Advanced
GeoEnvironmental, Inc.

02 October 2008
AGE-NC Project No. 08-1640

Mr. Jerry Wickham
Alameda County Heath Care Services
1131 Harbor Bay Parkway Suite 250
Alameda, CA 95202

Subject: **Soil Vapor Extraction Pilot Study Work Plan**
METRO VALLEY CLEANERS
224 Rickenbacker Circle, Livermore, California

Dear Mr. Wickham:

At the request of Mr. Robert Strong, *Advanced* GeoEnvironmental, Inc. has prepared this soil vapor extraction work plan to evaluate the potential for its use a remedial alternative for site located at 224 Rickenbacker Circle, Livermore, California.

If you have any questions or require further information, please contact me at (209) 467-1006.

Sincerely,

***Advanced* GeoEnvironmental, Inc.**

Daniel J. Villanueva
Staff Geologist

Rob D. Loeffler
Project Geologist
Registered Environmental Assessor I, No. 04607

cc: Mr. Lawrence Hancock
Mr. Robert Strong

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

Soil Vapor Extraction Pilot Study Work Plan
METRO VALLEY CLEANERS
224 Rickenbacker Circle, Livermore, California

TABLE OF CONTENTS

FIGURES

Soil Vapor Extraction Pilot Study Work Plan
METRO VALLEY CLEANERS
224 Rickenbacker Circle, Livermore, California

1.0. INTRODUCTION

At the request of Mr. Robert Strong, *Advanced* GeoEnvironmental, Inc. (AGE) has prepared this soil vapor extraction work plan for 224 Rickenbacker Circle, Livermore, California. The work plan includes the installation of one soil vapor extraction well and one soil vapor extraction observation well. The location of the site is illustrated on Figure 1. A plan of the site is illustrated on Figure 2. All field procedures will be overseen by an AGE representative under the direct supervision of a California Professional Geologist. This work plan has been prepared in accordance with regional board guidelines.

2.0. SCOPE OF WORK

The scope of work includes installation of wells, performance of a soil vapor extraction pilot test and preparation of a report. The work is proposed to assess the potential use of soil vapor extraction as a remediation technology to remove residual chlorinated hydrocarbon-impacted soil at the sites. The proposed scope of work will include the following tasks:

- Permitting and pre-field work activities;
- Installation of wells;
- Performance of an soil vapor extraction (SVE) pilot study;
- Laboratory analysis of collected samples; and
- Preparation of a report of findings.

2.1. PERMITTING AND PRE-FIELD WORK ACTIVITIES

A boring permit will be obtained from the Alameda County Heath Care Services Agency(ACHCSA) for all boring locations. A health and safety plan will be prepared in accordance with the *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, each well location will be clearly marked, and a utility clearance will be obtained through Underground Service Alert.

2.2. PILOT BORING ADVANCEMENT

AGE proposes the advancement of two pilot soil borings for the installation of a soil vapor extraction well and a soil vapor extraction observation well. Both pilot borings will be advanced to approximately 20 feet below surface grade (bsg). The locations chosen for the borings were based on previous investigations and the known high concentrations areas of chlorinated hydrocarbon in soil gas samples collected at the site. The total depth of each well boring may vary according to hydrogeologic/geologic conditions encountered during drilling. Soil boring advancement procedures are detailed in Section 3.1. The locations of the proposed borings are illustrated on Figure 2.

2.3. SOIL SAMPLE COLLECTION

Soil samples will be collected from each pilot boring for lithologic description. Selected soil samples may be analyzed by a State of California Department of Public Health (CDPH)-certified laboratory for the following constituents:

- Volatile organic compounds by EPA method 8260.

Laboratory report of soil analyses, testing methods, laboratory quality assurance/quality control (QA/QC) reports, and sample chain-of-custody documentation will be presented in a report of findings.

2.4. SVE WELL INSTALLATION AND PILOT STUDY

Two pilot borings will be completed SVE wells screened from 5-20 feet bsg. The screened interval of the SVE wells was determined using data collected from previous site investigations. Initially, a 24-hour SVE pilot test will be performed at the site. However, if data needed to evaluate the performance of SVE does not appear adequate, the test will be extended an additional 48 hours, for a total duration of 72 hours. SVE well installation and the SVE Pilot Study procedures are detailed in Section 3.3.

Where applicable, soil vapor field parameters and analytical results will be used to facilitate the design of an SVE system. Vapor flow data will be used to determine a general radius of influence for spacing of additional SVE wells, if warranted, and the selection of an appropriate SVE system.

2.5. REPORT PREPARATION

A report following the completion of the SVE Pilot Study will include a description of the work performed, results of the soil sampling and analysis, conclusions and recommendations. The report will be in a format acceptable to the ACHCSA 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 Professional Geologist. Procedures for boring advancement, soil sampling, well installation and pilot study tasks, are described below.

3.1. PILOT BORING ADVANCEMENT

Two pilot soil borings will be advanced at the site to depths of approximately 20 feet bsg. The borings will be advanced utilizing a track-mounted limited-access drill rig equipped with 8.25-inch diameter hollow-stem augers. Soil vapor extraction well SVE-1 will be advanced in the location south of the former dry-cleaning machine location, adjacent to soil gas monitoring point SG-5. Soil vapor extraction observation well OW-1 will be advanced 11 feet north of monitoring well MW-2 and adjacent to soil gas well SG-3, soil boring B-1 and soil and groundwater sample location S-5. Well OW-1 will be used during the pilot study to monitor the lateral effectiveness of the pilot test extraction system.

The total depth of each boring may vary according to hydrogeologic/geologic conditions encountered during drilling. The locations of the proposed borings are illustrated on Figure 2. Cuttings generated during drilling activities will be containerized in properly labeled Department of Transportation (DOT)-approved 55-gallon drums. Upon characterization, the cuttings will be disposed at an appropriate landfill facility.

3.2. SOIL SAMPLE COLLECTION

Soil samples will be collected from soil borings at five-foot intervals. Relatively undisturbed soil samples will be collected in each of the borings using a California modified split-spoon sampler fitted with 2-inch diameter by 6-inch long brass or stainless steel sleeves. Upon removal from the sampler, the sleeves will be separated with a clean knife. The exposed ends of the second sleeve will be covered with Teflon sheets, capped and sealed with tape. The remaining soil will be visually

classified by an AGE professional in accordance with the Unified Soil Classification System (USCS). Soil samples will also be field screened for the presence of volatile organic compounds using an organic vapor meter (OVM), equipped with a photo ionization detector (PID). Soil sample descriptions and OVM readings will be recorded on a log for each boring.

Following sample collection, each preserved sample sleeve will be labeled with the boring location, depth, time, date and sampler's initials. Appropriately sealed and labeled samples will be placed in a chilled container with ice and transported under chain of custody procedures to a CDPH-certified laboratory. Any non-disposable equipment used for sample collection is thoroughly rinsed with clean water after being washed with a solution of Alconox.

3.3. WELL COMPLETION

Wells will be completed as single-casing soil vapor extraction and observation wells utilizing 2-inch diameter schedule 40 polyvinylchloride (PVC) 0.020-inch slotted well screen and blank well casing. Based on geologic conditions, a 15-foot length of well screen, from 5 to 20 feet bsg, is anticipated for installation of each well. After installing each well casing, a filter pack material consisting of #3 sand will be added to approximately one feet above the screened interval.

A nominal one-foot bentonite seal (bentonite chips) will be placed above the filter pack to minimize the potential for grout penetration into the screened section of the well. The bentonite seal will be formed by pouring bentonite chips into the annulus and allowing them to settle on the filter pack. The bentonite chips will be hydrated using a few gallons of tap water and allowed to hydrate for a minimum of one-half hour prior to grouting.

The remaining annular space will be filled to the ground surface with a cement grout. The grout mixture will consist of Type I/II Portland neat cement and not more than 6 gallons of water per 94-pound sack of cement. The grout will be placed by pumping through tremmie pipe.

3.4. SVE PILOT STUDY

Initially, one 24-hour SVE pilot study will be conducted at the site. However, if after the 24-hour period of extraction the initial of data appears inadequate to evaluate SVE, the pilot study will be continued for an additional 48-hours.

The pilot study will be conducted at the site utilizing a minimum 2½-horsepower, regenerative vacuum blower; the vacuum blower will be rated at a maximum 150 cubic feet per minute (cfm). The inlet of the vacuum blower will be directly routed to the SVE well head connected by 2-inch

diameter PVC tubing or piping. The outlet of the vacuum blower will be directly routed through four 400-pound, vapor-phase activated carbon adsorption canisters.

Air-tight, 2-inch diameter PVC well caps fitted with Magnehelic (Dwyer) vacuum gauges will be attached to all adjacent monitoring wells and observation wells. The induced vacuum will be measured (i.e. inches of water) at the monitoring points. During the first 12-hours of the pilot test, the induced vacuum will be monitored in approximate 60-minute intervals during the pilot study and recorded in inches of water. The induced vacuum will be measured periodically thereafter.

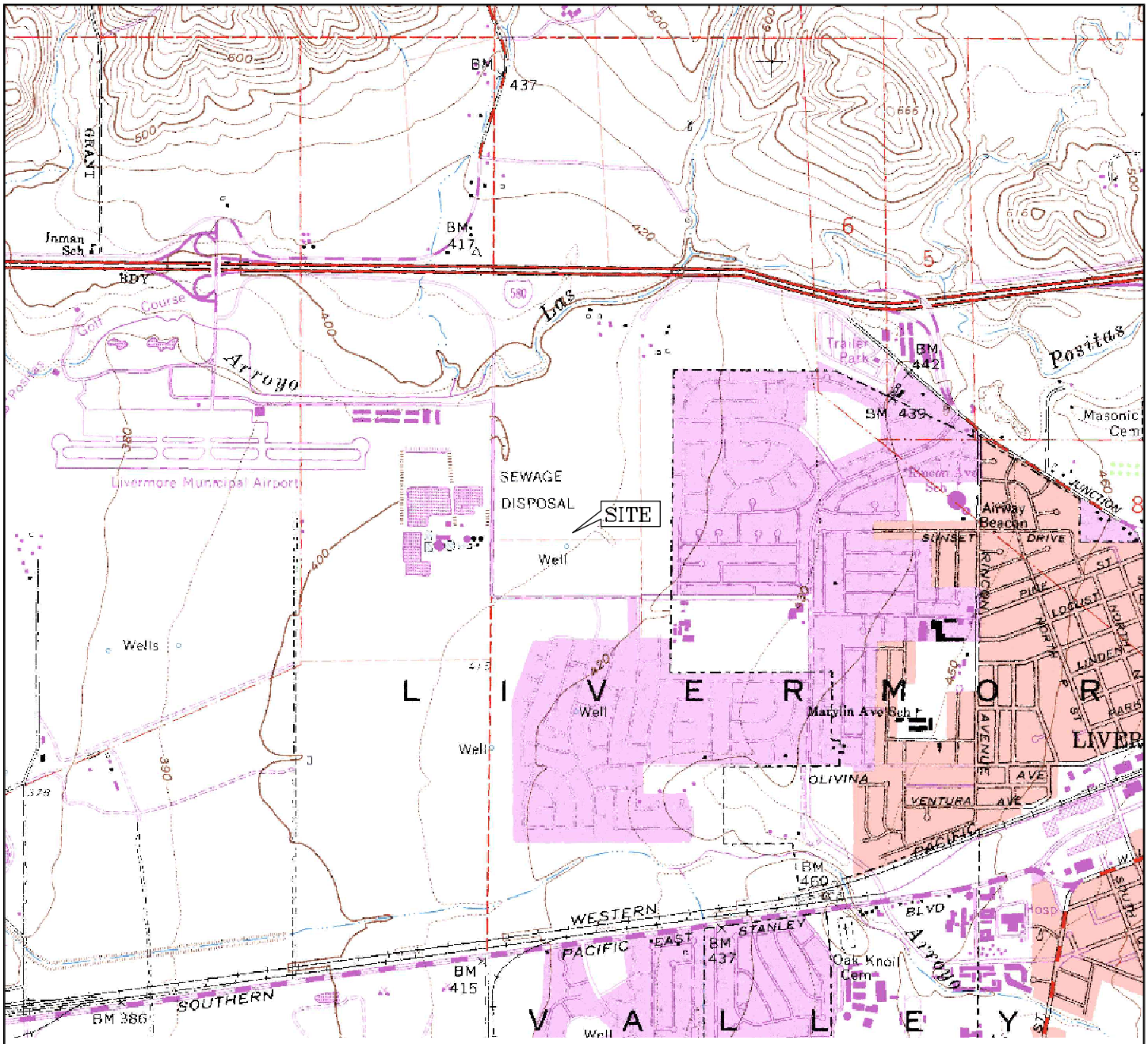
Additionally, the vapor stream from extraction well (SVE-1) will be monitored for the presence of organic vapor using an organic vapor analyzer (OVA) equipped with a PID. The vacuum applied at the SVE well should cause hydrocarbons in the vadose zone to volatilize and flow into the operated vapor well or monitoring well and through the regenerative vacuum blower. From the vacuum blower, the extracted hydrocarbon vapor will be processed and adsorbed through the carbon canisters as part of the treatment process. Hydrocarbon concentrations in the SVE effluent stream will also be measured at hourly intervals utilizing an OVA during the initial twelve hours of the test.

During the pilot study, the vapor flow rate extracted will be monitored at the inlet of the vacuum blower using a Dwyer DS-200 flow sensor (inches of water); the flow rate will be converted to standard cubic feet per minute (SCFM) using a manufacture (Dwyer) supplied conversion chart. Additionally, the flow rate will be measured with a Blue-White F-452 flow rotometer and measurements will be collected in meter cubed per hour and SCFM. During the first 12-hours of the pilot test, flow rates will be measured at approximate 60 minute intervals. Flow rates will be measured periodically thereafter.

Influent vapor samples will be collected at the start-up and at two-hour intervals thereafter from the inlet of the extraction well to measure concentrations of extracted hydrocarbon vapor. The samples will be collected in Tedlar bags using a hand air-vacuum pump. One effluent sample will be collected at the termination of SVE pilot study.

Following collection, the samples will be placed in a covered container and transported under chain of custody to a CDPH-certified analytical laboratory for analysis. Each sample will be analyzed within 72 hours for Volatile Organic Compounds using EPA method 8260.

FIGURES



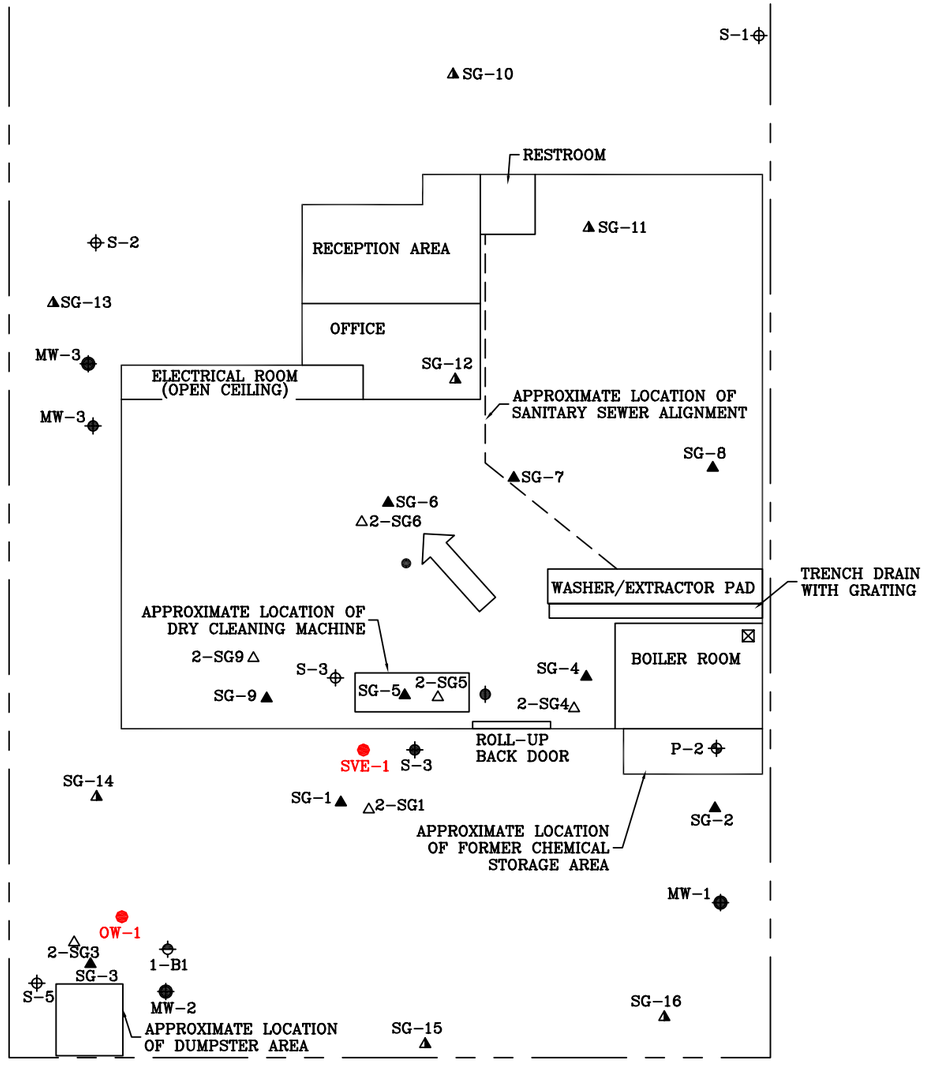
LIVERMORE QUADRANGLE, CALIFORNIA
7.5 MINUTE SERIES (U.S. GEOLOGICAL SURVEY)

LOCATION MAP

METRO VALLEY CLEANERS
224 RICKENBACKER CIRCLE
LIVERMORE, CALIFORNIA

Advanced GeoEnvironmental, Inc.
of Northern California

PROJECT NO. AGE-NC-08-1640	FILE: LOCATION	FIGURE:
DATE: 03 OCTOBER, 2008	DRAWN BY: MAC	1



LEGEND

- SG-9▲ APPROXIMATE LOCATION OF SOIL GAS SAMPLE (MOBILE LABORATORY, JANUARY, 2007)
- ● APPROXIMATE LOCATION OF BORING (BY JMK ENVIRONMENTAL. OCTOBER, 2005)
- 1-B1⊕ APPROXIMATE LOCATION OF DEEP BORING (ENGEO, NOVEMBER, 2007)
- S-5⊕ APPROXIMATE LOCATION OF SOIL AND GROUNDWATER SAMPLE (ENGEO, MARCH, 2007)
- P-2⊕ APPROXIMATE LOCATION OF SHALLOW SOIL SAMPLE (ENGEO, JANUARY, 2007)
- MW-3● APPROXIMATE LOCATION OF MONITORING WELL
- SG-15▲ APPROXIMATE LOCATION OF SOIL GAS SAMPLE (SUMMA CANISTER, DECEMBER, 2007)
- ⇨ APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- SVE-1● PROPOSED SOIL VAPOR EXTRACTION WELL LOCATION
- OW-1● PROPOSED SOIL VAPOR EXTRACTION OBSERVATION WELL LOCATION

N

SCALE
0 20 40
FEET

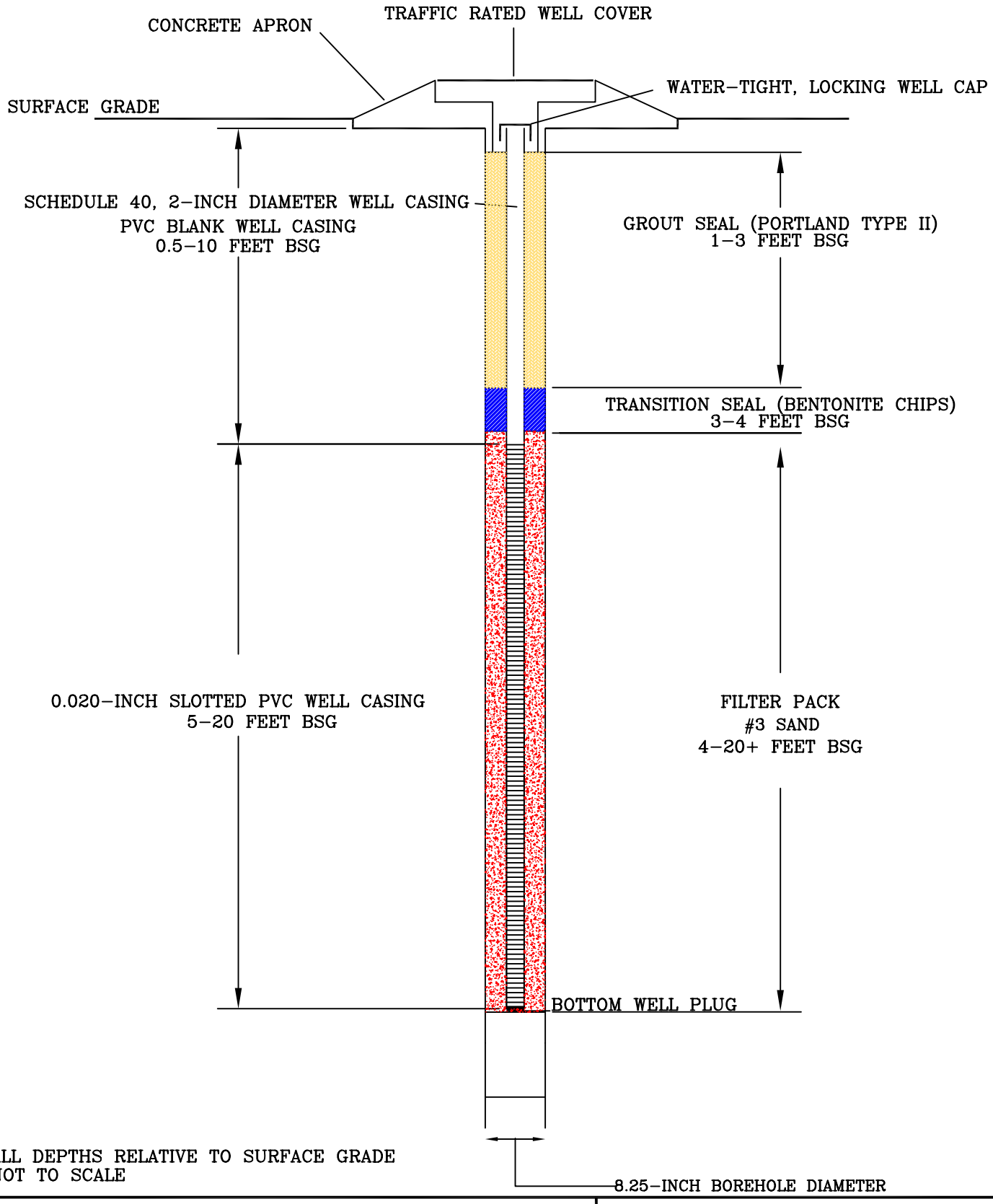
SITE PLAN

METRO VALLEY CLEANERS
224 RICKENBACKER CIRCLE
LIVERMORE, CALIFORNIA

Advanced GeoEnvironmental, Inc.

PROJECT NO. AGE-NC-08-1640	FILE: METRO2
DATE: 02 OCTOBER, 2008	DRAWN BY: MAC

FIGURE: 2



SOIL VAPOR EXTRACTION WELL DESIGN

METRO VALLEY CLEANERS
224 RICKENBACKER CIRCLE
LIVERMORE, CALIFORNIA

Advanced GeoEnvironmental, Inc.
of Northern California

PROJECT NO. AGE-NC-02-0926	FILE: METRO 5	FIGURE: 3
DATE: 2 October 2008	DRAWN BY: KMM	