

Mr. David Brownlee  
Response and Remediation Program  
Georgia Environmental Protection Division  
2 Martin Luther King, Jr. Drive  
Suite 1052 East Tower  
Atlanta, Georgia 30334-9000

**SEMI-ANNUAL PROGRESS REPORT  
CORNERS SHOPPING CENTER (HSI NO. 10326)  
MARIETTA, GEORGIA**

Dear Mr. Brownlee:

August 29, 2016

On behalf of our client, MSC Naples, LLC (MSC), Ramboll Environ US Corporation (Ramboll Environ) is pleased to provide you with this Semi-Annual Progress Report for the Corners Shopping Center site (Corners) located near the intersection of Sandy Plains Road and Post Oak Tritt Road in Marietta, Cobb County, Georgia. This report provides information supplemental to the Voluntary Investigation and Remediation Plan (VIRP) and Application, approved by the Georgia Environmental Protection Division (GA EPD) per their letter dated February 26, 2016.

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**Recent Site Activities**

The site continues to function as a retail shopping center surrounded by an asphalt parking lot. The remainder of the property consists of a single residential parcel to the north-northwest and an undeveloped wooded area to the north (**Figure 1**). As such, the exposure conditions at the site have not changed since the submittal and approval of the VIRP. However, a drinking water well survey was conducted to update a previous water well survey conducted by Law Engineering and Environmental Services, Inc. (Law) in 1997. In addition, a focused soil vapor assessment was conducted to evaluate the current soil vapor conditions at the site. Both the drinking water well survey and the focused soil vapor assessment are summarized below.

***Drinking Water Well Survey***

Groundwater at the site is not used as a drinking water source and there is no evidence of public or private drinking water wells on adjoining properties. According to the Application for Limitation of Liability and Compliance Status Report (MACTEC, 2005; approved by GA EPD in a letter dated August 24, 2005), the properties (both residential and non-residential) within the vicinity of the site are connected to municipal water supplies. Therefore, the ingestion of groundwater pathway is not a complete exposure pathway. In addition, Cobb County has established a municipal ordinance (Cobb County, Georgia – Code of Ordinances;

Part I, Chapter 122, Article II, Division 7, Section 122-221 (b)(8)) that requires the disconnection of private groundwater wells when public water is connected to the premises.

A drinking water well survey was conducted in 1994, and supplemented in 1997, by Law to identify potential human receptors in the downgradient vicinity of the site. The survey identified 27 potential wells within a 1-mile radius of the site. The nearest well identified as a drinking water source was located approximately 0.5 miles northwest of the shopping center. Although this well was reported to be hydrogeologically downgradient of the site, it was noted to be approximately 1,800 feet beyond the then-current, downgradient extent of the plume. This historical drinking water well survey is included in **Appendix A**.

In order to confirm the current presence or absence of groundwater wells in the area, Ramboll Environ performed the following tasks:

- Reviewed the site's historical well survey;
- Obtained a listing of groundwater wells located within 3 miles of the site from the United States Geological Survey (USGS) (included in **Appendix B**);
- Reviewed GA EPD's files of four nearby HSI sites (10519, 10695, and 10790, and 10814) for information pertaining to wells in the area;
- Contacted the GA EPD to identify non-HSI sites within 1 mile of the site and subsequently reviewed the file that was provided;
- Reviewed USGS topographic maps and aerial photography; and,
- Conducted a focused reconnaissance of two potentially downgradient wells.

The results of the well search provided by USGS and the files of the four nearby HSI and one non-HSI sites did not identify any groundwater wells within 1 mile downgradient of the site. A map showing the location of HSI and non-HSI sites within 1 mile of the Corners site, provided by the GA EPD, is included in **Appendix C**; and a map from the non-HSI file showing wells in vicinity of the site is included in **Appendix D**. Regardless, Ramboll Environ attempted to locate the two wells identified in the historical well survey in the general downgradient direction of the site. These wells were reported to be located at 3000 Tara Terrace and 3230 Ebenezer Road, identified as wells 17 and 26 (respectively) in the historical well survey (**Appendix A**). A Ramboll Environ representative attempted to make contact with the property owner at each location. The property on Tara Terrace was visited multiple times, but attempts to contact the resident were unsuccessful. The well formerly located on Ebenezer Road appears to no longer exist, as the area now appears to be a neighborhood of newer construction.

### ***Focused Soil Vapor Assessment***

As discussed in the VIRP, vapor intrusion is considered to be a potentially complete exposure pathway for onsite retail (commercial/industrial) workers and offsite residential receptors at the site. These receptors could inhale airborne, vapor phase contaminants that migrate into buildings from impacted groundwater. Therefore, a focused soil vapor assessment was conducted by Ramboll Environ in February 2015 to evaluate the soil vapor conditions related to the presence of tetrachloroethene (PCE) in groundwater at the site.

Four soil borings were advanced using hand augers for the purpose of installing temporary soil vapor points and subsequently collecting soil vapor samples. The four sampling locations (SV-01 through SV-04) are shown on **Figure 2**. The soil borings at each location were advanced to approximately 3 feet in depth and a soil vapor point was installed. The soil vapor samples were collected as follows:

- The samples were collected via a temporary soil vapor sampling point installed in a borehole advanced to approximately 3 feet below the ground surface using hand augers. Each soil vapor point was constructed of an expendable vapor implant attached to disposable, ¼-inch I.D. tubing. The annulus space around and immediately above the vapor implant was filled with coarse grained, chemically inert, clean, silica (quartz) sand. The remaining annulus space was sealed using bentonite granules and hydrated in 6-inch lifts to the ground surface.
- Each soil vapor point was left in place for at least 1-hour to allow the bentonite to swell and seal the borehole from the surface/ambient air. The soil vapor samples were then collected from the vapor points using laboratory provided, evacuated, clean, 1-Liter stainless steel, Summa® canisters at a flow rate of approximately 15 mL/min. The canister was equipped with a flow controller that was pre-set by the laboratory to correspond to an approximate 60-minute sampling time. The sampling was discontinued when the regulator showed negative pressure to ensure the presence of a residual vacuum.

The Summa® canisters with the soil vapor samples were protected with bubble-wrap, sealed in a heavy-duty cardboard box, and shipped via FedEx overnight service to ALS Environmental in Simi Valley, California, under chain-of-custody protocol for analysis of the following chlorinated volatile organic compounds (CVOCs) using USEPA Method TO-15:

- 1,1-Dichloroethene;
- cis-1,2-Dichloroethene;
- trans-1,2-Dichloroethene;
- PCE;
- Trichloroethene; and,
- Vinyl chloride.

Down-hole tooling was decontaminated between use at each boring location using a Liquinox and potable water solution followed by a potable water rinse. After completing the sampling activities, each borehole was abandoned by removing the soil vapor tubing from the borehole and restoring the ground surface.

#### *Soil Vapor Analytical Results*

The analytical results of the soil vapor sampling are summarized in **Table 1** and the complete laboratory analytical report is provided in **Appendix E**. PCE was detected in three of the four soil vapor samples collected at concentrations ranging from 10 to 150 micrograms per cubic meter (µg/m<sup>3</sup>); PCE was not detected in the sample from the residential property (SV-02). No other CVOCs were detected in the soil vapor samples.

#### *Soil Vapor Intrusion Evaluation*

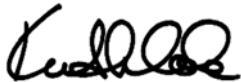
As previously discussed, the site is currently used as a retail shopping center and will remain as such in the future. In addition, a residential development is located downgradient (north) of the site. Therefore, as a conservative measure, site-specific soil gas cleanup goals were calculated for residential exposure to vapors from the groundwater using the United States Environmental Protection Agency's (USEPA) Vapor Intrusion Screening Level (VISL) Calculator (USEPA, 2016).

Residential receptors were assumed to have a body weight of 70 kg as an adult and 15 kg as a child. They are assumed to be at home 24 hours per day, 350 days per year, for 30 years (age adjusted to represent 6 years as a child and 24 years as an adult). To be consistent with the Hazardous Site Response Act (HSRA), the target hazard index (noncarcinogens) was 1 and the target cancer risk was 1E-05. These exposure factors, target hazard index, and target cancer risk were used in VISL Calculator (USEPA, 2016) to calculate the cleanup goals for soil gas that are protective of a resident exposed to vapors in their home. The VISL spreadsheet is provided in **Appendix F** and the generated cleanup goals for soil gas are summarized on **Table 1**.

The maximum detected concentration of the only constituent detected (PCE at 150 ug/m<sup>3</sup>) in the soil gas does not exceed the residential clean up goal (1,400 ug/m<sup>3</sup>). This indicates that exposure of residential and non-residential receptors to indoor vapors associated with the groundwater is not likely to result in adverse health effects.

Please let us know if you have any questions about the information provided in this report, including the attached materials, or any other project-related matter.

Sincerely



**Keith Cole, P.E., CHMM**

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 M +1 404 3542950  
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**Jeff Margolin**

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## Table

**Table 1 - Summary of CVOCs in Soil Gas**  
**Corners Shopping Center**  
**February 2015**

Analyte	Target Soil Gas Concentration (Residential)	Sample Identification			
		SV-01	SV-02	SV-03	SV-04
1,1-Dichloroethene	7,000	<2	<29	<1.7	<2
cis-1,2-Dichloroethene	--	<2	<29	<1.7	<2
trans-1,2-Dichloroethene	--	<2	<29	<1.7	<2
Tetrachloroethene	1,400	150	<29	2.5	10
Trichloroethene	70	<2	<29	<1.7	<2
Vinyl Chloride	56	<2	<29	<1.7	<2

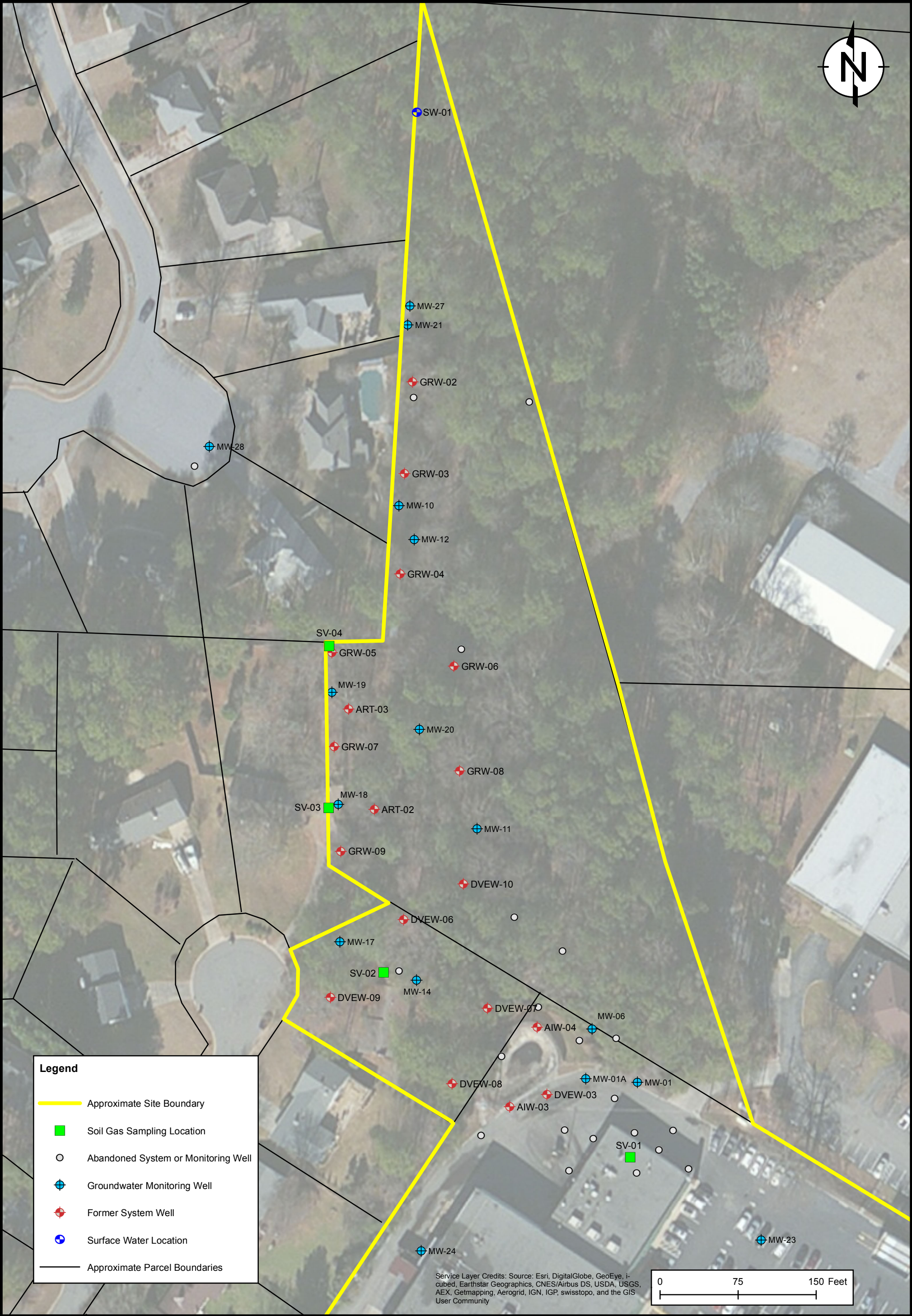
**Notes:**

Samples collected on 2/5/2015

Units in  $\mu\text{g}/\text{m}^3$

## Figures





## **Appendix A**

### **Historical Well Survey**



**LAW**

ENGINEERING AND ENVIRONMENTAL SERVICES

June, 1994

THE CORNERS SHOPPING CENTER  
2731 SANDY PLAINS ROAD  
MARIETTA, GEORGIA 30060

## DRINKING WATER USAGE SURVEY

In conducting our survey we consulted the following sources:

- U.S. Geologic Survey (USGS)
- USGS Information Circular 63  
"Groundwater of the Greater Atlanta Region"
- USGS Topographic Maps: Kennesaw, GA; Mountain Park, GA; Sandy Springs, GA; and Marietta, GA Quadrangles
- Georgia Environmental Protection Division Underground Storage Tank Group (EPD UST)
- Cobb County Health Department
- Cobb County Water & Sewer Department

## PUBLIC DRINKING WATER INTAKES (Three Mile Radius)

The site was plotted on a quadrangle map and compared to the USGS records viewed at the USGS office in Atlanta, Georgia. The records revealed no public supply wells within three miles of the site. Public supply wells are those which service 25 or more people and/or have 15 or more hookups.

A search of the EPD, UST Group's Public Water System Sources List provided no intakes within the three mile radius of the site. The Public Water System Sources List is a list of permitted drinking water supplies in the State of Georgia. EPD regulations state that public drinking water supplies must be permitted and registered with the EPD.

Ms. Tary Kennedy of the Cobb County Water & Sewer Department stated that Cobb County receives its water from the Chattahoochee River and Lake Allatoona, the intake points for which are located outside of the 3 mile radius.

#### **PRIVATE WELLS**

No private intake points were located on USGS records within a 1/2 mile radius of the subject site. Private or domestic wells are not required to be permitted within the State. As such, assessing the actual number of domestic wells in the vicinity of the site is not possible without investigating each individual resident. LAW conducted an automobile reconnaissance of residential property within 1/2 mile of the site and no private or domestic wells were sighted.

Mr. Eddie Osborne of the Cobb County Water and Sewer Department, stated that they do not maintain private well records in Cobb. Such records, if they exist are maintained by the Cobb County Health Department. Mr. Osborne also stated that the County purchases its water from the Marietta Cobb County Water Authority.

Ms. Tary Kennedy, of the Cobb County Water Authority, stated that they do not maintain a list of homes that do not receive water bills.

Mr. Gary Shepard, of the Cobb County Health Department stated that they have limited records of private wells. After reviewing the records, seven wells were identified within the site vicinity.

Through a site reconnaissance and interview, an eighth well was discovered at 2372 Post Oak Tritt Road. The property is owned by Mr. Tony Amitrano. According to him the well is located in a barn behind the house and is used for irrigation and drinking.

In addition to the wells identified, Ms. Lisa Lewis of the GA-EPD had supplied information regarding two potential additional wells located east of the site on Baramore Road, within one-half mile of the site. One of these was formerly located south of Post Oak Tritt Road, however, the house which was served by this well was moved in 1994 prior to construction of a new residential subdivision, and the well destroyed. The second was reportedly located north of Post Oak Tritt Road; however, the current resident indicated there was no well on site and that they

were connected to the municipal water supply. According to another resident of Baramore Road, the entire street is serviced by the municipal water supply. No other well houses were observed in the area.

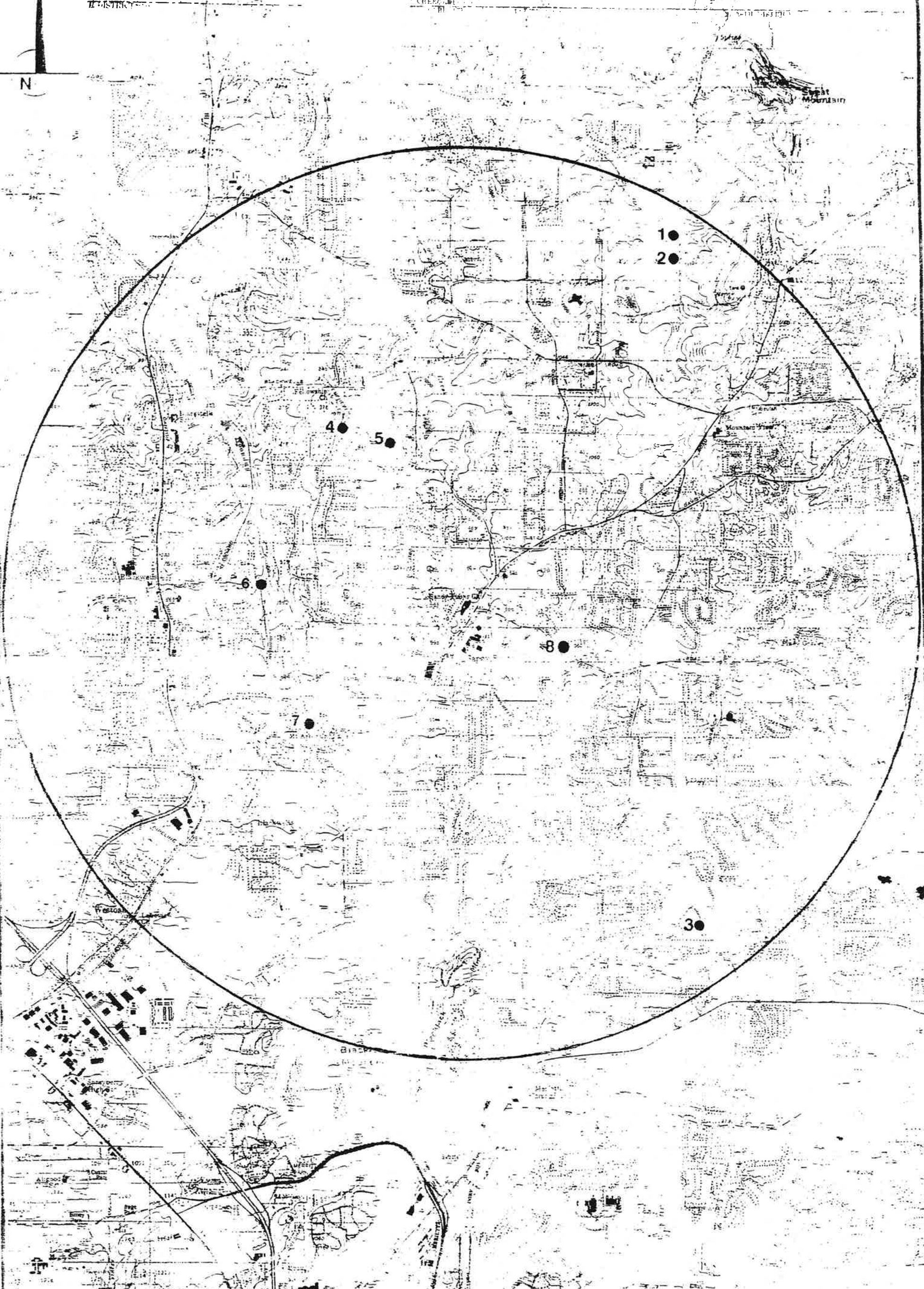
A third potential well was reportedly located on Kinjac Road, southwest of the site. No well houses were observed in this area and the address given as having a well could not be located. The area where this house should have been located was occupied by an office building.

The following table lists the eight wells identified. Their locations relative to the site are shown on the attached plan.

Well ID	USGS ID	Well Owner	Latitude/Longitude	Well Use
1	10GG3	Brad Denman	340309/842804	Domestic
2	10GG4	Brad Denman	330305/842804	Unused
3	10FF1	Richard Ardell	335918/842754	Domestic
4	9GG7	Charles Hutson	340203/843009	Recreation
5	9GG1	E. Barron	340207/843027	Not Listed
6	-	Mark Marshal	340116/843102	Not Listed
7	-	Wallace Carter	340027/843040	Not Listed
8	-	Tony Amitrano	340049/842854	Irrigation/Domesti

## CONCLUSIONS

- No public drinking water intakes were identified within a three mile radius of the site.
- The nearest private drinking water intake was identified approximately 0.7 miles east-southeast of the site.



**Law Engineering**  
Atlanta, Georgia

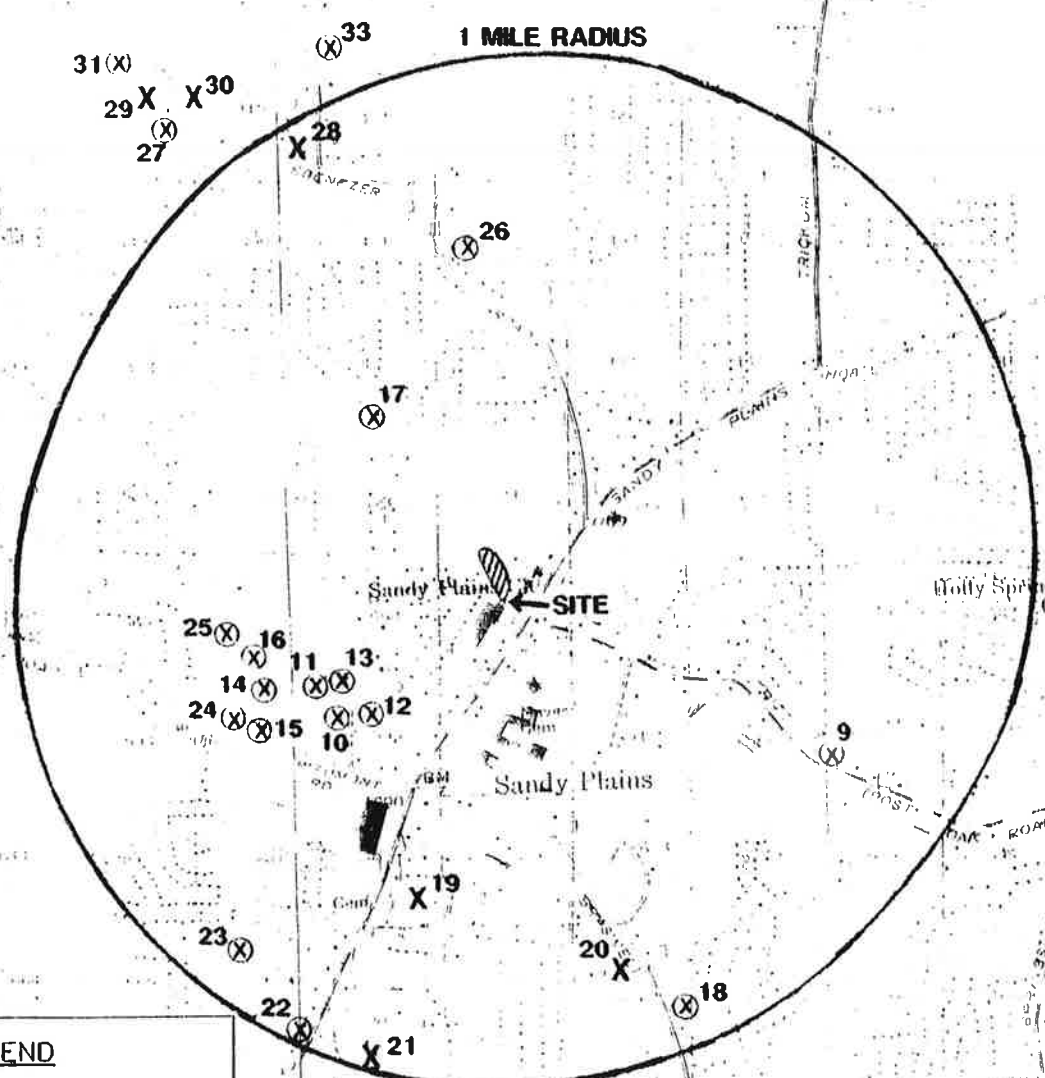
Geotechnical, Materials & Environmental Consultants

CORNER CLEANERS  
METROPOLITAN LIFE INSURANCE COMPANY  
MARIETTA, GEORGIA

JOB NUMBER  
5790677901

SCALE  
1 IN = .6 MI

FIGURE 1  
GROUNDWATER WELL  
LOCATION MAP

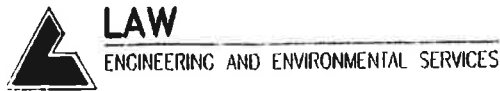


**LEGEND**

- ⊗ CONFIRMED WELL
- X UNCONFIRMED WELL
- CONTAMINANT PLUME



CORNERS SHOPPING CENTER



DOMESTIC WATER WELLS



**LAW**

ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

October 30, 1997

Mr. Steven L. Johnson  
MetLife Real Estate Investments  
477 Perimeter Center East  
Suite 300  
Atlanta, Georgia 30346

**Subject: Addendum to Drinking Water Usage Survey  
The Corners Shopping Center  
Marietta, Georgia  
LAW Project No. 50139-5-6779**

Dear Mr. Johnson:

Law Engineering and Environmental Services, Inc. (LAW) is pleased to submit this Addendum to the Drinking Water Usage Survey previously performed for the subject site. The additional information was obtained is based on a detailed reconnaissance of the site vicinity within an approximate one-mile radius of the site. The results of the survey are presented in the attached table and accompanying Figure.

If you have any questions regarding this addendum, please feel free to contact us.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Stephen R. Foley, P.G.  
Senior Geologist

Charles T. Ferry, P.E.  
Chief Engineer

# Water Supply Wells Within One-Mile Radius of the Site

As of October 1997

Map No.	Well Owner	Street Address	Well Use Distance	Distance From Site (feet)	Confirmation	Longitude/Latitude
9	David Smith	2372 Post Oak Tritt	Domestic/Irrigation	2860	Confirmed	340021/0842913
10	Lyle Hyde	2671 Santelah Street NE	Domestic	2470	Confirmed	340055/0842957
11	Fred Simonton	2681 Santelah Street NE	Unused	2440	Confirmed	340057/0842959
12	Billy Batchelor	2675 Miller Dr. NE	Unused	2360	Confirmed	340052/0842955
13	Hazelene Morris	Miller Lane	Domestic	2110	Confirmed	340056/0842954
14	David P. Gross	1671 Fairview Drive NE	Domestic	2820	Confirmed	340056/0843007
15	James B. Wilson	1710 Fairview Drive NE	Domestic	2740	Confirmed	340053/0843000
16	J. M. Pope	1685 Brown Cir. NE	Domestic	3090	Confirmed	340057/0843003
17	Mr. Anderson	3000 Tara Trace	Domestic	2820	Confirmed	340129/0842950
18	Charles M. Mickery, Jr.	2255 E. Piedmont Road	Domestic	4770	Confirmed	340021/0842913
19	Ronnie D. Swann	1949 Mozzelle Drive NE	Domestic	3830	Unconfirmed	
20	Elmer Lovinggood, Jr.	2316 Pinkney Dr. NE	Domestic	3960	Unconfirmed	340028/0842926
21	Jack E. Watkins	1800 Hill Road, NE	Domestic	5000	Unconfirmed	340020/0842954
22	Danny R. Suttle	1656 Whitlock Road, NE	Domestic	5720	Confirmed	340020/0843012
23	Sally Shigart	1650 Newton Road, NE	Domestic	4500	Confirmed	340032/0843007
24		1675 E. Piedmont	Domestic	5360	Confirmed	340054/0843008
25	Mr. Taylor	2766 Brown Cir.	Domestic	3150	Confirmed	340101/0843008
26	Mr. Koon	3230 Ebenezer	Domestic	3940	Confirmed	340149/0842941
27	Mr. Harmon	3389 Ebenezer	Domestic	5660	Confirmed	310155/0843003
28	Mr. Rice	3390 Ebenezer	Domestic	5870	Unconfirmed	340158/0843010
29	Scott Schlegel	3391 Ebenezer	Domestic	5740	Unconfirmed	340204/0843014
30	Mr. Kimbrow	3392 Ebenezer	Domestic	6050	Unconfirmed	340203/0843012
31		3395 Ebenezer	Domestic	6060	Unconfirmed	340201/0843006
32	Mr. Epps	3580 Ebenezer	Domestic	806	Confirmed	340218/0843026
33		3321 Knight Road	Domestic	6540	Unconfirmed	340156/0842953

## **Appendix B**

### **USGS Listing of Wells**



U.S. Department of the Interior  
U.S. Geological Survey  
South Atlantic Water Center  
1770 Corporate Dr. Suite 500  
Norcross, GA 30093

Phone: (678) 924-6677  
Fax: (678) 924-6710  
<http://www.ga.usgs.gov>  
Total Number of Pages Including Cover Sheet: 2

**To:** Ken Nye

**Date:** 05/23/2016

**Office:** Ramboll Environmental

**From:** Michael Peck

**Email:** [knye@ramboll.com](mailto:knye@ramboll.com)

**Phone:** (678) 924-6677

**Phone** 678 388-1651

**E-mail:** [mfpeck@usgs.gov](mailto:mfpeck@usgs.gov)

**Message:**

Well search results for site located at 340107.2/0842932.7, 0.5, 1 and 3 mile radius. There were no wells found in the USGS NWIS database for this site within 0.5 and 1 mile radius.

The USGS is no longer charging a fee for database searches.

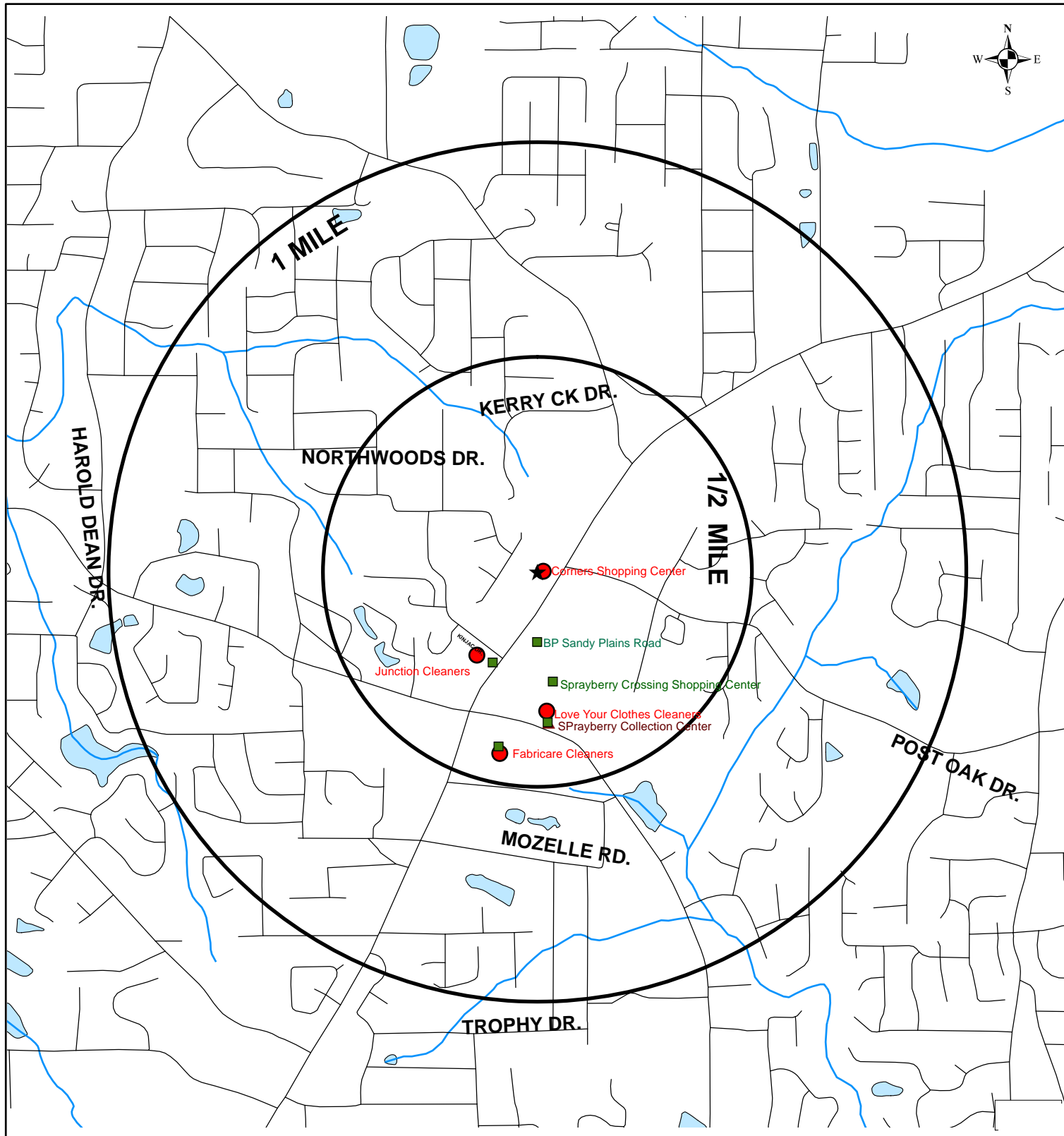
LOCAL WELL NUMBER	LATITUDE (DDMMSS)	LONGITUDE (DDMMSS)	LAT/LONG DATUM (CODE)	ALTITUDE OF LAND SURFACE (FEET)	ALTITUDE DATUM (CODE)	DEPTH OF WELL (FEET)	BOTTOM OF CASING (FEET)	DIAMETER OF CASING (IN)	DATE OF CONSTRUCTION
10FF05	335917	0842807	NAD27	972	NGVD29	603	38	8	12-09-1992
10FF01	335918	0842754	NAD27	1000.00	NGVD29	205	54.00	6.00	05- -1974
10GG11	340024	0842646	NAD27	990.00	NGVD29	452.00	31.50	--	06-30-1993
10GG10	340027	0842650	NAD27	990	NGVD29	577.00	92.00	8	05-06-1993
10GG09	340034	0842651	NAD27	990	NGVD29	422.00	35.00	8	05-11-1993
09GG01	340203	0843009	NAD27	1065.00	NGVD29	104	22.00	6.00	- -1969
09GG07	340207	0843027	NAD27	1080.00	NGVD29	186	90	6	- -1959
10GG04	340305	0842804	NAD27	1055.00	NGVD29	505	11.00	6.00	- -1977
10GG03	340309	0842804	NAD27	1035.00	NGVD29	70.0	50.00	6.00	- -1977

1DATE: 05/26/16 Wells within 3 miles of 340107.2/0842932.7 PAGE 1b

## DATA

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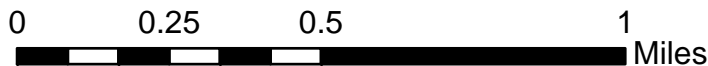
**Appendix C**  
**Map of HSI and non-HSI Sites**  
**within 1 mile of the Site**



- Roads
- State and US Highways
- Interstate Highways
- Rivers/Streams
- Lake/Pond
- Swamp/Marsh
- HSI Site Location**
- NON-HSI Site Location**
- Brownfield Site Location**

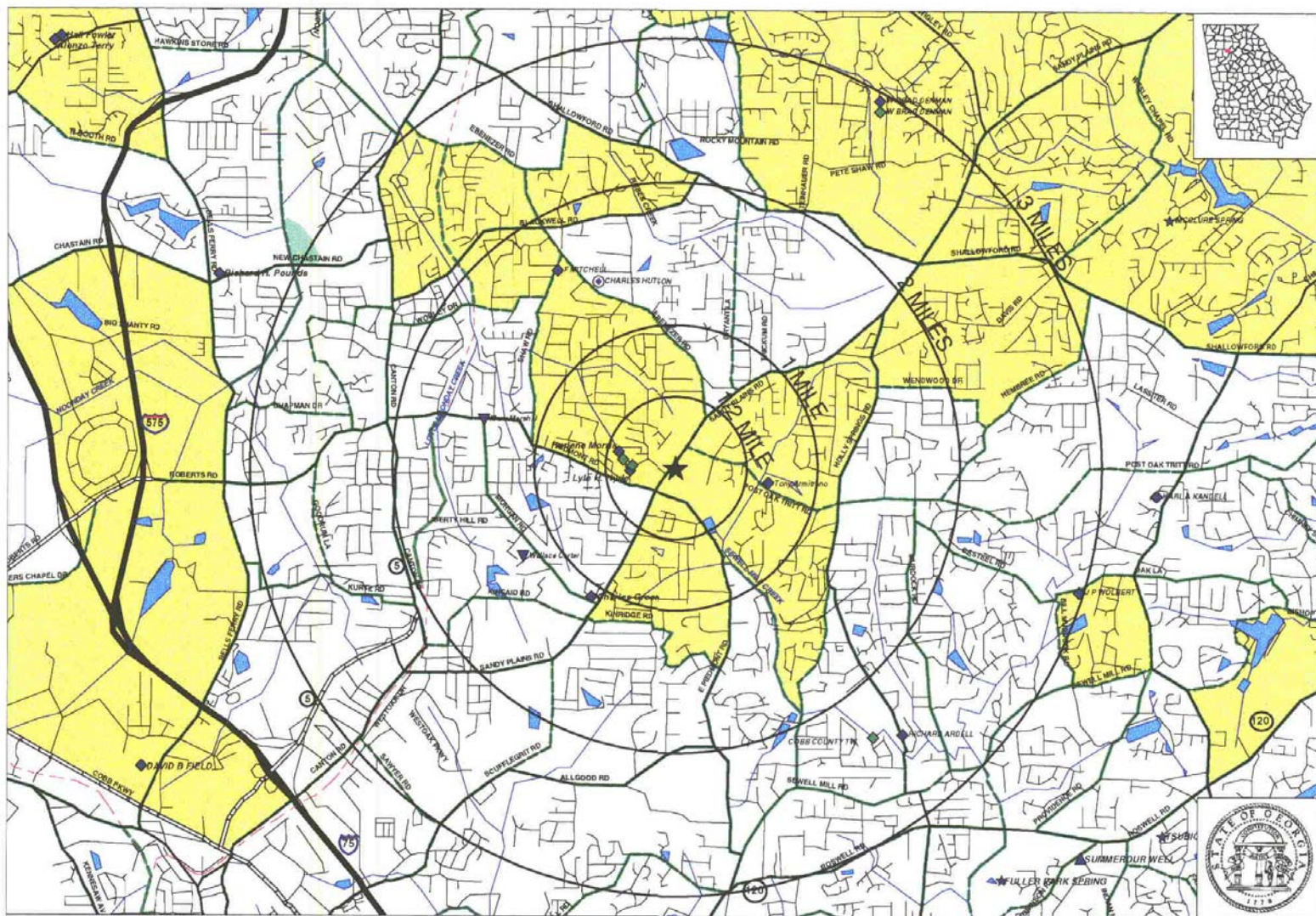
**Corners Shopping Center**  
**2745 Sandy Plains Road**  
**Marietta, Cobb County**  
**1/2, & 1 Mile Radii HSI, NON-HSI**  
**& Brownfield Site Locations**

34 01' 03 84 29' 32"



## **Appendix D**

### **Well Location Map from non-HSI File**



8/5/97

**BP SANDY PLAINS ROAD**  
**2670 SANDY PLAINS ROAD**  
**MARIETTA, COBB COUNTY**  
 1/2, 1, 2, and 3 MILE RADII Well Locations  
 34° 0' 55" LAT / 84° 29' 34.4" LONG

SOURCES: Georgia Public Water Source Inventory, 1994; US Census Bureau 1990; Ga. Water Source Inv., USGS, 1995

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></span> Census Block Group with &gt;zero non-public supply well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Census Block Group served by public water</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Public Supply Well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Surface Water Intake</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Domestic Well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Unused Well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Spring</li> </ul> | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Industrial Well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Commercial Well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Irrigation Well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Livestock well</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Well - Unknown use</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Other Well</li> </ul> | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> County Boundary</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Road</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Major Highway</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Stream/River</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Railroad</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> Wetland</li> </ul> |
|--|---|---|

## **Appendix E**

### **Soil Gas Analytical Results**



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2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
F: +1 805 526 7270  
[www.alsglobal.com](http://www.alsglobal.com)

## LABORATORY REPORT

February 19, 2015

Kenneth Nye  
Environ International Corporation  
1600 Parkwood Circle, Suite 310  
Atlanta, GA 30339

**RE: CSC / 07-35252C**

Dear Kenneth:

Your report number P1500493 has been amended for the samples submitted to our laboratory on February 6, 2015. The report has been revised to report tetrachloroethylene and the degradation products. The entire report has been revised and indicated by the "Revised Page" footer located at the bottom right of each page.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

By Kate Aguilera at 10:29 am, Feb 19, 2015

Kate Aguilera  
Project Manager



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Simi Valley, CA 93065  
T: +1 805 526 7161  
F: +1 805 526 7270  
[www.alsglobal.com](http://www.alsglobal.com)

Client: Environ International Corporation  
Project: CSC / 07-35252C

Service Request No: P1500493

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## CASE NARRATIVE

The samples were received intact under chain of custody on February 6, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### Volatile Organic Compound Analysis

The samples were analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. This method is not included on the laboratory's AIHA-LAP scope of accreditation. Any analytes flagged with an X are not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

The Summa canisters were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	<a href="http://www.aihaaccreditedlabs.org">http://www.aihaaccreditedlabs.org</a>	101661
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0694
DoD ELAP	<a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>	L14-2
Florida DOH (NELAP)	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E871020
Maine DHHS	<a href="http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm">http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm</a>	2014025
Minnesota DOH (NELAP)	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	838341
New Jersey DEP (NELAP)	<a href="http://www.nj.gov/dep/oqa/">http://www.nj.gov/dep/oqa/</a>	CA009
New York DOH (NELAP)	<a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>	11221
Oregon PHD (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	CA200007
Pennsylvania DEP	<a href="http://www.depweb.state.pa.us/labs">http://www.depweb.state.pa.us/labs</a>	68-03307 (Registration)
Texas CEQ (NELAP)	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704413-14-5
Utah DOH (NELAP)	<a href="http://www.health.utah.gov/lab/labimp/certification/index.html">http://www.health.utah.gov/lab/labimp/certification/index.html</a>	CA01627201 4-4
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at [www.alsglobal.com](http://www.alsglobal.com), or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

## ALS ENVIRONMENTAL

### DETAIL SUMMARY REPORT

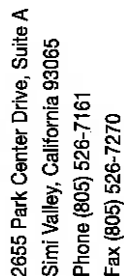
Client: Environ International Corporation  
Project ID: CSC / 07-35252C

Service Request: P1500493

Date Received: 2/6/2015  
Time Received: 09:40

TO-15 - VOC Cans

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	
SV-01 20150205	P1500493-001	Air	2/5/2015	17:28	ISC00855	-1.91	6.00	X
SV-02 20150205	P1500493-002	Air	2/5/2015	17:48	ISC00481	-1.46	4.68	X
SV-03 20150205	P1500493-003	Air	2/5/2015	18:06	ISC01139	0.27	5.48	X
SV-04 20150205	P1500493-004	Air	2/5/2015	18:12	ISC01158	-2.08	5.08	X



## Page 1 of 1

[illegible]

**ALS Environmental**  
**Sample Acceptance Check Form**

Client: Environ International Corporation

Work order: P1500493

Project: CSC / 07-35252C

Sample(s) received on: 2/6/15

Date opened: 2/6/15

by: ADAVID

**Note:** This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1 Were <b>sample containers</b> properly marked with client sample ID?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Container(s) <b>supplied by ALS</b> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Did <b>sample containers</b> arrive in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Were <b>chain-of-custody</b> papers used and filled out?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Did <b>sample container labels</b> and/or tags agree with custody papers?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Was <b>sample volume</b> received adequate for analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Are samples within specified holding times?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9 Was a <b>trip blank</b> received?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10 Were <b>custody seals</b> on outside of cooler/Box?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of seal(s)? _____ Sealing Lid?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were signature and date included?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were seals intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were custody seals on outside of sample container?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Location of seal(s)? _____ Sealing Lid?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were signature and date included?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were seals intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11 Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there a client indication that the submitted samples are <b>pH</b> preserved?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were <b>VOA vials</b> checked for presence/absence of air bubbles?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12 <b>Tubes:</b> Are the tubes capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Do they contain moisture?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13 <b>Badges:</b> Are the badges properly capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are dual bed badges separated and individually capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1500493-001.01	1.0 L Source Can					
P1500493-002.01	1.0 L Source Can					
P1500493-003.01	1.0 L Source Can					
P1500493-004.01	1.0 L Source Can					

Explain any discrepancies: (include lab sample ID numbers): \_\_\_\_\_

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environ International Corporation

**Client Sample ID:** SV-01 20150205

**Client Project ID:** CSC / 07-35252C

ALS Project ID: P1500493

ALS Sample ID: P1500493-001

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Simon Cao

Sample Type: 1.0 L Summa Canister

Test Notes:

Container ID: 1SC00855

Date Collected: 2/5/15

Date Received: 2/6/15

Date Analyzed: 2/13/15

Volume(s) Analyzed: 0.40 Liter(s)

Initial Pressure (psig): -1.91 Final Pressure (psig): 6.00

Canister Dilution Factor: 1.62

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	2.0	ND	0.79	
75-35-4	1,1-Dichloroethene	ND	2.0	ND	0.51	
156-60-5	trans-1,2-Dichloroethene	ND	2.0	ND	0.51	
156-59-2	cis-1,2-Dichloroethene	ND	2.0	ND	0.51	
79-01-6	Trichloroethene	ND	2.0	ND	0.38	
127-18-4	Tetrachloroethene	150	2.0	23	0.30	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environ International Corporation

**Client Sample ID:** SV-02 20150205

**Client Project ID:** CSC / 07-35252C

ALS Project ID: P1500493

ALS Sample ID: P1500493-002

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Simon Cao

Sample Type: 1.0 L Summa Canister

Test Notes:

Container ID: 1SC00481

Date Collected: 2/5/15

Date Received: 2/6/15

Date Analyzed: 2/13/15

Volume(s) Analyzed: 0.025 Liter(s)

Initial Pressure (psig): -1.46 Final Pressure (psig): 4.68

Canister Dilution Factor: 1.46

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	29	ND	11	
75-35-4	1,1-Dichloroethene	ND	29	ND	7.4	
156-60-5	trans-1,2-Dichloroethene	ND	29	ND	7.4	
156-59-2	cis-1,2-Dichloroethene	ND	29	ND	7.4	
79-01-6	Trichloroethene	ND	29	ND	5.4	
127-18-4	Tetrachloroethene	ND	29	ND	4.3	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environ International Corporation

**Client Sample ID:** SV-03 20150205

**Client Project ID:** CSC / 07-35252C

ALS Project ID: P1500493

ALS Sample ID: P1500493-003

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Simon Cao

Sample Type: 1.0 L Summa Canister

Test Notes:

Container ID: 1SC01139

Date Collected: 2/5/15

Date Received: 2/6/15

Date Analyzed: 2/13/15

Volume(s) Analyzed: 0.40 Liter(s)

Initial Pressure (psig): 0.27 Final Pressure (psig): 5.48

Canister Dilution Factor: 1.35

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	1.7	ND	0.66	
75-35-4	1,1-Dichloroethene	ND	1.7	ND	0.43	
156-60-5	trans-1,2-Dichloroethene	ND	1.7	ND	0.43	
156-59-2	cis-1,2-Dichloroethene	ND	1.7	ND	0.43	
79-01-6	Trichloroethene	ND	1.7	ND	0.31	
127-18-4	Tetrachloroethene	2.5	1.7	0.37	0.25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environ International Corporation

**Client Sample ID:** SV-04 20150205

**Client Project ID:** CSC / 07-35252C

ALS Project ID: P1500493

ALS Sample ID: P1500493-004

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Simon Cao

Sample Type: 1.0 L Summa Canister

Test Notes:

Container ID: 1SC01158

Date Collected: 2/5/15

Date Received: 2/6/15

Date Analyzed: 2/13/15

Volume(s) Analyzed: 0.40 Liter(s)

Initial Pressure (psig): -2.08 Final Pressure (psig): 5.08

Canister Dilution Factor: 1.57

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	2.0	ND	0.77	
75-35-4	1,1-Dichloroethene	ND	2.0	ND	0.50	
156-60-5	trans-1,2-Dichloroethene	ND	2.0	ND	0.50	
156-59-2	cis-1,2-Dichloroethene	ND	2.0	ND	0.50	
79-01-6	Trichloroethene	ND	2.0	ND	0.37	
127-18-4	Tetrachloroethene	10	2.0	1.5	0.29	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Environ International Corporation

**Client Sample ID:** Method Blank

**Client Project ID:** CSC / 07-35252C

ALS Project ID: P1500493

ALS Sample ID: P150213-MB

**Test Code:** EPA TO-15

**Instrument ID:** Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

**Analyst:** Simon Cao

**Sample Type:** 1.0 L Summa Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/13/15

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	Data Qualifier
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Environ International Corporation

**Client Sample ID:** Lab Control Sample

**Client Project ID:** CSC / 07-35252C

ALS Project ID: P1500493

ALS Sample ID: P150213-LCS

**Test Code:** EPA TO-15

**Instrument ID:** Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

**Analyst:** Simon Cao

**Sample Type:** 1.0 L Summa Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/13/15

Volume(s) Analyzed: 0.125 Liter(s)

CAS #	Compound	Spike Amount µg/m <sup>3</sup>	Result µg/m <sup>3</sup>	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
75-01-4	Vinyl Chloride	202	172	85	61-127	
75-35-4	1,1-Dichloroethene	214	187	87	70-114	
156-60-5	trans-1,2-Dichloroethene	212	186	88	69-123	
156-59-2	cis-1,2-Dichloroethene	214	169	79	69-119	
79-01-6	Trichloroethene	208	184	88	69-115	
127-18-4	Tetrachloroethene	198	178	90	67-120	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

## **Appendix F**

### **VISL Spreadsheet**

EPA-OLEM VAPOR INTRUSION ASSESSMENT  
Vapor Intrusion Screening Level (VSL) Calculator Version 3.5.1 (May 2016 RSLs)

The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or "near source" soil gas concentrations) fall below screening levels (i.e., VSLs), no further action or study is warranted, so long as the exposure assumptions match those taken into account by the calculations and the site fulfills the conditions and assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk-based screening can help the data review team identify areas, buildings, and/or chemicals that can be eliminated from further assessment. The generic conceptual model underlying these screening levels is described in OSWER Publication 9200.2-154 (OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air) (EPA 2015, Section 6.5)

Parameter	Symbol	Value	Instructions
Exposure Scenario			Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	25	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP<1)	Does chemical have inhalation toxicity data?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? Cvp > Cia.target?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? Cgw > Cia.target?	Target Indoor Air Conc. @ TCR = 10E-06 or THQ = 1 MIN(Cia,c,Cia.nc)	Target Sub-Exterior Soil Gas Conc. @ TCR = 10E-06 or THQ = 1 Csg	Target Ground Water Conc. @ TCR = 10E-06 or THQ = 1 Cgw	Is Target Groundwater Conc. < MCL? Cgw<MCL?	Pure Phase Vapor Conc. @ 25°C Cvp	Maximum Groundwater Vapor Conc. Cgw	Temperature for Max. Groundwater Vapor Conc. Tgw or 25	Lower Explosive Limit** LEL	LEL Source	Inhalation Unit Risk IUR	IUR Source*	Reference Concentration RfC	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 10E-06 Cia.c	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1 Cia.nc
x 75-35-4	Dichloroethylene, 1,1-	Yes	Yes/No	Yes/No	Yes/No	CINC	(ug/m <sup>3</sup> )	(ug/L)	Cgw<MCL?	(ug/m <sup>3</sup> )	(ug/m <sup>3</sup> )	C	(% by vol)	N	(ug/m <sup>3</sup> ) <sup>-1</sup>		(mg/m <sup>3</sup> )		(ug/m <sup>3</sup> )	(ug/m <sup>3</sup> )
x 156-59-2	Dichloroethylene, 1,2-dis-	Yes	Yes	No	Yes	NC	7.0E+03	2.0E+02	No (7)	3.13E+09	2.58E+09	25	6.5	N			2.00E-01	I		2.1E+02
x 156-60-5	Dichloroethylene, 1,2-trans-	Yes	No	No Inhal. Tox. Info	No Inhal. Tox. Info	NC	1.4E+03	5.8E+01	No (5)	1.73E+09	1.73E+09	25	9.7	M						
x 127-18-4	Tetrachloroethylene	Yes	Yes	No Inhal. Tox. Info	Yes	NC	7.0E+01	5.2E+00	No (5)	1.65E+08	1.49E+08	25		N	2.60E-07	I	4.00E-02	I	1.1E+02	4.2E+01
x 79-01-6	Trichloroethylene	Yes	Yes	Yes	Yes	NC	2.1E+00	1.5E+00	Yes (2)	4.88E+08	5.15E+08	25	8	N	see note	I	2.00E-03	I	4.8E+00	2.1E+00
x 75-01-4	Vinyl Chloride	Yes	Yes	Yes	Yes	C	5.0E+01	1.5E+00	Yes (2)	1.00E+10	1.00E+10	25	3.6	N	4.40E-08	I	1.00E-01	I	1.7E+00	1.0E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

**Exposure Scenario**  
Averaging time for carcinogens  
Averaging time for non-carcinogens  
Exposure duration  
Exposure frequency  
Exposure time

(2) **Generic Attenuation Factors:**  
**Source Medium of Vapors**  
Groundwater  
Sub-Slab and Exterior Soil Gas

(3) **Formulas**  
Cia.target = MIN(Cia.c,Cia.nc)  
Cia.c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)  
Cia.nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**  
Trichloroethylene

Mutagenic Chemicals

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

**Mutagenic-mode-of-action (MMOA) adjustment factor** 72 This factor is used in the equations for mutagenic chemicals.

See the Navigation Guide equation for Cia.c for vinyl chloride.

Notation:

N/I = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium  
C = Carcinogenic  
NC = Non-Carcinogenic  
IUR = Inhalation Unit Risk  
IRIS = EPA Integrated Risk Information System (IRIS). Available online at: <http://www.epa.gov/iris/subst/index.html>  
P = PPRTV, EPA Provisional Peer-Reviewed Toxicity Values (PPRTVs). Available online at: <http://hhprrt.cerill.com/pprtv.shtml>  
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: <http://www.atsdr.cdc.gov/mrls/index.html>  
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: <http://www.oehha.ca.gov/risk/chemicalDB/index.asp>  
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: <http://epa-heast.com/epa/heast.shtml>  
S = See RSL User Guide, Section 5  
X = PPRTV Appendix  
E = The Engineering ToolBox. Available online at [http://www.engineeringtoolbox.com/explosive-concentration-limits-d\\_423.html](http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html)  
N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at: <http://www.cdc.gov/niosh/npg/default.html>  
M = Chemical-specific MSDS  
Wt = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation)  
TCE = Trichloroethylene  
Blue highlighting indicates site-specific parameters that may be edited by the user.  
Yellow highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.  
\*\*Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.