PCE IN GROUNDWATER

Mac's One Hour Cleaners  
10825 SE 176th Street  
Renton, Washington

Job Number:

JN-20209-5

Date:

October 2012

Scale:

1"=80'

Plate:

4

## **APPENDIX-A**

### **Laboratory Reports**

210478

## SAMPLE CHAIN OF CUSTODY

NE 10/26/12 V5

Send Report To Environmental Associates, Inc.Company Tri Western Syndicated Inc.Address 10423 Main St, Suite 4City, State, ZIP Bellevue, WA - 98004Phone # (425) 455-9025 Fax # (425) 455-2316SAMPLERS (signature) [Signature]PROJECT NAME/NO. Tri-western / Mac's CleanersPO # N-20209-5

REMARKS

TURNAROUND TIME

☒ Standard (2 Weeks)☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Dispose after 30 days☐ Return samples☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes
						TPH-Diesel	TPH-Gasoline	RTEX by 8021B	VOCs by 8260	SVOCs by 8270	IIFS	
MW-1	01	10/23/12		H <sub>2</sub> O	3				X			
MW-2	02	10/24/12			3				X			
MW-3	03	10/24/12			3				X			
MW-4	04	10/24/12			3				X			
MW-5	05	10/24/12			3				X			
MW-6	06	10/23/12			3				X			
MW-7	07	10/23/12			3				X			
MW-8	08	10/23/12			3				X			
MW-9	09	10/23/12			3				X			
Drum	10	10/24/12		V	3				X			Samples received at 14 °C

Friedman & Bruya, Inc.  
3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

SIGNATURE

Relinquished by: [Signature]Received by: [Signature]

Relinquished to:

Received by: [Signature]

PRINT NAME

Robert Roe

Mike Pucak

Nhan Phan

COMPANY

EAT

Postal Express

Fe B.I

DATE

10/26/12

10/26/12

TIME

1130

1430

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.  
Yelena Aravkina, M.S.  
Bradley T. Benson, B.S.  
Kurt Johnson, B.S.

3012 16th Avenue West  
Seattle, WA 98119-2029  
TEL: (206) 285-8282  
e-mail: fbi@isomedia.com

November 1, 2012

Rob Roe, Project Manager  
Environmental Associates, Inc.  
1380 112th Ave. NE, 300  
Bellevue, WA 98004

Dear Mr. Roe:

Included are the results from the testing of material submitted on October 26, 2012 from the Tri-Western/Mac's Cleaners JN-20209-5, F&BI 210478 project. There are 16 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl  
Project Manager

Enclosures  
EAI1101R.DOC

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### CASE NARRATIVE

This case narrative encompasses samples received on October 26, 2012 by Friedman & Bruya, Inc. from the Environmental Associates Tri-Western/Mac's Cleaners JN-20209-5 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Environmental Associates</u>
210478-01	MW-1
210478-02	MW-2
210478-03	MW-3
210478-04	MW-4
210478-05	MW-5
210478-06	MW-6
210478-07	MW-7
210478-08	MW-8
210478-09	MW-9
210478-10	Drum

Methylene chloride in the 8260C laboratory control sample and laboratory control sample duplicate exceeded the acceptance criteria. The analyte was not detected in the sample, therefore the data were acceptable.

All other quality control requirements were acceptable.



# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW-1	Client: Environmental Associates
Date Received: 10/26/12	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 210478-01
Date Analyzed: 10/29/12	Data File: 102912.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-2	Client:	Environmental Associates
Date Received:	10/26/12	Project:	Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted:	10/29/12	Lab ID:	210478-02
Date Analyzed:	10/29/12	Data File:	102919.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	104	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	140

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-3	Client:	Environmental Associates
Date Received:	10/26/12	Project:	Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted:	10/29/12	Lab ID:	210478-03
Date Analyzed:	10/29/12	Data File:	102921.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	130

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-4	Client:	Environmental Associates
Date Received:	10/26/12	Project:	Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted:	10/29/12	Lab ID:	210478-04
Date Analyzed:	10/29/12	Data File:	102913.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	2.6

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-5	Client:	Environmental Associates
Date Received:	10/26/12	Project:	Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted:	10/29/12	Lab ID:	210478-05
Date Analyzed:	10/29/12	Data File:	102917.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	90
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	13

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-6	Client:	Environmental Associates
Date Received:	10/26/12	Project:	Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted:	10/29/12	Lab ID:	210478-06
Date Analyzed:	10/29/12	Data File:	102918.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	160 ve

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW-6	Client: Environmental Associates
Date Received: 10/26/12	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 210478-06 1/10
Date Analyzed: 10/30/12	Data File: 103009.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<2
Chloroethane	<10
1,1-Dichloroethene	<10
Methylene chloride	<50
trans-1,2-Dichloroethene	<10
1,1-Dichloroethane	<10
cis-1,2-Dichloroethene	<10
1,2-Dichloroethane (EDC)	<10
1,1,1-Trichloroethane	<10
Trichloroethene	<10
Tetrachloroethene	160

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW-7	Client: Environmental Associates
Date Received: 10/26/12	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 210478-07
Date Analyzed: 10/29/12	Data File: 102920.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	1.0
Tetrachloroethene	190 ve



# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW-7	Client: Environmental Associates
Date Received: 10/26/12	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 210478-07 1/10
Date Analyzed: 10/30/12	Data File: 103010.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<2
Chloroethane	<10
1,1-Dichloroethene	<10
Methylene chloride	<50
trans-1,2-Dichloroethene	<10
1,1-Dichloroethane	<10
cis-1,2-Dichloroethene	<10
1,2-Dichloroethane (EDC)	<10
1,1,1-Trichloroethane	<10
Trichloroethene	<10
Tetrachloroethene	170

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW-8	Client: Environmental Associates
Date Received: 10/26/12	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 210478-08
Date Analyzed: 10/29/12	Data File: 102914.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	93	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	1.5

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: MW-9	Client: Environmental Associates
Date Received: 10/26/12	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 210478-09
Date Analyzed: 10/29/12	Data File: 102915.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	4.3

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Drum	Client:	Environmental Associates
Date Received:	10/26/12	Project:	Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted:	10/29/12	Lab ID:	210478-10
Date Analyzed:	10/29/12	Data File:	102916.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	94	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID: Method Blank	Client: Environmental Associates
Date Received: Not Applicable	Project: Tri-Western/Mac's Cleaners JN-20209-5
Date Extracted: 10/29/12	Lab ID: 02-1943 mb
Date Analyzed: 10/29/12	Data File: 102912A.D
Matrix: Water	Instrument: GCMS9
Units: ug/L (ppb)	Operator: VM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	101	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<1
1,1,1-Trichloroethane	<1
Trichloroethene	<1
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/01/12

Date Received: 10/26/12

Project: Tri-Western/Mac's Cleaners JN-20209-5, F&BI 210478

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER  
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 210478-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	50	<0.2	120	73-131
Chloroethane	ug/L (ppb)	50	<1	117	70-127
1,1-Dichloroethene	ug/L (ppb)	50	<1	115	74-123
Methylene chloride	ug/L (ppb)	50	<5	113	62-125
trans-1,2-Dichloroethene	ug/L (ppb)	50	<1	111	74-123
1,1-Dichloroethane	ug/L (ppb)	50	<1	103	82-110
cis-1,2-Dichloroethene	ug/L (ppb)	50	<1	105	75-117
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	98	78-113
1,1,1-Trichloroethane	ug/L (ppb)	50	<1	107	79-117
Trichloroethene	ug/L (ppb)	50	<1	98	78-108
Tetrachloroethene	ug/L (ppb)	50	<1	97	70-115

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	50	120	115	73-132	4
Chloroethane	ug/L (ppb)	50	114	115	72-125	1
1,1-Dichloroethene	ug/L (ppb)	50	112	115	75-119	3
Methylene chloride	ug/L (ppb)	50	113 vo	122 vo	71-112	8
trans-1,2-Dichloroethene	ug/L (ppb)	50	111	107	76-118	4
1,1-Dichloroethane	ug/L (ppb)	50	103	105	82-110	2
cis-1,2-Dichloroethene	ug/L (ppb)	50	105	104	83-110	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	99	98	80-110	1
1,1,1-Trichloroethane	ug/L (ppb)	50	106	107	80-116	1
Trichloroethene	ug/L (ppb)	50	98	97	77-108	1
Tetrachloroethene	ug/L (ppb)	50	101	101	81-109	0

**Data Qualifiers & Definitions**

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 - More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr - The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.