ENGEO
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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
MATERIALS TESTING

Project No.
4729.3.002.02

March 14, 2000

Mr. Steve Waters
Livermore Valley Joint Unified School District
685 East Jack London Street
Livermore, CA 94550

Subject: Del Valle Continuation High School
2253 Fifth Street
Livermore, California

WORK PLAN FOR GROUND-WATER MONITORING WELL CONSTRUCTION

Reference: ENGEO Inc.; Observation and Sampling Services During Underground Storage Tank Removal, Dell Valle High School, Livermore, California; October 29, 1999.

Dear Mr. Waters:

ENGEO Incorporated is pleased to present this work plan for the drilling and construction of a ground-water monitoring well at the subject property located in Livermore, California. Ms. Eva Chu, with the Alameda County Environmental Health Department, requested the additional well (Figure 1). The proposed scope of the work plan includes the following:

- Observation of the drilling and construction of one 50-foot-deep, 2-inch-diameter ground-water monitoring well.
- Recovery of soil samples during drilling with organic vapor screening.
- Development of the monitoring well.
- Purging of the monitoring well with sample recovery.
- Laboratory analysis of the soil and ground-water samples.

SITE DESCRIPTION AND HYDROGEOLOGY

The property is located within the downtown Livermore area, near the junction of South Livermore Avenue and 1st Street (Figure 1). The property is underlain by Quaternary alluvial deposits, consisting of unconsolidated sand, silt and clay, with some gravel. According to data compiled by the Alameda County Zone 7 Flood Control Agency, ground water is approximately 30 to 35 feet

below the surface with flow to the northwest. The site is an existing Continuation High School, which utilized an underground boiler tank prior to the 1960s.

The heating oil UST was removed on August 13, 1999, under the observation of Ms. Danielle Stefani with the Livermore-Pleasanton Fire District. Trace levels of purgeable hydrocarbons, toluene and xylenes were reported for the excavation and piping samples. Concentrations of residual heavy range hydrocarbons were reported for the samples. No MtBE was reported for the five samples. Based on the results of the analyses, the stockpiled soil (±44 tons) was removed from site for disposal at the Altamont Landfill facility (Appendix C). Upon review of the laboratory test report, the overburden soil stockpiles and select import material was backfilled and compacted within the excavation.

Upon review of the UST removal report, Ms. Eva Chu, with the Alameda County Heath Services Department, requested the installation of a ground-water monitoring well to address potential impacts from the former UST.

MONITORING WELL INSTALLATION AND DEVELOPMENT

The proposed location of the monitoring well is shown on Figure 2. The location of the well was based on an interpretation of the local ground-water gradient[1]. The well boring will be advanced using a truck-mounted Mobile B-61 drill rig equipped with 8¼-inch-diameter hollow-stem augers. Exploratory drilling and soil sampling protocol details are provided in Appendix B.

The monitoring well will consist of 2-inch-diameter PVC casing with flush joints, installed down through the hollow stem auger. The well will be constructed with 15 feet of screened casing (0.01-inch slot width) and an appropriate length of solid PVC well casing (2-inch-diameter Schedule 40 PVC). The total depth of the monitoring well is estimated at 50 feet. A #2/16 sand filter pack will be placed from the base of the well to the top of the screened interval. A ±12-inch-thick bentonite seal will be placed at the top of the filter pack. The remaining annular space will be backfilled with a cement-bentonite grout seal. The well will be completed within a flush-mounted 8-inch-diameter manhole. The top of the well casing will be secured with a locking waterproof cap. The drill cuttings will be placed within sealed 55-gallon drums, pending a review of the field PID screenings. Upon review of the laboratory analyses, a disposal plan for the soil cuttings will be developed.

After the cement-bentonite grout has set for 72 hours, the well will be developed using a surge block and bailer to produce relatively nonturbid ground water. We anticipate that ten to twenty well volumes of water will be removed from the well during the development process. The purged water

[1] Alameda County Zone Seven Ground-Water Contour Map, 1997.

will be stored on site in Department of Transportation approved drums until the results of the laboratory testing are available. At that time a remediation/disposal plan for the purged water will be developed.

SOIL AND GROUND-WATER SAMPLING

Soil samples will be recovered from the monitoring well boring on five-foot depth intervals down to the satuarated zone. It is anticipated that one to two soil samples will be recovered from the boring for testing. A photoionization detector will be used in the field to screen the soil samples for volatile organic vapors. Soil samples will be sealed with Teflon, plastic end caps, and tape. The samples will be preserved in a cooled ice chest for transportation under documented chain-of-custody to a DTSC certified analytical laboratory.

Forty-eight hours after development, the monitoring well will be purged and a ground-water sample will be recovered for laboratory analysis. Ground-water sampling protocol details are provided in Appendix A.

Following completion of the monitoring well, ENGEO will prepare a Department of Water Resources (DWR) Well Installation Form for submittal to DWR and the Alameda County Zone Seven Water District.

LABORATORY TESTING

Laboratory analysis will be performed by Chromalab, Inc. in Pleasanton, California. The soil and ground-water samples will be tested for the following:

- Total Volatile Petroleum Hydrocarbons (gasoline)
- Total Extractable Petroleum Hydrocarbons (diesel, heating oil)
- Benzene, Toluene, Ethyl Benzene, Xylenes (BTEX – EPA 8020) MTBE
- Methyl Tertiary-Butyl Ether (MtBE – EPA 8260) X this can be done w/ 8020
- Polychlorinated Biphenyls (PCBs - EPA 8082) X this can be detected in 8270
- Polynuclear Aromatic Hydrocarbons (PNAs - EPA 8270)
- Luft Metals (Pb, Ni, Cr, Cd, Zn) X No needed

DATA ANALYSIS AND REPORT PREPARATION

Following completion of field and laboratory work, we will review the field and laboratory test data from this study and previous investigations. A final report will be prepared under the direct supervision of, and signed by, a Certified Hydrogeologist. The report will include an analysis of the data collected and will provide conclusions and recommendations regarding the property.

A copy of this work plan should be provided to Ms. Eva Chu (ACEHD) and Ms. Danielle Stefani, with the Livermore-Pleasanton Fire District. We appreciate the opportunity to be of continued service to you on this project. If you have any questions, please contact our office.

Very truly yours,

ENGEO INCORPORATED

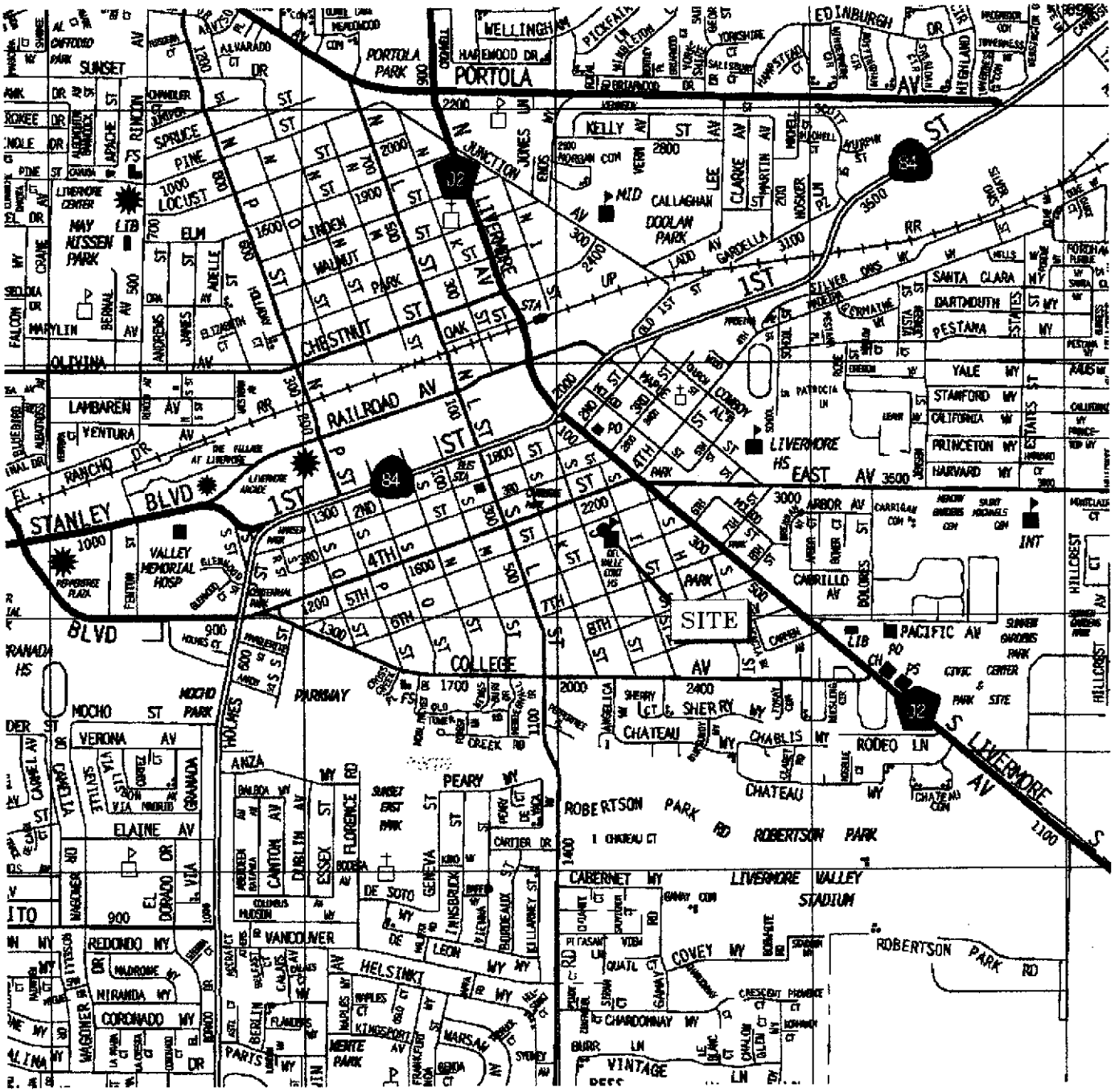
Shawn Munger
CHG 413
sm/jd:wkpln

Reviewed by:

Donald E. Brugger
GE 2094

Attachments: Figures 1 and 2
Appendix A – Ground-Water Sampling Protocol
Appendix B – Soil Sampling Protocol
Laboratory Procedures

cc: 1 – Livermore-Pleasanton Fire District, Danielle Stefani
1 – Alameda County Health Services Department, Eva Chu



SITE VICINITY MAP
DEL VALLE HIGH SCHOOL
2253 5TH STREET
LIVERMORE, CALIFORNIA

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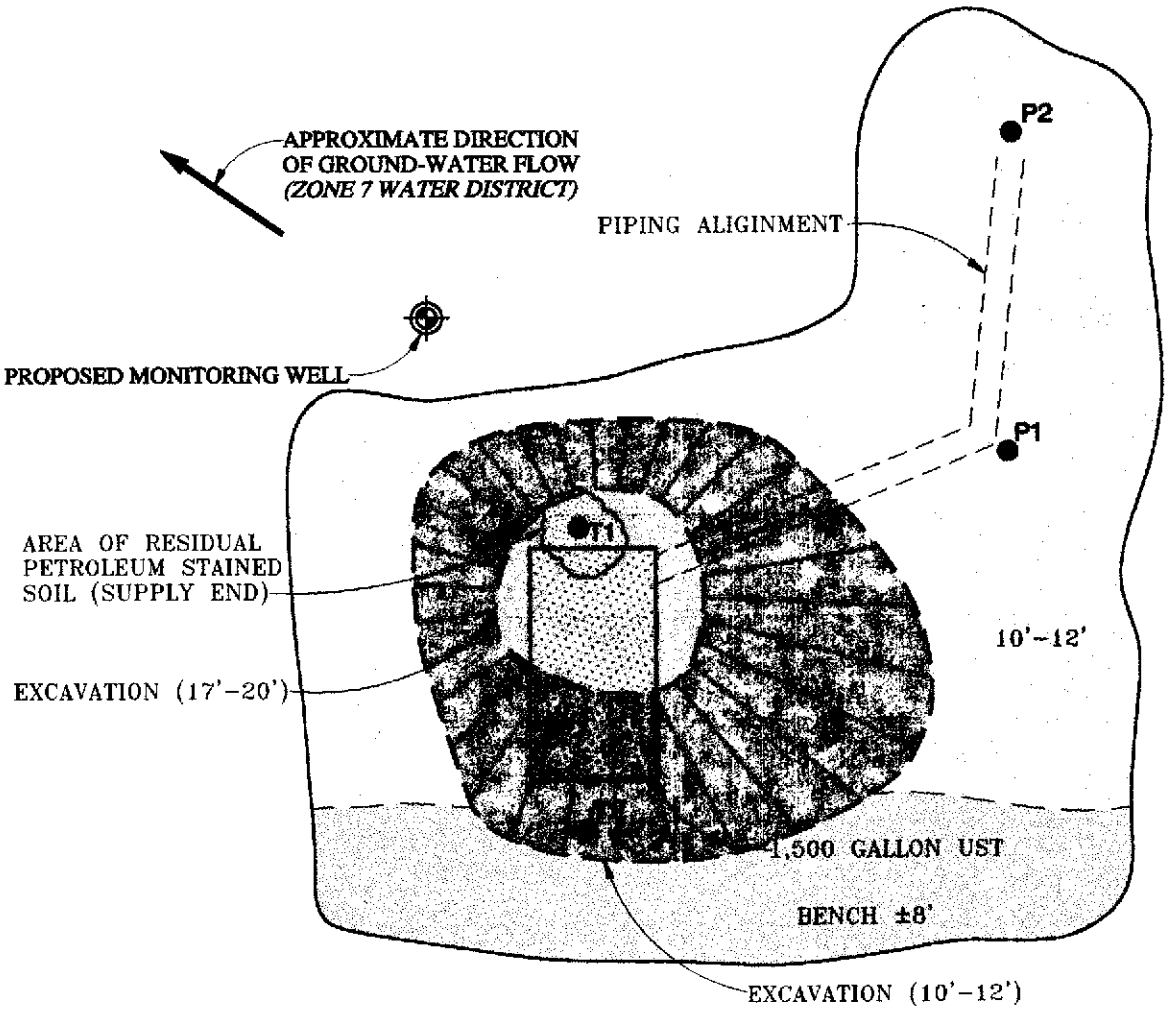
PROJECT NO.: 4729.3.002.02	FIGURE NO. 1
DATE: MARCH 2000	
DRAWN BY:	CHECKED BY:

(BASEMENT)

SCHOOL BUILDING



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SITE PLAN
DEL VALLE HIGH SCHOOL
2253 5TH STREET
LIVERMORE, CALIFORNIA

PROJECT NO.: 4729.3.002.02	FIGURE NO. 2
DATE: MARCH 2000	
DRAWN BY:	CHECKED BY:

APPENDIX A

GROUND-WATER SAMPLING PROTOCOL

Equipment Cleaning

Ground-water samples are recovered in pre-cleaned disposable polyethylene or Teflon bailers. The samples are then placed in pre-cleaned laboratory supplied glassware. Sample bottles and caps remain sealed until actual usage at the site. Before and during use at the site, equipment which comes in contact with the well or ground water is thoroughly cleaned with trisodium phosphate or Alquinox and rinsed with deionized or distilled water. This procedure occurs between each sampling event. Monitoring wells are sampled in approximate order of increasing contamination.

Prior to field activities ground-water and field monitoring equipment are calibrated using the appropriate calibration standards.

Water Level Measurements

Prior to checking for floating product, purging of the well and sampling, the depth to water is measured in each well using a sealed sounding tape of a scaled electric sounder. Water levels are recorded in the field to the nearest 0.01 foot from a common reference point on the well casing.

Floating Product Thickness

A field check for floating product is made with a clean and clear acrylic or Teflon bailer. Thickness of floating product as well as odor and color of the water is recorded. A clean nylon or cotton cord is used in each well. The cords are replaced with new cords prior to the sampling event.

Water Sampling Procedures

Prior to sampling of the ground water, a minimum of four to ten well-casing volumes of water are removed from the well. The volume of water to be removed is calculated from the measurements of the water level, casing diameter, and the well depth. Water is removed by either bailer, hand pump, or submersible electric pump. During purging, temperature, pH, dissolved solids, and oxidation-reduction potential are monitored for stabilization (±10%). Turbidity of the water is also noted either qualitatively or by means of a NTU instrument. A water sample is collected using a clean disposable polyethylene bailer when the appropriate volume has been purged or when the parameters have stabilized and a minimum of four well-casings have been purged. If the well is dewatered during purging, the well is allowed

to recover to 80 percent of the static water level prior to sampling. If recovery exceeds a two-hour duration, the sample will be collected when a sufficient volume is available for the specific laboratory analyses.

Collection of Samples

Ground-water samples are collected in the appropriately sized pre-cleaned laboratory containers. Samples for volatile organic analyses are recovered in 40 milliliter vials lined with a Teflon septum. The volatile organic samples are recovered with zero headspace to prevent the loss of volatile constituents.

Ground-water samples for metal analyses are filtered in the field using a pressurized bailer system. Following filtering the metal samples are acidified to pH < 2 with HNO_3 or HCL and preserved in a cooled ice chest.

The water sample containers are labeled with the appropriate sample number, location, project name and number, time of collection and the date. Chain-of-custody forms are logged with the same information, signed and accompany the samples. Samples are placed in an iced cooler and transported to a state-certified analytical laboratory. Travel and equipment blanks are submitted on a project specific basis to provide for laboratory and field QA/QC.

APPENDIX B

SOIL SAMPLING PROTOCOL

Soil Sampling by Drill Rig

Review and confirmation of the proposed boring locations and special instructions are discussed with the client prior to sampling. Underground Service Alert (USA) and/or private utility locators are contacted to mark utilities in the area before beginning the drilling activities.

Equipment used in drilling is steam cleaned prior to its arrival at the site. Equipment includes, but is not limited to, augers, bits, drilling rod, samplers and sample liners. The sampler is thoroughly cleaned with trisodium phosphate or Alquinox and rinsed with distilled water between sampling intervals.

Each exploratory boring is drilled with a truck-mounted drilling rig using either solid flight or hollow stem augers. The boring is advanced to the desired sampling depth and the sampler is then lowered to the bottom of the hole. The sampler is driven a maximum of 18 inches by a 140-pound rig-operated hammer falling 30 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the boring log.

The samplers commonly used are either a California-type sampler (3-inch or 2.5-inch) or a standard penetrometer (2-inch). If samples are collected for laboratory analysis, a California sampler equipped with brass or stainless steel liners is used.

Upon retrieval, the sampler is disassembled into its component parts. One or more of the liners are selected for chemical analysis. The selected liners(s) are sealed with Teflon sheets, plastic caps, and tape. The samples are then labeled, logged on the chain-of-custody and preserved in a cooled ice chest.

Each soil sample is classified in the field with the aid of the Unified Soil Classification System and a Munsell soil color chart. Soil descriptions are detailed on the boring log.

Soil samples may also be field-screened for volatile organic vapor with a photoionization detector (PID) calibrated to a 100 ppm isobutylene standard. Soil samples or auger cuttings are placed into polyethylene bags or glass mason jars and allowed to accumulate (PID) headspace vapors for a period of five to ten minutes (temperature dependent). The instrument probe is inserted into the bags or mason jars and the maximum reading is recorded.

Samples are held in the possession of ENGEO personnel until transfer to the analytical laboratory. The transfer is accomplished in one of three ways; on-site pickup by the laboratory, pick-up by the laboratory at ENGEO offices; or delivery to the laboratory by ENGEO. Each transfer of responsibility is documented on a chain-of-custody log that accompanies the sample(s).

LABORATORY PROCEDURES

Laboratory Contractor Selection

The laboratories selected to perform the analytical work are certified by the California State Department of Health Services as qualified to perform the selected analyses. The selected laboratories are reviewed by ENGEO to provide that an adequate quality control program is in place and certified by the State of California.

Chain-of-Custody Control

The following procedures are used during sampling and analytical activities to provide chain-of-custody control during transfer of samples from collection through delivery to the laboratory.

Contact with the laboratory prior to the sampling date to attain the appropriate containers for the desired analysis and the alert the laboratory to the date of sampling and sample pick up.

Documentation of the field sampling activities are logged.

Each sample is clearly and completely labeled for identification.

Chain-of-custody record documenting the transfer and possession of samples is maintained.

A laboratory analysis request sheet for documenting analyses to be performed is completed.

Samples Containers

Sample containers vary with each type of analytical parameter. Selected container types and materials are non-reactive with the sample and the particular analytical parameter being tested. Sample containers are cleaned and sterilized by the certified laboratory according to the EPA protocol for the individual analyses.

Sample Preservation and Shipment

Various preservatives are used by the certified laboratory to retard chemical changes in the samples. The samples are stored on ice after collection. Sample shipment from ENGEO to laboratories performing the selected analyses routinely occurs within 24 hours of sample

collection. Sample holding times designated by DHS and the EPA for the specific analyses are observed.

Analytical Procedures

The analysis of ground-water and soil samples is conducted in accordance with accepted quantitative analytical procedures. The following publications are considered the primary references for ground-water sample analysis, and the contracts with the laboratories analyzing the samples stipulate that the methods set out in these publications be used. These procedures used are periodically updated by federal and state agencies.

Standard Methods for the Examination of Water and Wastewater, 16th Edition, American Public Health Association, et al., 1985.

Methods for Chemical Analysis of Water and Wastes, United States Environmental Protection Agency, 600/4-79-020, March 1979.

Test Methods for Evaluation of Solid Waste: Physical/Chemical Methods, United States Environmental Protection Agency, SW-846, 1982.

Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, United States Environmental Protection Agency, 600/4-82-057, 1982.

Practical Guide for Ground-Water Sampling, United States Environmental Protection Agency, 600/2-85/104.

RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, United States Environmental Protection Agency, September 1986.

Leaking Underground Tank Field Manual, State of California Leaking Underground Fuel Tank Task Force; October 1989.

Tri-Regional Board Staff Recommendations For Preliminary Evaluation and Investigation of Underground Tank Sites, State of California Regional Water Quality Control Board (Regions 1, 2, and 5), August 10, 1990.