Advanced
GeoEnvironmental, Inc.

08 July 2013
AGE Project No. 12-2461

Mr. William Mathews Brooks
Ardenbrook, Inc.
4725 Thornton Avenue
Fremont, California 94536

Subject: **Vapor Mitigation and Remedial Well Installation Work Plan**
SWISS VALLEY CLEANERS
1395 MacArthur Boulevard, San Leandro, California

Dear Mr. Brooks:

At your request, *Advanced* GeoEnvironmental, Inc. has prepared the enclosed *Vapor Mitigation and Remedial Well Installation Work Plan* for the property located at 1395 MacArthur Boulevard, San Leandro, California. The work plan details the installation of ten (10) sub-slab vapor mitigation wells and the installation of a vapor mitigation system at the above referenced site.

If you have any questions or comments, please contact our office at (209) 467-1006.

Sincerely,

***Advanced* GeoEnvironmental, Inc.**

Robert E. Marty
President

Enclosure

837 Shaw Road • Stockton, CA 95215
Telephone (209) 467-1006 • Fax (209) 467-1118

Vapor Mitigation & Remedial Well Installation Work Plan

SWISS VALLEY CLEANERS
1395 MacArthur Boulevard, San Leandro, California

08 July 2013
AGE Project No. 12-2461

PREPARED FOR:

Mr. William Mathews Brooks
ARDENBROOK, INC.

PREPARED BY:

***Advanced* GeoEnvironmental, Inc.**

Stockton • Santa Rosa • Monterey • Brea • Spokane • Reno • Dallas
(800) 511-9300
www.advgeoenv.com

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PROJECT MANAGER:

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President

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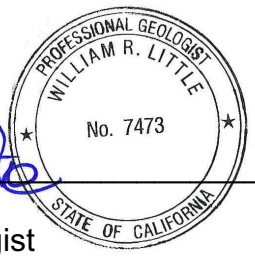


William R. Little
Senior Project Geologist
California Professional Geologist No. 7473

Vapor Mitigation and Remedial Well Installation Work Plan
SWISS VALLEY CLEANERS
1395 MacArthur Boulevard, San Leandro, California

TABLE OF CONTENTS

FIGURES

TABLES

Vapor Mitigation and Remedial Well Installation Work Plan
SWISS VALLEY CLEANERS
1395 MacArthur Boulevard, San Leandro, California

1.0. INTRODUCTION AND SCOPE OF WORK

At your request, *Advanced* GeoEnvironmental, Inc. (AGE) has prepared this *Vapor Mitigation* and *Remediation Well Installation Work Plan* for the property located at 1395 MacArthur Boulevard, San Leandro, California (site). The work plan proposes the installation of ten (10) sub-slab vapor mitigation wells and the installation of a vapor mitigation system to remediate residual chlorinated hydrocarbon impact to soil and the sub-slab soil-vapor at the subject site. The location of the site is illustrated in Figure 1. A plan of the site is illustrated in Figure 2. Historical soil vapor and soil analytical data are included in Tables 1 and 2.

2.0. SCOPE OF WORK & FIELD PROCEDURES

Based on historical soil and soil-vapor samples collected at the site (Tables 1 and 2), AGE proposes to advance and install a total of ten (10) sub-slab vapor mitigation wells, related infrastructure and a vapor mitigation system at the site. The proposed scope of work will include the following tasks:

- Permitting and pre-field work activities;
- Installation of ten (10) sub-slab vapor mitigation wells;
- Installation of above-ground remediation system piping;
- Remedial system permitting (includes electrical and building);
- Installation of sub-slab vapor mitigation equipment;
- Performance of start-up and progress monitoring; and
- Report preparation.

Each of these tasks is described in greater detail below.

2.1. PERMITTING AND PRE-FIELD WORK ACTIVITIES

Applicable boring permits will be obtained from the Alameda County Public Work Agency. Site permits will be obtained from the City of San Leandro (i.e., electrical, building, etc.) and an air discharge permit from the Bay Area Air Quality Management District (BAAQMD). In addition, an update to the health and safety plan presently on-file will be prepared in accordance with *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (National Institute for Occupational Safety and Health Administration, U.S.

Coast Guard and U.S. Environmental Protection Agency, 1985). Prior to mobilization, all underground areas will be clearly marked and a utility clearance obtained through Underground Service Alert.

2.2. INSTALLATION OF VAPOR MITIGATION WELLS

Based on tetrachloroethene (PCE) chlorinated hydrocarbon impact to soil and soil-vapor collected during historical investigations, a total of ten (10) vapor mitigation wells are proposed for installation surrounding the former/current location of the dry cleaning unit at the site. The locations of the proposed vapor mitigation wells are illustrated in Figure 2. Procedures for the installation of the remediation wells are described below in Section 3.1.

2.3. INSTALLATION OF SVE/IAS SYSTEM PIPING

One-inch diameter, schedule 80 PVC piping will be installed aboveground vertically to the building's ceiling and then to the proposed vapor mitigation system. The system is proposed to be located out of public/tenant interference in the rear of the facility.

2.4. PROPOSED VAPOR MITIGATION REMEDIATION SYSTEM

The proposed vapor mitigation unit will consist of a condensation separator, a vacuum blower, a minimum of three virgin coconut carbon canisters (400 pounds each) and control components. One-inch diameter piping installed from the well-heads will be routed to the inlet of the condensation separator and then to the vacuum blower. The outlet from the vacuum blower will be routed through the three carbon vessels prior to release to the atmospheric air.

Induced vacuum will be measured utilizing a Magnehelic® vacuum gauge attached to the inlet of the blower; SVE vapor flow will be monitored using a Dwyer® DS-200 flow sensor. Sampling ports will be installed upstream of the vacuum blower inlet to recover influent vapor flow vapor stream samples, and downstream of the third carbon unit to recover effluent vapor flow samples and to monitor the efficiency of chlorinated hydrocarbon destruction.

The proposed location of the vapor mitigation system and fenced enclosure is in the rear of the building. The selected location should not interfere with current businesses, delivery vehicles and other business. The SVE unit will be secured by a chain-linked, barbed-wire, gated enclosure approximately 15 feet wide, 15 feet long and 8 feet high. Electricity is readily available to the site.

2.5. REMEDIATION START-UP PERIOD

In order to monitor chlorinated hydrocarbon destruction efficiency during the vapor mitigation start-up period (first week of operation), influent and effluent vapor samples will be collected on a daily basis and submitted to a State of California Department of Public Health (CDPH)-certified laboratory for analysis of volatile organic compounds (VOC's) by EPA method 8260B.

Vapor mitigation operational parameters including vapor concentrations, vapor flow and vacuum will be monitored on a daily basis to gauge the optimal destruction rate of recovered chlorinated hydrocarbon vapors.

2.6. COMPLIANCE/PROGRESS SAMPLING & MONITORING AND MAINTENANCE

Following the initial start-up period, influent and effluent vapor samples will be collected on a monthly basis and submitted to a CDPH-certified laboratory for analysis for VOC's. Laboratory report for vapor sample analyses, testing methods, laboratory quality assurance/quality control (QA/QC) reports and sample chain of custody documentation will be presented in quarterly reports. Additionally, the mitigation system will be maintained on a weekly basis according to manufacturer's recommendations.

2.7. REPORT PREPARATION

Quarterly reports will be prepared presenting the findings from vapor mitigation activities. The quarterly reports will include a description of work performed and the results of the influent and effluent vapor samples. Conclusions and recommendations will also be included in the reports, if applicable. The report will be in a format acceptable to regulating agencies and will be reviewed and signed by a California Professional Geologist

3.0. FIELD PROCEDURES

All field procedures will be overseen by an AGE representative under the supervision of a California registered Professional Geologist. Procedures for installation, start-up, and operation of the proposed vapor mitigation system are detailed below.

3.1. INSTALLATION OF VAPOR MITIGATION WELLS

A total of ten (10) vapor mitigation wells will be installed at the site. Wells will be advanced

by an AGE representative within the subject building using a 4-inch hand auger and extensions. All borings will be advanced to a termination depth of nine (9) feet below surface grade (bsg).

Once the proposed depth is reached 1-inch diameter, Schedule 40 PVC, 0.020-inch slotted well screen and blank casing will be installed from near surface grade to seven (7) feet bsg; well screen will be installed from two (2) feet bsg to seven (7) feet bsg, while blank casing will be installed from near surface grade to two (2) feet bsg.

The well casings, filter pack and sealing materials will be placed into the boreholes from surface. After installing the well casings, filter pack material consisting of pre-washed #2/12 sand will be added to the remaining annular space from the bottom of the borehole to the top of the screening interval (2 feet bsg).

The remaining annular space will be sealed with bentonite in either chip or crumble form and a thin concrete seal at the surface grade. The seal combination will allow for easy removal/destruction of the wells and prevent any surface intrusions. Once installed the bentonite will be hydrated using a sufficient volume of water. An as-built well diagram is illustrated as Figures 3.

3.2. PIPING NETWORK INSTALLATION

A network of one-inch diameter, schedule 40 PVC piping will be installed above ground and conveyed vertically to the ceiling of the building from each of the proposed vapor mitigation wells. The PVC piping will be routed from each valved well head to a one-inch PVC pipe manifold and then to the proposed vapor mitigation system. A PVC ball valve will be installed at each well head so that air flow can be controlled independently and monitored with a flow meter and pressure gauge.

3.3. VAPOR MITIGATION SYSTEM DESIGN

The vapor mitigation system will consist of a condensation separator, a vacuum blower and three 400 pound virgin coconut carbon filtration vessels. The system should be able to extract soil-vapor between 50 and 100 cubic feet per minute (cfm). The system will be connected through a manifold to each mitigation well; chlorinated hydrocarbon vapors extracted from these wells will be sequentially routed through a condensation entrapment chamber and a vacuum blower before entering three, vapor phase carbon scrubbers for final destruction.

Induced vacuum measurements will be collected utilizing a Magnehelic® vacuum gauge

attached near the inlet of the blower; influent vapor flow will be monitored using a Dwyer® DS-200 flow sensor. Following the start-up period, the vapor flow along the influent and effluent lines will be monitored weekly for the presence of organic vapor using an OVM equipped with a PID. Sampling ports will be installed upstream of the vacuum blower inlet to recover influent vapor stream samples and downstream of the three 400-pound carbon vessels to collect effluent/compliance vapor samples.

3.4. VAPOR MITIGATION MONITORING

During the start-up period for the SVE system, soil-vapor samples will be collected and operational parameters will be monitored on a daily basis. The anticipated start-up period will be approximately one week.

Following the start-up period, the vapor extraction system will be monitored weekly using a PID and Dwyer® DS-200 flow sensor to ensure optimal destruction of recovered vapors and to monitor cleanup progress. The PID readings will be taken and recorded from the influent end of the vacuum blower unit and the effluent end of the third 400-pound carbon vessel. Operational parameters (air flow, air vacuum and volume of processed vapor) will be measured on a weekly basis to monitor and record soil-vapor volumes extracted and operational efficiency.

Vapor samples will be collected on a monthly basis from the influent and effluent end of the vapor extraction system utilizing an electric vacuum pump. The samples will be collected into Tedlar® bags and transported under chain of custody to a CDPH-certified laboratory and analyzed for VOC's.

4.0. REPORT PREPARATION

Quarterly remediation reports will be prepared presenting the findings from vapor mitigation remedial activities. Additionally, a supplemental report will be prepared summarizing the findings of the above additional remediation well installations. Reports will include a description of work performed and the results of the soil vapor and soil sampling analysis. Conclusions and recommendations will also be included in the reports, if applicable. Reports will be in a format acceptable to regulatory guidelines, and will be reviewed and signed by a California Professional Geologist.

FIGURES

N

SCALE
0 2000 4000
FEET

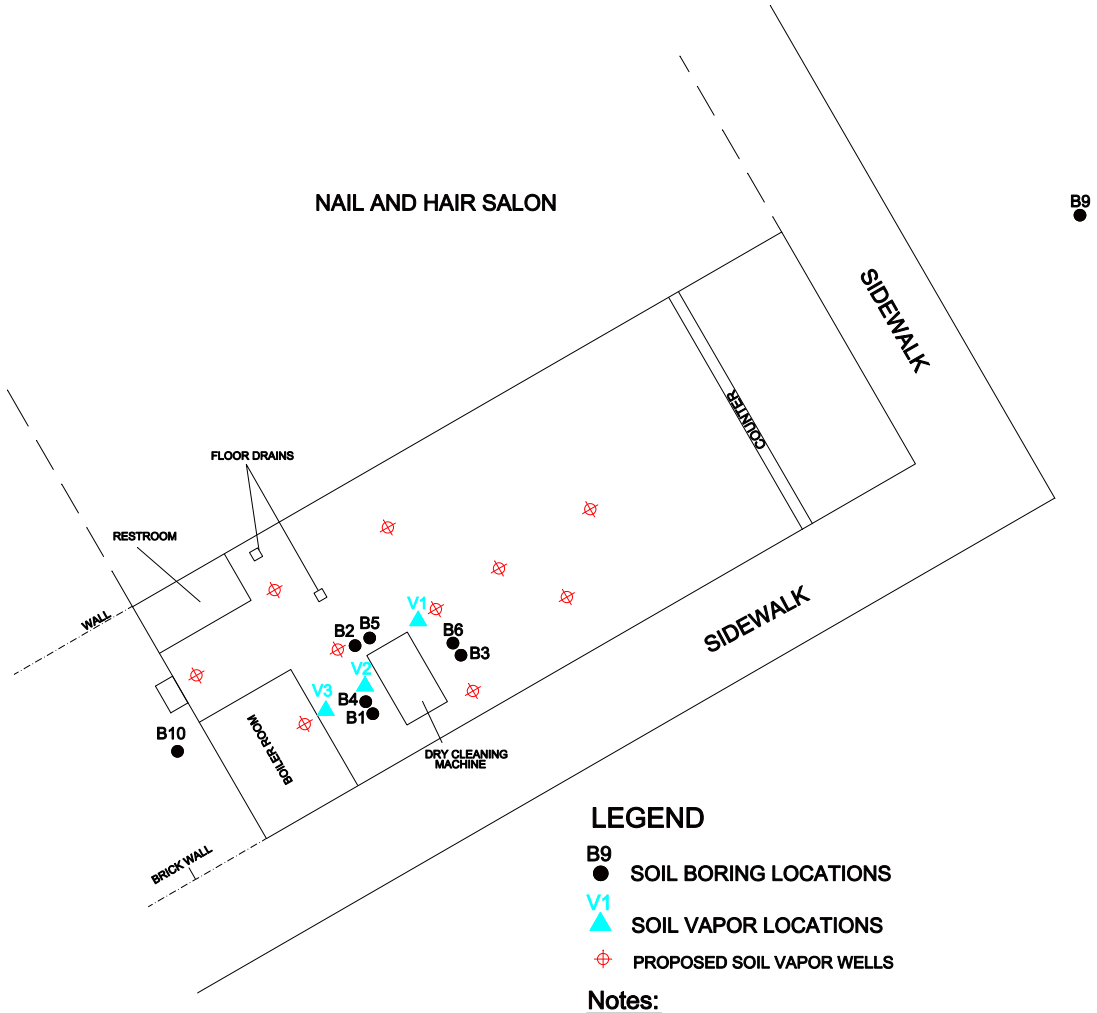
SAN LEANDRO QUADRANGLE, CALIFORNIA
7.5 MINUTE SERIES (U.S. GEOLOGICAL SURVEY)

LOCATION MAP

SWISS VALLEY CLEANERS
1395 MacArthur Boulevard
SAN LEANDRO, CALIFORNIA

Advanced GeoEnvironmental, Inc.
www.advgeoenv.com

PROJECT NO. AGE-NC-12-2461	FILE: LOCATION	FIGURE: 1
DATE: 21 MAY, 2013	DRAWN BY: MAC	



LEGEND

B9 ● SOIL BORING LOCATIONS

V1 ▲ SOIL VAPOR LOCATIONS

⊕ PROPOSED SOIL VAPOR WELLS

Notes:

Borings B1 through B3 advanced by Hageman-Aguiar in August 1998
Borings B4 through B6 advanced by Stellar Environmental Solutions in April 2005

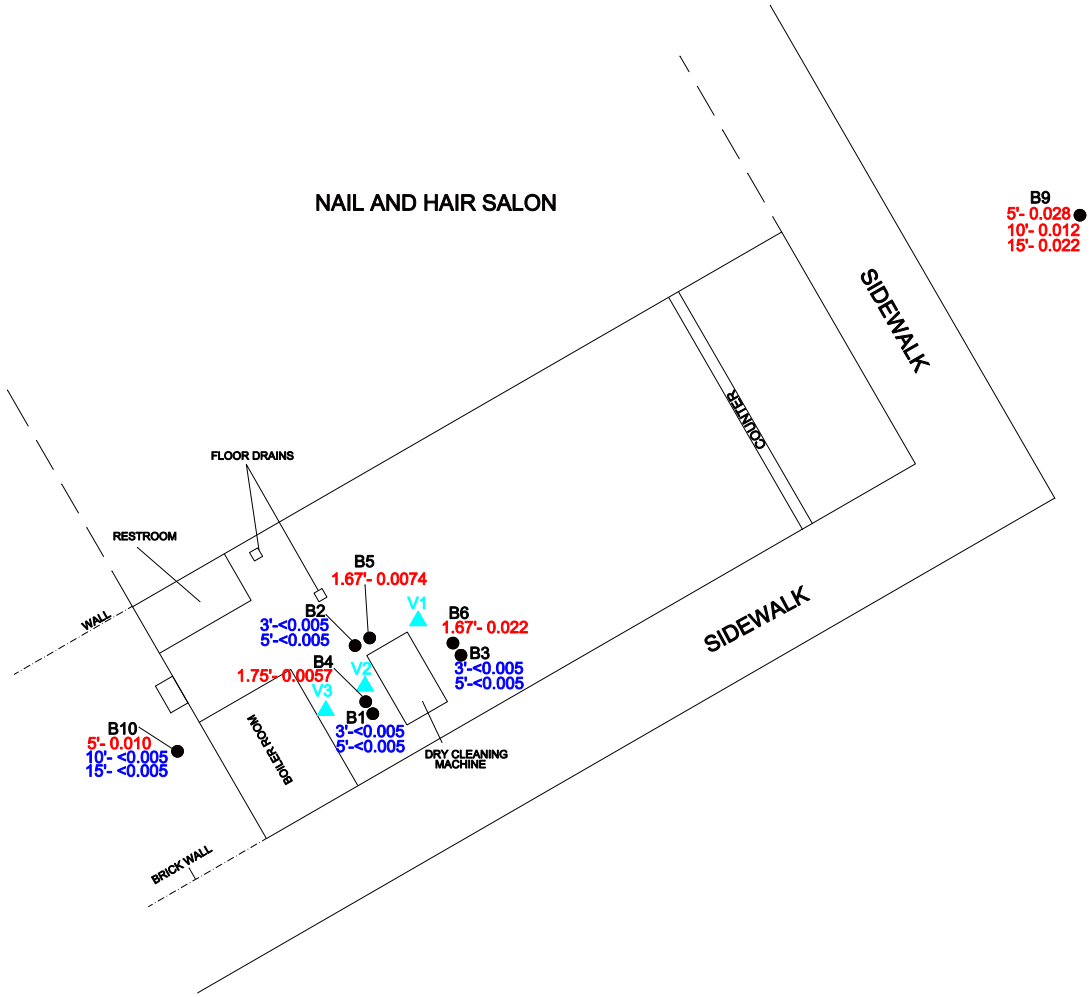
N

SCALE
0 15 30
FEET

SITE PLAN
SWISS VALLEY CLEANERS
1395 MacArthur Boulevard
SAN LEANDRO, CALIFORNIA

Advanced GeoEnvironmental, Inc.
www.advgeoenv.com

PROJECT NO. AGE-12-2461	FILE:	FIGURE:
DATE: JUNE 2013	DRAWN BY: MAC	2



LEGEND

B9
5'- 0.010
10'- <0.005
SOIL BORING LOCATION, DEPTH AND PCE CONCENTRATION (mg/kg)

V1
SOIL VAPOR LOCATIONS

Notes:

Borings B1 through B3 advanced by Hageman-Aguiar in August 1998
Borings B4 through B6 advanced by Stellar Environmental Solutions in April 2005
PCE: Tetrachloroethene
mg/kg: milligrams per kilogram

N

SCALE
0 15 30
FEET

ADSORBED PCE
SWISS VALLEY CLEANERS
1395 MacArthur Boulevard
SAN LEANDRO, CALIFORNIA

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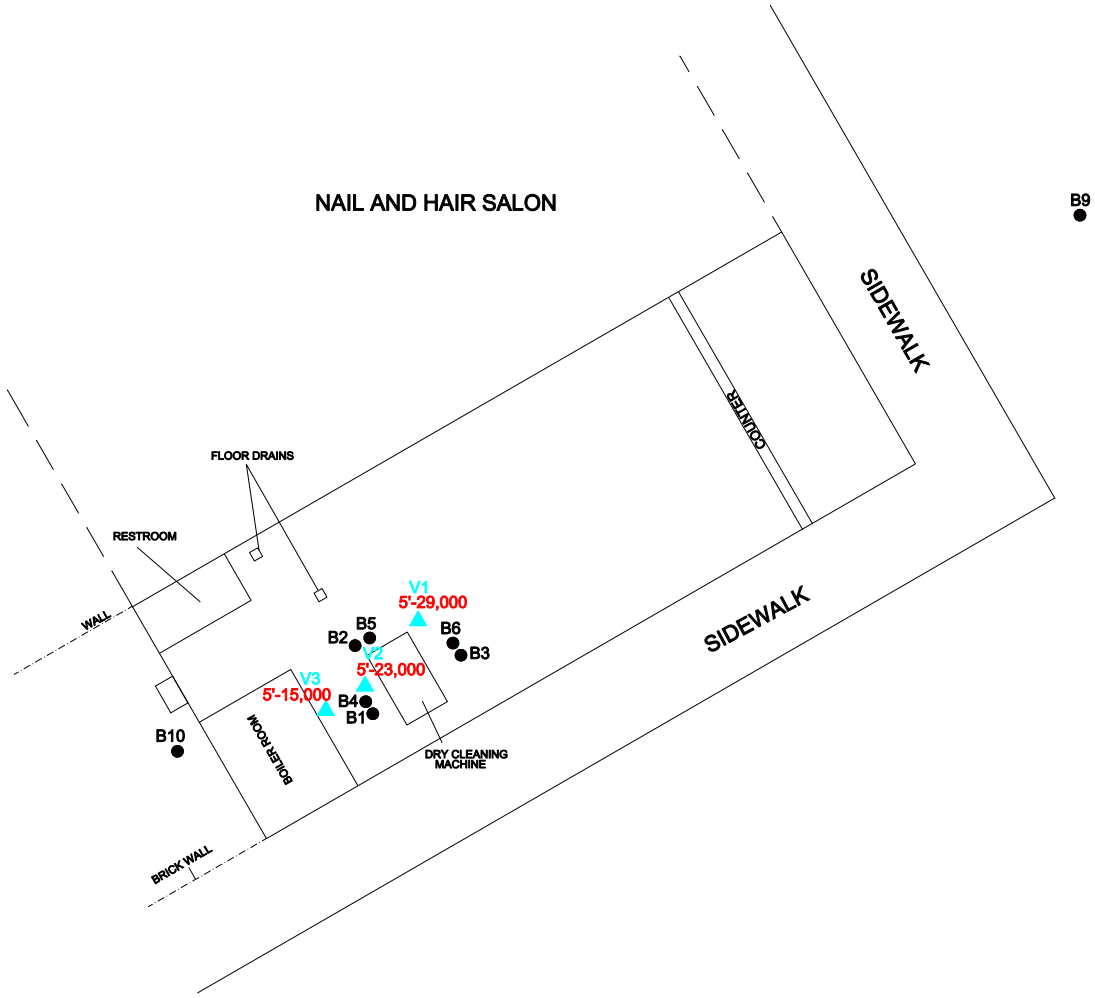
PROJECT NO. AGE-12-2461	FILE:	FIGURE:
DATE: MAY 2013	DRAWN BY: MAC	3



LEGEND

B9 ● SOIL BORING LOCATIONS

V1 5'-15,000 ▲ SOIL VAPOR LOCATIONS, DEPTH AND PCE CONCENTRATION (ug/m3)

Notes:

Borings B1 through B3 advanced by Hageman-Aguiar in August 1998
Borings B4 through B6 advanced by Stellar Environmental Solutions in April 2005
PCE: Tetrachloroethene
ug/m3: micrograms per cubic meter

N

SCALE
0 15 30
FEET

PCE VAPOR CONCENTRATION MAP

SWISS VALLEY CLEANERS
1395 MacArthur Boulevard
SAN LEANDRO, CALIFORNIA

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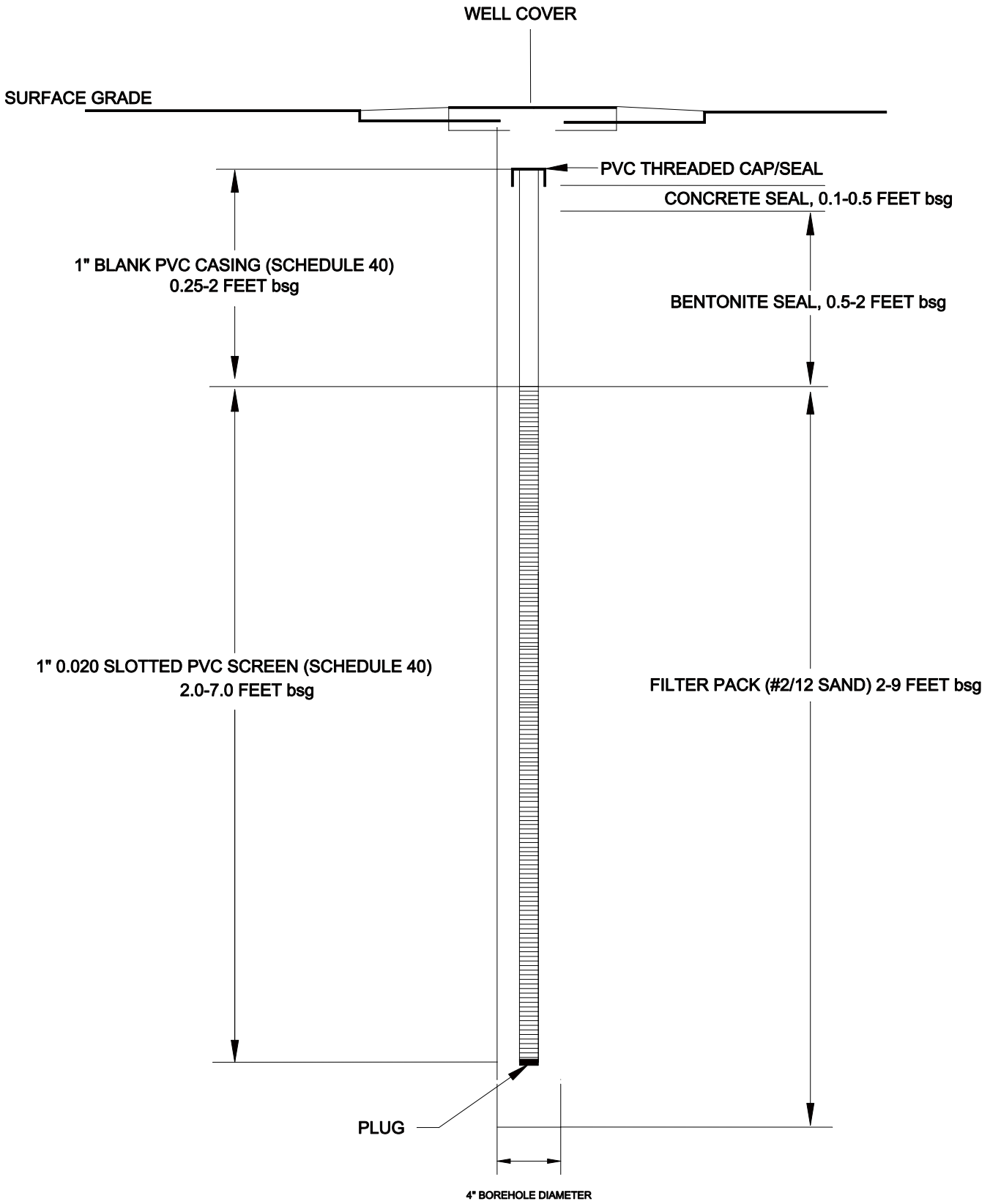
PROJECT NO. AGE-12-2461	FILE:	FIGURE:
DATE: JUNE 2013	DRAWN BY: MAC	4



ALL DEPTHS RELATIVE TO SURFACE GRADE
NOT TO SCALE

PROPOSED SOIL VAPOR WELL

SWISS VALLEY CLEANERS
1395 MacArthur Boulevard
SAN LEANDRO, CALIFORNIA

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PROJECT NO. AGE-03-1117	FILE: ESL	FIGURE: 5
DATE: JUNE 2013	DRAWN BY: MAC	

TABLES

TABLE 1

ANALYTICAL RESULTS OF SOIL VAPOR SAMPLES
Swiss Valley Cleaners
1395 MacArthur Boulevard, San Leandro, California
(micrograms per cubic meter)

Sample ID	Date	Depth (feet bsg)	EPA Method 8260B					
			PCE	TCE	1,1-DCE	Trans 1,2-DCE	Cis 1,2-DCE	VC
V-1	05-08-2013	5	**29,000**	<2	<2	<2	<2	<2
V-2	05-08-2013	5	**23,000**	<2	<2	<2	<2	<2
V-3	05-08-2013	5	**15,000**	<2	<2	<2	<2	<2
CHHSLs (Residential)			180	528	1,500	31,900	44,400	13.3
SFBRWCB ESL Shallow Soil Gas (Commercial)			1,400	4,100	5,100	41,000	20,000	100
SFBRWCB ESL Shallow Soil Gas (Residential)			410	1,200	1,500	15,000	7,300	31

Notes:
SFBRWCB ESL: San Francisco Bay Regional Water Quality Control Board Environmental Screening Level for shallow soil gas
<: Indicates constituents were not detected at a concentration greater than the reporting limit shown.
CHHSLs: California Human Health Screening Levels
PCE: Tetrachloroethene
TCE: Trichloroethene
1,1-DCE: 1,1-Dichloroethene
Trans 1,2-DCE: Trans 1,2-Dichloroethene
Cis 1,2-DCE: Cis 1,2-Dichloroethene
VC: Vinyl Chloride
bsg: below surface grade

TABLE 2

ANALYTICAL RESULTS OF SOIL SAMPLES
Swiss Valley Cleaners
1395 MacArthur Boulevard, San Leandro, California
(mg/kg)

Sample ID	Depth (feet bsg)	Date	EPA SW 846/8260B					
			Tetrachloroethene (PCE)	Trichloroethene (TCE)	1,1-Dichloroethene (1,1-DCE)	Trans 1,2-Dichloroethene (Trans 1,2-DCE)	Cis 1,2-Dichloroethene (Cis 1,2-DCE)	Vinyl Chloride (VC)
B-1@3'	3	08-19-1998	<0.005	<0.005	<0.005	-	-	<0.005
B-1@5'	5	08-19-1998	<0.005	<0.005	<0.005	-	-	<0.005
B-2@3'	3	08-19-1998	<0.005	<0.005	<0.005	-	-	<0.005
B-2@5'	5	08-19-1998	<0.005	<0.005	<0.005	-	-	<0.005
B-3@3'	3	08-19-1998	<0.005	<0.005	<0.005	-	-	<0.005
B-3@5'	5	08-19-1998	<0.005	<0.005	<0.005	-	-	<0.005
B-4	1.75	04-06-2005	**0.0057**	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098
B-5	1.83	04-06-2005	**0.0074**	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094
B-6	1.67	04-06-2005	**0.022**	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093
B-7	2	07-08-2008	<0.005	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094
B-8	2	07-08-2008	**0.060**	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094
B9-5	5	05-07-2013	**0.028**	<0.005	<0.005	<0.005	<0.005	<0.005
B9-10	10	05-07-2013	**0.012**	<0.005	<0.005	<0.005	<0.005	<0.005
B9-15	15	05-07-2013	**0.022**	<0.005	<0.005	<0.005	<0.005	<0.005
B10-5	5	05-07-2013	**0.010**	<0.005	<0.005	<0.005	<0.005	<0.005
B10-10	10	05-07-2013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B10-15	15	05-07-2013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes:

mg/kg: milligrams per kilogram

bsg: below surface grade

<: Indicates constituents were not detected at a concentration greater than the reporting limit shown.