

September 30, 2015

Mr. Ralph Lambert
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

**INTERIM REPORT
OFFSITE SOIL VAPOR INVESTIGATION STATUS
SEPTEMBER 2015
FORMER PROSPERITY CLEANERS/
MARINWOOD PLAZA SHOPPING CENTER
CASE #21S0053
187 MARINWOOD AVENUE
SAN RAFAEL, CA 94903**

Dear Mr. Lambert:

1.0 INTRODUCTION

GEOLOGICA Inc. (GEOLOGICA) is pleased to submit this Report presenting the results of a limited subsurface soil vapor sampling program conducted in September 2015 at the commercial property located at the above referenced location in San Rafael, CA (the “property”). The site location is shown on **Figure 1**. The work completed included collection of soil vapor “grab” samples at six locations on the west side of the Marinwood Plaza Shopping Center. This report describes GEOLOGICA’s field procedures and discusses the results of chemical analysis of the soil vapor “grab” samples collected from the exploratory borings completed in September 2015. This work was conducted to partially address the requirements of the March 2105 Directive Letter from the Regional Water Quality Control Board (RWQCB) for the above referenced site as described below.

2.0 BACKGROUND

The March 20, 2015 Directive Letter from the RWQCB requires Marinwood Plaza to submit two technical reports consisting of a soil vapor investigation work plan and a report documenting the results of this investigation. The March 2015 Directive Letter requires a work plan and report “to delineate the upgradient extent of impacted soil vapor to residential ESLs, toward the residential neighborhood to the southwest of the Site”. GEOLOGICA submitted a Work Plan for soil vapor investigation on April 20, 2015, which was approved by the RWQCB on April 28, 2015. GEOLOGICA subsequently conducted an initial soil vapor investigation in May 2015 that included collecting soil vapor samples from temporary soil vapor probes at six locations along the west side of the Marinwood Plaza Shopping Center. Results of that investigation were presented in a report dated June 23, 2015. Tetrachloroethene (PCE) was reported in four of the six May 2015 sampling locations at concentrations ranging from 24 to 580 micrograms per cubic meter (ug/m^3). The PCE concentration reported in sample SV-26 of 580 ug/m^3 exceeded the December 2013 Residential ESL of 210 ug/m^3 but was below the Commercial / Industrial ESL of 2,100 ug/m^3 . Though sporadic low level detections of aromatic hydrocarbons including benzene, toluene, and m,p xylenes, which are not chemically related to PCE, were reported in several of the samples, no other analytes were detected at concentrations exceeding their respective Residential or Commercial / Industrial ESLs in the May 2015 soil vapor samples. The SV-26 sample was collected in a landscaped area on the west edge of the shopping center parking area approximately 100 feet southwest of the former dry cleaner. Based on these results, GEOLOGICA recommended additional soil vapor sampling to the southwest of the Marinwood Plaza Shopping Center property to further delineate the extent of PCE concentrations greater than the Residential ESL.

In an email dated June 30, 2015, the RWQCB project manager stated that based on the results of the May 2015 soil vapor investigation, additional soil vapor investigation would be needed to meet the requirements of the March 2015 Directive Letter. Consequently, GEOLOGICA developed and executed the field and laboratory testing program described below.

3.0 SCOPE OF WORK COMPLETED

The Scope of Work completed in September 2015 included advancing six temporary soil vapor probes at locations along the west side of Marinwood Avenue as shown on **Figure 1**. After completing the temporary soil vapor probes, one soil vapor sample was collected from each vapor probe for analysis for VOCs by a California-certified analytical laboratory.

4.0 FIELD PROCEDURES

The soil vapor sampling field program was implemented as described below.

4.1 Preliminary Field Activities

Prior to conducting field activities, GEOLOGICA completed the following:

- Permitting & Mobilization Activities – In Marin County, no drilling permits are required for drilling if groundwater will not be encountered. Because the explorations were completed in the sidewalk in unincorporated Marin County, GEOLOGICA obtained an encroachment permit from the Marin County Department of Public works prior to starting fieldwork. GEOLOGICA contracted with a licensed driller, concrete coring contractor, concrete repair contractor, and traffic control contractor and an accredited laboratory; and scheduled field activities.
- Assess Presence of Subsurface Utilities – GEOLOGICA coordinated with appropriate site personnel to arrange site access and mark borehole and sampling locations, reviewed available as-built blueprints and contacted Underground Services Alert (USA) to help establish the approximate location of subsurface utilities within the area to be investigated. GEOLOGICA engaged a private utility locator, J.R. Associates of San Jose, CA to clear each boring location.
- Prepare Site for Drilling – GEOLOGICA engaged TBC Safety-Santa Rosa to provide traffic control signage and barricades to temporarily close the sidewalk during sampling activities. GEOLOGICA engaged Durling Concrete Sawing of Santa Rosa, CA to core 4” diameter holes through the concrete sidewalk slab at each sampling location.

4.2 Drilling and Temporary Vapor Probe Installation Procedures

GEOLOGICA engaged TEG, a California-licensed driller based in Rancho Cordova, CA, to complete temporary soil vapor probes at six locations as shown on **Figure 1**. The vapor probes were completed and sampled on September 4, 2015. TEG advanced 1-1/2-inch diameter soil vapor sampling probe borings to a depth of approximately 5.5 feet below ground surface (bgs) using a truck-mounted Geoprobe drill rig. TEG constructed temporary soil vapor sampling probes in the open boreholes consisting of 0.25-inch diameter stainless steel vapor implants attached to 0.125-inch diameter Teflon tubing. Monterey #30 silica sand (filter pack) was placed in the well annulus from the bottom of each boring to approximately 4.5 feet bgs (6-inches above the top of the vapor implant). Approximately 1-foot of dry bentonite powder was placed above the filter pack followed

by approximately 2.5 feet of hydrated granular bentonite placed from 3.5 feet to 1 foot bgs.

4.3 Soil Vapor Sampling Procedures

Soil vapor samples were collected at depths of approximately 5 ft bgs for comparison to RWQCB ESLs for shallow soil gas for evaluation of potential soil vapor intrusion to indoor air. Sampling procedures were conducted in general accordance with the DTSC 2012 Advisory Soil Gas guidelines. In accordance with DTSC guidance, the soil vapor samples were collected a minimum of two hours after completing the soil vapor probes. Soil vapor “grab” samples were collected by connecting a clean 1-liter stainless steel summa canister to each of the soil gas probes using clean, dedicated Teflon tubing and polyethylene fittings. A clean, dedicated 100 milliliter per minute in-line flow regulator provided by the analytical laboratory was used to regulate the soil gas collection rate. After conducting a physical leak check to verify that all tubing connections are tight, the soil gas probes were purged to remove 7 casing volumes of soil gas prior to sampling. A plastic shroud was placed over each borehole and spiked with 1,1-difluoroethane as a leak check compound. The soil vapor samples were transported under chain of custody protocol to the California-certified analytical laboratory on the day they were collected.

4.4 Boring Closure

After collecting a soil vapor sample from a temporary soil vapor probe, the probe was removed by pulling the plastic casing out of the boring. In accordance with the requirements of the County encroachment permit, GEOLOGICA engaged a concrete repair contractor, Van Midde & Sons of San Rafael, CA, to sawcut and remove the individual concrete sidewalk panels penetrated during drilling. After removing the concrete, the concrete contractor poured fresh concrete to replace the panels damaged during drilling.

4.5 Laboratory Analytical Testing

The six soil vapor samples collected on September 4, 2015 were submitted to Analytical Sciences, a California-certified analytical laboratory, based in Petaluma, CA for analysis for VOCs using EPA Method TO-15.

5.0 FINDINGS

Testing results are tabulated in the attached **Table 1**. A copy of the laboratory testing report is provided in **Attachment A**. **Figure 1** illustrates sampling locations and PCE concentrations detected in each soil vapor sample. Detected PCE concentrations in soil vapor ranged from 130 to 2,300 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). PCE was

detected in 5 of the 6 sampling locations. The related compounds, trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride were not detected in any of the samples. Sporadic low level detections of aromatic hydrocarbons including benzene, toluene, and m,p xylenes, which are not chemically related to PCE, were reported in several of the samples.

6.0 DISCUSSION

The PCE concentrations reported in samples SV-31, SV-32, SV-34 and SV-35 ranging from 310 to 2,300 ug/m³ exceed the December 2013 Residential ESL of 210 ug/m³. The PCE concentration of 2,300 ug/m³ reported in sample SV-31 also exceeds the Commercial / Industrial ESL of 2,100 ug/m³. No other analytes were detected at concentrations exceeding their respective Residential or Commercial / Industrial ESLs in any of the samples.

7.0 RECOMMENDATIONS

Because the southwestern extent of the VOC concentrations in soil vapor exceeding the Residential ESLs has not been defined, we recommend collecting additional grab soil vapor samples southwest of the September 2015 sampling locations to better define the soil vapor VOC plume. We also recommend collecting additional soil vapor samples on the Marinwood Plaza Shopping Center property to assess whether specific utility alignments, e.g., natural gas, storm sewer, or water, may be acting as preferential conduits for VOC migration in soil vapor.

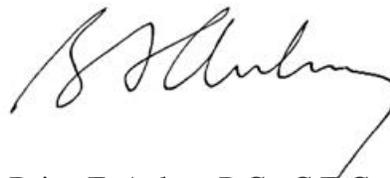
We would be happy to discuss this report at your convenience. Should you have any questions, please don't hesitate to call Dan at (415) 279-2694 or Brian at (415) 722-3629.

Sincerely,

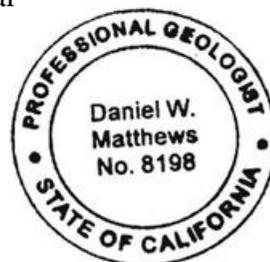
GEOLOGICA INC.



Daniel Matthews, P.G.
Associate Hydrogeologist



Brian F. Aubry, P.G., C.E.G., C.Hg.
Principal



Attachments:

Table 1 – September 2015 Temporary Soil Vapor Probe Sample Chemical Testing
Summary

Figure 1 – Offsite Soil Vapor Sampling Results

Attachment A – Laboratory Testing Report

TABLES

Table 1
Former Prosperity Cleaners / Marinwood Plaza
187 Marinwood Avenue, San Rafael, California

September 2015 Temporary Soil Vapor Probe Sample Chemical Testing Summary

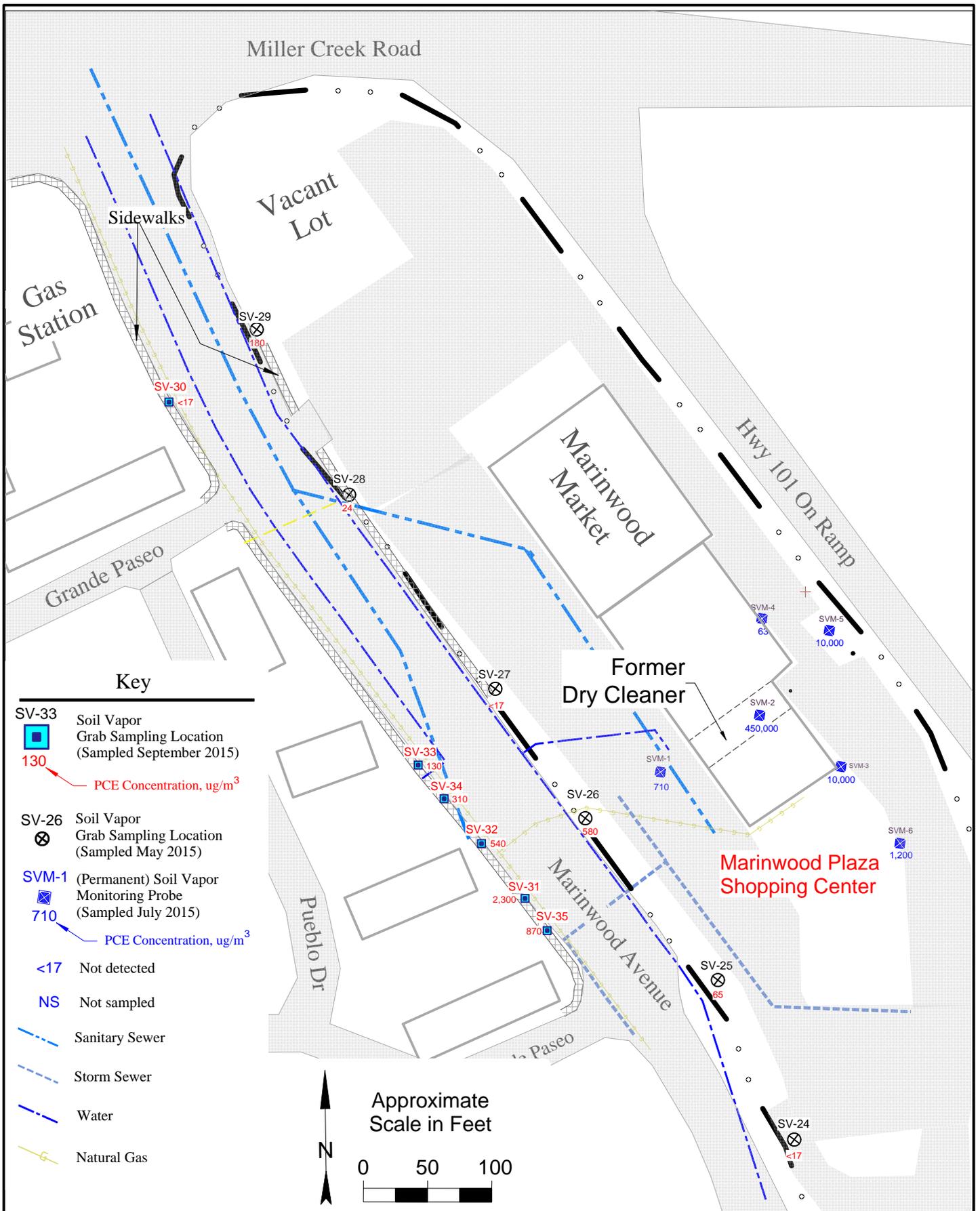
Concentrations in micrograms per cubic meter (ug/m³)

Sample Location	Tetrachloroethene (PCE)	Benzene	m,p-Xylene	Toluene
SV-30	<17	<8	<11	<9.4
SV-31	2,300	<8	<11	9.9
SV-32	540	<16	<22	<19
SV-33	130	8.9	22	28
SV-34	310	14	24	38
SV-35	870	<8	<11	<9.4
Residential Site Cleanup Levels ⁽²⁾	210	42⁽³⁾	52,000^(3,4)	160,000⁽³⁾
Commercial / Industrial Site Cleanup Levels ⁽²⁾	2,100	420⁽³⁾	440,000^(3,4)	1,300,000⁽³⁾

Notes:

- 1) Analysis by EPA Method TO-15, results for analytes detected in at least one sample listed, see laboratory
- 2) California Regional Water Quality Control Board San Francisco Bay Region, Order No. R2-2014-0007, Site
- 3) Cleanup Level not Established in February 2014 Order; Level based on Table E: Screening Levels for Indoor Air and Soil Gas (Vapor Intrusion Concerns); SF RWQCB, Interim Final (Revised December 2013).
- 4) Value for Total Xylenes.
- 5) <24 = Not detected above sample reporting limit.
- 6) **40** = Analyte detected above sample reporting limit.
- 7) **310** Concentration above Cleanup Level for Residential Use.
- 8) **2,300** Concentration above Cleanup Levels for Commercial / Industrial and Residential Use.

FIGURES



ATTACHMENT A
Laboratory Analytical Testing Report



Report Date: September 28, 2015

Laboratory Report

Dan Matthews
Geologica, Inc.
220 4th St. Suite 201
Oakland, CA 94607

Project Name: **Marinwood Cleaners** **Hoyt1.001**
Lab Project Number: **5090412**

This 9 page report of analytical data has been reviewed and approved for release.

Mark A. Valentini, Ph.D.

Laboratory Director



Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Lab#	Sample ID	Compound Name	Result ($\mu\text{g}/\text{m}^3$)	RDL ($\mu\text{g}/\text{m}^3$)										
5090412-01	SV-30	Dichlorodifluoromethane (F-12)	ND	12										
		Chloromethane	ND	5.2										
		Vinyl chloride	ND	6.4										
		Chloroethane (CE)	ND	6.6										
		Trichlorofluoromethane (F-11)	ND	14										
		1,1-Dichloroethene (1,1-DCE)	ND	9.9										
		Trichlorotrifluoroethane (F-113)	ND	19										
		Methylene chloride	ND	8.7										
		trans-1,2-Dichloroethene	ND	9.9										
		1,1-Dichloroethane (1,1-DCA)	ND	10										
		cis-1,2-Dichloroethene (c1,2-DCE)	ND	9.9										
		Chloroform (THM1)	ND	12										
		1,1,1-Trichloroethane (TCA)	ND	14										
		1,2-Dichloroethane (EDC)	ND	10										
		Carbon tetrachloride	ND	9.4										
		Benzene	ND	8.0										
		Trichloroethene (TCE)	ND	13										
		cis-1,3-Dichloropropene	ND	11										
		trans-1,3-Dichloropropene	ND	11										
		Toluene	ND	9.4										
		1,1,2-Trichloroethane	ND	14										
		Dibromochloromethane (THM3)	ND	21										
		Tetrachloroethene (PCE)	ND	17										
		Chlorobenzene	ND	12										
		Ethylbenzene	ND	11										
		m,p-Xylene	ND	11										
		o-Xylene	ND	11										
		1,1,2,2-Tetrachloroethane	ND	17										
		1,3-Dichlorobenzene	ND	15										
		1,4-Dichlorobenzene	ND	15										
		1,2-Dichlorobenzene	ND	15										
		1,2,4-Trichlorobenzene	ND	19										
		Methyl tert-Butyl Ether (MTBE)	ND	9.0										
		Difluoroethane (LEAK CHECK)	ND	54										
		Surrogates	Result ($\mu\text{g}/\text{m}^3$)	% Recovery										
		Dibromofluoromethane	38.1	98										
		4-Bromofluorobenzene	32.5	84										
			Acceptance Range (%)											
			70-130											
			70-130											
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Date Sampled:</td> <td style="width: 25%;">09/04/15</td> <td style="width: 25%;">Date Analyzed:</td> <td style="width: 25%;">09/09/15</td> <td style="width: 20%; text-align: right;">QC Batch: B014988</td> </tr> <tr> <td>Date Received:</td> <td>09/04/15</td> <td>Method:</td> <td>EPA TO-15</td> <td></td> </tr> </table>					Date Sampled:	09/04/15	Date Analyzed:	09/09/15	QC Batch: B014988	Date Received:	09/04/15	Method:	EPA TO-15	
Date Sampled:	09/04/15	Date Analyzed:	09/09/15	QC Batch: B014988										
Date Received:	09/04/15	Method:	EPA TO-15											



Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Lab#	Sample ID	Compound Name	Result ($\mu\text{g}/\text{m}^3$)	RDL ($\mu\text{g}/\text{m}^3$)
5090412-02	SV-33	Dichlorodifluoromethane (F-12)	ND	12
		Chloromethane	ND	5.2
		Vinyl chloride	ND	6.4
		Chloroethane (CE)	ND	6.6
		Trichlorofluoromethane (F-11)	ND	14
		1,1-Dichloroethene (1,1-DCE)	ND	9.9
		Trichlorotrifluoroethane (F-113)	ND	19
		Methylene chloride	ND	8.7
		trans-1,2-Dichloroethene	ND	9.9
		1,1-Dichloroethane (1,1-DCA)	ND	10
		cis-1,2-Dichloroethene (c1,2-DCE)	ND	9.9
		Chloroform (THM1)	ND	12
		1,1,1-Trichloroethane (TCA)	ND	14
		1,2-Dichloroethane (EDC)	ND	10
		Carbon tetrachloride	ND	9.4
		Benzene	8.9	8.0
		Trichloroethene (TCE)	ND	13
		cis-1,3-Dichloropropene	ND	11
		trans-1,3-Dichloropropene	ND	11
		Toluene	28	9.4
		1,1,2-Trichloroethane	ND	14
		Dibromochloromethane (THM3)	ND	21
		Tetrachloroethene (PCE)	130	17
		Chlorobenzene	ND	12
		Ethylbenzene	ND	11
		m,p-Xylene	22	11
		o-Xylene	ND	11
		1,1,2,2-Tetrachloroethane	ND	17
		1,3-Dichlorobenzene	ND	15
		1,4-Dichlorobenzene	ND	15
		1,2-Dichlorobenzene	ND	15
		1,2,4-Trichlorobenzene	ND	19
		Methyl tert-Butyl Ether (MTBE)	ND	9.0
		Difluoroethane (LEAK CHECK)	ND	54

Surrogates	Result ($\mu\text{g}/\text{m}^3$)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	38.8	100	70-130
4-Bromofluorobenzene	35.9	93	70-130

Date Sampled:	09/04/15	Date Analyzed:	09/09/15	QC Batch: B014988
Date Received:	09/04/15	Method:	EPA TO-15	



Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Lab#	Sample ID	Compound Name	Result ($\mu\text{g}/\text{m}^3$)	RDL ($\mu\text{g}/\text{m}^3$)
5090412-03	SV-34	Dichlorodifluoromethane (F-12)	ND	12
		Chloromethane	ND	5.2
		Vinyl chloride	ND	6.4
		Chloroethane (CE)	ND	6.6
		Trichlorofluoromethane (F-11)	ND	14
		1,1-Dichloroethene (1,1-DCE)	ND	9.9
		Trichlorotrifluoroethane (F-113)	ND	19
		Methylene chloride	ND	8.7
		trans-1,2-Dichloroethene	ND	9.9
		1,1-Dichloroethane (1,1-DCA)	ND	10
		cis-1,2-Dichloroethene (c1,2-DCE)	ND	9.9
		Chloroform (THM1)	ND	12
		1,1,1-Trichloroethane (TCA)	ND	14
		1,2-Dichloroethane (EDC)	ND	10
		Carbon tetrachloride	ND	9.4
		Benzene	14	8.0
		Trichloroethene (TCE)	ND	13
		cis-1,3-Dichloropropene	ND	11
		trans-1,3-Dichloropropene	ND	11
		Toluene	38	9.4
		1,1,2-Trichloroethane	ND	14
		Dibromochloromethane (THM3)	ND	21
		Tetrachloroethene (PCE)	310	17
		Chlorobenzene	ND	12
		Ethylbenzene	ND	11
		m,p-Xylene	24	11
		o-Xylene	ND	11
		1,1,2,2-Tetrachloroethane	ND	17
		1,3-Dichlorobenzene	ND	15
		1,4-Dichlorobenzene	ND	15
		1,2-Dichlorobenzene	ND	15
		1,2,4-Trichlorobenzene	ND	19
		Methyl tert-Butyl Ether (MTBE)	ND	9.0
		Difluoroethane (LEAK CHECK)	ND	54

Surrogates	Result ($\mu\text{g}/\text{m}^3$)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	37.2	96	70-130
4-Bromofluorobenzene	34.4	89	70-130

Date Sampled:	09/04/15	Date Analyzed:	09/09/15	QC Batch: B014988
Date Received:	09/04/15	Method:	EPA TO-15	



Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Lab#	Sample ID	Compound Name	Result ($\mu\text{g}/\text{m}^3$)	RDL ($\mu\text{g}/\text{m}^3$)	
5090412-04	SV-32	Dichlorodifluoromethane (F-12)	ND	25	
		Chloromethane	ND	10	
		Vinyl chloride	ND	13	
		Chloroethane (CE)	ND	13	
		Trichlorofluoromethane (F-11)	ND	28	
		1,1-Dichloroethene (1,1-DCE)	ND	20	
		Trichlorotrifluoroethane (F-113)	ND	38	
		Methylene chloride	ND	17	
		trans-1,2-Dichloroethene	ND	20	
		1,1-Dichloroethane (1,1-DCA)	ND	20	
		cis-1,2-Dichloroethene (c1,2-DCE)	ND	20	
		Chloroform (THM1)	ND	24	
		1,1,1-Trichloroethane (TCA)	ND	27	
		1,2-Dichloroethane (EDC)	ND	20	
		Carbon tetrachloride	ND	19	
		Benzene	ND	16	
		Trichloroethene (TCE)	ND	27	
		cis-1,3-Dichloropropene	ND	23	
		trans-1,3-Dichloropropene	ND	23	
		Toluene	ND	19	
		1,1,2-Trichloroethane	ND	27	
		Dibromochloromethane (THM3)	ND	43	
		Tetrachloroethene (PCE)	540	34	
		Chlorobenzene	ND	23	
		Ethylbenzene	ND	22	
		m,p-Xylene	ND	22	
		o-Xylene	ND	22	
		1,1,2,2-Tetrachloroethane	ND	34	
		1,3-Dichlorobenzene	ND	30	
		1,4-Dichlorobenzene	ND	30	
		1,2-Dichlorobenzene	ND	30	
		1,2,4-Trichlorobenzene	ND	37	
		Methyl tert-Butyl Ether (MTBE)	ND	18	
		Difluoroethane (LEAK CHECK)	ND	110	
	Surrogates	Result ($\mu\text{g}/\text{m}^3$)	% Recovery	Acceptance Range (%)	
		Dibromofluoromethane	74.7	96	70-130
		4-Bromofluorobenzene	76.7	99	70-130
Date Sampled: 09/04/15		Date Analyzed: 09/09/15		QC Batch: B014988	
Date Received: 09/04/15		Method: EPA TO-15			



Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Lab#	Sample ID	Compound Name	Result ($\mu\text{g}/\text{m}^3$)	RDL ($\mu\text{g}/\text{m}^3$)
5090412-05	SV-31	Dichlorodifluoromethane (F-12)	ND	12
		Chloromethane	ND	5.2
		Vinyl chloride	ND	6.4
		Chloroethane (CE)	ND	6.6
		Trichlorofluoromethane (F-11)	ND	14
		1,1-Dichloroethene (1,1-DCE)	ND	9.9
		Trichlorotrifluoroethane (F-113)	ND	19
		Methylene chloride	ND	8.7
		trans-1,2-Dichloroethene	ND	9.9
		1,1-Dichloroethane (1,1-DCA)	ND	10
		cis-1,2-Dichloroethene (c1,2-DCE)	ND	9.9
		Chloroform (THM1)	ND	12
		1,1,1-Trichloroethane (TCA)	ND	14
		1,2-Dichloroethane (EDC)	ND	10
		Carbon tetrachloride	ND	9.4
		Benzene	ND	8.0
		Trichloroethene (TCE)	ND	13
		cis-1,3-Dichloropropene	ND	11
		trans-1,3-Dichloropropene	ND	11
		Toluene	9.9	9.4
		1,1,2-Trichloroethane	ND	14
		Dibromochloromethane (THM3)	ND	21
		Tetrachloroethene (PCE)	2300	17
		Chlorobenzene	ND	12
		Ethylbenzene	ND	11
		m,p-Xylene	ND	11
		o-Xylene	ND	11
		1,1,2,2-Tetrachloroethane	ND	17
		1,3-Dichlorobenzene	ND	15
		1,4-Dichlorobenzene	ND	15
		1,2-Dichlorobenzene	ND	15
		1,2,4-Trichlorobenzene	ND	19
		Methyl tert-Butyl Ether (MTBE)	ND	9.0
		Difluoroethane (LEAK CHECK)	ND	54

Surrogates	Result ($\mu\text{g}/\text{m}^3$)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	38.0	98	70-130
4-Bromofluorobenzene	34.8	90	70-130

Date Sampled:	09/04/15	Date Analyzed:	09/09/15	QC Batch: B014988
Date Received:	09/04/15	Method:	EPA TO-15	



Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Lab#	Sample ID	Compound Name	Result ($\mu\text{g}/\text{m}^3$)	RDL ($\mu\text{g}/\text{m}^3$)
5090412-06	SV-35	Dichlorodifluoromethane (F-12)	ND	12
		Chloromethane	ND	5.2
		Vinyl chloride	ND	6.4
		Chloroethane (CE)	ND	6.6
		Trichlorofluoromethane (F-11)	ND	14
		1,1-Dichloroethene (1,1-DCE)	ND	9.9
		Trichlorotrifluoroethane (F-113)	ND	19
		Methylene chloride	ND	8.7
		trans-1,2-Dichloroethene	ND	9.9
		1,1-Dichloroethane (1,1-DCA)	ND	10
		cis-1,2-Dichloroethene (c1,2-DCE)	ND	9.9
		Chloroform (THM1)	ND	12
		1,1,1-Trichloroethane (TCA)	ND	14
		1,2-Dichloroethane (EDC)	ND	10
		Carbon tetrachloride	ND	9.4
		Benzene	ND	8.0
		Trichloroethene (TCE)	ND	13
		cis-1,3-Dichloropropene	ND	11
		trans-1,3-Dichloropropene	ND	11
		Toluene	ND	9.4
		1,1,2-Trichloroethane	ND	14
		Dibromochloromethane (THM3)	ND	21
		Tetrachloroethene (PCE)	870	17
		Chlorobenzene	ND	12
		Ethylbenzene	ND	11
		m,p-Xylene	ND	11
		o-Xylene	ND	11
		1,1,2,2-Tetrachloroethane	ND	17
		1,3-Dichlorobenzene	ND	15
		1,4-Dichlorobenzene	ND	15
		1,2-Dichlorobenzene	ND	15
		1,2,4-Trichlorobenzene	ND	19
		Methyl tert-Butyl Ether (MTBE)	ND	9.0
		Difluoroethane (LEAK CHECK)	ND	54

Surrogates	Result ($\mu\text{g}/\text{m}^3$)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	40.0	103	70-130
4-Bromofluorobenzene	42.7	110	70-130

Date Sampled:	09/04/15	Date Analyzed:	09/09/15	QC Batch: B014988
Date Received:	09/04/15	Method:	EPA TO-15	



Quality Assurance Report

Volatile Hydrocarbons by GC/MS in Air ($\mu\text{g}/\text{m}^3$)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
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Batch B014988 - Air prep GC/MS

Blank (B014988-BLK1)

Prepared: 09/08/15 Analyzed: 09/09/15

Dichlorodifluoromethane (F-12)	ND	12	$\mu\text{g}/\text{m}^3$						
Chloromethane	ND	5.2	$\mu\text{g}/\text{m}^3$						
Vinyl chloride	ND	6.4	$\mu\text{g}/\text{m}^3$						
Chloroethane (CE)	ND	6.6	$\mu\text{g}/\text{m}^3$						
Trichlorofluoromethane (F-11)	ND	14	$\mu\text{g}/\text{m}^3$						
1,1-Dichloroethene (1,1-DCE)	ND	9.9	$\mu\text{g}/\text{m}^3$						
Trichlorotrifluoroethane (F-113)	ND	19	$\mu\text{g}/\text{m}^3$						
Methylene chloride	ND	8.7	$\mu\text{g}/\text{m}^3$						
trans-1,2-Dichloroethene	ND	9.9	$\mu\text{g}/\text{m}^3$						
1,1-Dichloroethane (1,1-DCA)	ND	10	$\mu\text{g}/\text{m}^3$						
cis-1,2-Dichloroethene (c1,2-DCE)	ND	9.9	$\mu\text{g}/\text{m}^3$						
Chloroform (THM1)	ND	12	$\mu\text{g}/\text{m}^3$						
1,1,1-Trichloroethane (TCA)	ND	14	$\mu\text{g}/\text{m}^3$						
1,2-Dichloroethane (EDC)	ND	10	$\mu\text{g}/\text{m}^3$						
Carbon tetrachloride	ND	9.4	$\mu\text{g}/\text{m}^3$						
Benzene	ND	8.0	$\mu\text{g}/\text{m}^3$						
Trichloroethene (TCE)	ND	13	$\mu\text{g}/\text{m}^3$						
cis-1,3-Dichloropropene	ND	11	$\mu\text{g}/\text{m}^3$						
trans-1,3-Dichloropropene	ND	11	$\mu\text{g}/\text{m}^3$						
Toluene	ND	9.4	$\mu\text{g}/\text{m}^3$						
1,1,2-Trichloroethane	ND	14	$\mu\text{g}/\text{m}^3$						
Dibromochloromethane (THM3)	ND	21	$\mu\text{g}/\text{m}^3$						
Tetrachloroethene (PCE)	ND	17	$\mu\text{g}/\text{m}^3$						
Chlorobenzene	ND	12	$\mu\text{g}/\text{m}^3$						
Ethylbenzene	ND	11	$\mu\text{g}/\text{m}^3$						
m,p-Xylene	ND	11	$\mu\text{g}/\text{m}^3$						
o-Xylene	ND	11	$\mu\text{g}/\text{m}^3$						
1,1,2,2-Tetrachloroethane	ND	17	$\mu\text{g}/\text{m}^3$						
1,3-Dichlorobenzene	ND	15	$\mu\text{g}/\text{m}^3$						
1,4-Dichlorobenzene	ND	15	$\mu\text{g}/\text{m}^3$						
1,2-Dichlorobenzene	ND	15	$\mu\text{g}/\text{m}^3$						
1,2,4-Trichlorobenzene	ND	19	$\mu\text{g}/\text{m}^3$						
Methyl tert-Butyl Ether (MTBE)	ND	9.0	$\mu\text{g}/\text{m}^3$						
Difluoroethane (LEAK CHECK)	ND	54	$\mu\text{g}/\text{m}^3$						

Surrogate: Dibromofluoromethane	37.3	$\mu\text{g}/\text{m}^3$	38.9	96	70-130
Surrogate: 4-Bromofluorobenzene	42.7	$\mu\text{g}/\text{m}^3$	38.8	110	70-130



Notes and Definitions

RDL	Reporting Detection Limit
ND	Analyte NOT DETECTED at or above the reporting detection limit (RDL)
RPD	Relative Percent Difference
NR	Not Reported



Analytical Sciences
 P.O. Box 750336, Petaluma, CA 94975-0336
 110 Liberty Street, Petaluma, CA 94952
 (707) 769-3128

CHAIN OF CUSTODY

LAB PROJECT NUMBER: 5090412

CLIENT'S PROJECT NAME: Marinwood

CLIENT'S PROJECT NUMBER: Box 41:001

BILLING INFORMATION

CONTACT: _____
 COMPANY NAME: _____
 ADDRESS: _____
 PHONE#: _____
 FAX #: _____

CLIENT INFORMATION

COMPANY NAME: GEOLOGICA, INC.
 ADDRESS: 220 4TH ST., SUITE 201
OAKLAND, CA 94607
 CONTACT: Dan Matthews
 PHONE#: 415-597-7888
 FAX #: 415-597-7880

TURNAROUND TIME (check one)

MOBILE LAB _____
 SAME DAY _____ 24 HOURS _____
 48 HOURS _____ 72 HOURS _____
 5 DAYS _____ NORMAL

GEOTRACKER EDF: Y N

GLOBAL ID: _____

COOLER TEMPERATURE _____ °C

COC _____

PAGE 1 OF 1

ANALYSIS

ITEM	CLIENT SAMPLE I.D.	Summa Canister Serial #	Regulator Serial #	Sample Start Time	Sample End Time	Date Sampled	Matrix	EPA TO-15	COMMENTS	LAB SAMPLE #
1	SV-30	315	1	10:45	10:55	9-4-15	air	X	1,1-dichloroethane	-01
2	SV-33	303	25	11:05	11:15		"	X	leak check	-02
3	SV-34	140	2	11:20	11:30		"	X	comparison	-03
4	SV-32	305	7	11:35	11:45		"	X		-04
5	SV-31	1010	3	11:45	11:55		"	X		-05
6	SV-35	1002	14	11:56	12:06		"	X		-06
7										
8										
9										
10										

SIGNATURES

RELINQUISHED BY: [Signature]
 SIGNATURE _____
 DATE 9-4-15 TIME 1:46

SAMPLED BY: DJM
 SIGNATURE _____
 DATE 9-4-15 TIME 1:46

RECEIVED BY LABORATORY: [Signature]
 SIGNATURE _____
 DATE 9/4/15 TIME 1345

geologica

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