SMITH-EMERY GEOSERVICES
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July 23, 1996

SEG File No. 90404
SEG Report No. SF 96-935

Alameda Conty Health Care Services Agency
UST Local Oversight Program
1131 Harbor Bay Parkway
Alameda, California 94502

Attention: Mr. Barney Chan

Gentlemen:

We herewith submit for your review and comments one copy of our "Site Characterization and Risk Assessment Workplan, 3925 Alameda Avenue, Oakland, California." The goal of this investigation is to characterize the site by taking hydropunch samples in six borings, installing two additional monitoring wells, and to performing a Tier 1 Risk-Based Corrective Action report. The following reports were reviewed in the preparation of this workplan:

"Report on Soil and Ground-Water Sampling With Laboratory Testing, Oakland, California" prepared by ENGEO Incorporated, dated March 24, 1994.

"Soil and Ground-Water Contamination Investigation, 569 High Street, Oakland, California" prepared by Harding Lawson Associates, HLA Job No. 9382,006/01, dated July 24, 1987.

"Well Installation and Environmental Sampling, 3925 Alameda Avenue, Oakland, California" prepared by Smith-Emery GeoServices, Job No. 90404, Dated August 22, 1995.

If you have any questions regarding the contents of this report please contact our office at (415) 330-3000, ext. 126.

Respectfully Submitted,
SMITH-EMERY GEOSERVICES

MILES GRANT, R.G. 5367
Project Geologist

Reviewed and Approved by

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SMITH-EMERY GEOSERVICES

SITE CHARACTERIZATION AND RISK ASSESSMENT WORKPLAN
3925 Alameda Avenue
Oakland, California

Prepared By

SMITH-EMERY GEOSERVICES
San Francisco, California

July 23, 1996
SEG File No. 90404
SEG Report No. SF 96-335

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Plate 1 - Vicinity Map
Plate 2 - Plot Plan
Plate 3 - Typical Well Construction Diagram

INTRODUCTION

The subject site is located just west of the intersection of the I-880 Freeway and High Street in southern Oakland as shown on the Vicinity Map, Plate 1. . Two on-site underground storage tanks, one 10,000-gallon diesel and one 1,000-gallon gasoline, were removed from the subject property on March 10, 1988. Samples of the soil at the time of the tank removal indicated that the site was contaminated with petroleum hydrocarbons as gasoline and diesel.

The following reports were reviewed in the preparation of this workplan:

> "Report on Soil and Ground-Water Sampling With Laboratory Testing, Oakland, California" prepared by ENGEO Incorporated, dated March 24, 1994.
>
> "Soil and Ground-Water Contamination Investigation, 569 High Street, Oakland, California" prepared by Harding Lawson Associates, HLA Job No. 9382,006/01, dated July 24, 1987.
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> "Well Installation and Environmental Sampling, 3925 Alameda Avenue, Oakland, California" prepared by Smith-Emery GeoServices, Job No. 90404, Dated August 22, 1995.

In 1994, a subsequent investigation was performed by Engeo, Inc. within the former tank locations. The Engeo investigation further characterized the contaminates as gasoline, diesel, and kerosene, and determined that the backfill and shallow groundwater beneath the site had been impacted by these contaminates.

Harding Lawson Associates performed an investigation in June 1987 in the easement attached to the southern property boundary. This investigation consisted of three borings. The boring that was adjacent to the southern property boundary had elevated levels of petroleum hydrocarbons as gasoline and diesel. The boring in the middle of the easement, further to the south, also contained elevated levels of petroleum hydrocarbons as gasoline and diesel, but at lower levels. In the boring at the southern end of the easement, petroleum hydrocarbons as gasoline were not detected, and diesel was detected at a lower level than the boring in the middle of the easement.

Smith-Emery GeoServices performed a groundwater investigation in August 1995. Three monitoring wells were installed on May 31, 1995. All monitoring wells were adjacent to the removed tanks. Monitoring Well No. 1 (MW1) is upgradient, Monitoring Well No. 2 (MW2) is cross-gradient, and Monitoring Well No. 3 (MW3) is downgradient. This report noted that the subject site is adjacent and downgradient of the Ecotek Lube facility, which is the suspected source of a kerosene plume that extends under the subject site.

The analyses of the soil and water samples taken from the monitoring wells revealed hydrocarbons and BTEX in all the soil and water samples tested from the monitoring wells. MW3 returned the lowest overall results for the analytes tested. MW1 had the highest results for diesel and for kerosene soil contamination, while MW2 had the highest result for gasoline soil contamination. The highest concentrations of contaminants in the groundwater samples were found in MW1, the well most downgradient of the former tank area. The lowest concentrations of groundwater contaminants were found in MW3, the well most upgradient of the former tank area.

This report contained the following conclusions:

- the subject site is adjacent and downgradient of the Ecotek Lube facility, which is the suspected source of a kerosene plume that extends under the subject site;
- The zone of soil contamination from the former underground storage tanks extends beyond the tank excavation zone;
- The groundwater plume encompasses the tank excavation zone and extends downgradient of it;
- The hydrocarbon contamination, being less dense than water, has migrated along the top of the shallow aquifer, flowing in the local downgradient direction to the southeast;
- The upper vertical limit of the hydrocarbon groundwater plume is the top of the water table at approximately ten feet below ground surface;

- The horizontal limits of the gasoline and diesel plume could not be estimated using the data that is currently available.

SCOPE OF SERVICES

The scope of services to be provided by Smith-Emery GeoServices will include:

- The preparation of a site-specific health and safety plan detailing field procedures and protocols;
- Drilling of six borings with a Geoprobe (cuttingless core) drilling rig. Three soil samples will be collected from each boring. One water samples will be obtained in each boring using a hydropunch;
- Installation of two additional monitoring wells on the site: one upgradient, and one downgradient. This will bring the total number of wells on site to five. The monitoring well borings will be sampled at five-foot intervals;
- Analytical analysis of the soil and water samples collected at the site;
- Development of the two new wells and sampling of all five wells;
- Preparation of a monitoring well installation and site characterization report;
- Preparation of a Tier 1 RCBA Risk Assessment Report according to ASTM guideline ES 1739-95, as required by the Mr. Barney Chan of the Alameda County Health Care Services Agency.

HEALTH AND SAFETY PLAN

As per OSHA guidelines, a site-specific health and safety plan detailing field procedures and protocols will be prepared and submitted for review before any work on the site begins. The purpose of this document will be to provide health and safety guidelines during the investigation. Smith-Emery GeoServices will be responsible for implementing the provisions of this document in the field.

REGIONAL AND SITE HYDROGEOLOGY

The subject site is located in the East Bay Plain of the Coast Range physiographic province. The land survey for this site referenced city benchmark BM19NW24 at the corner of Alameda Avenue and Eighth Street, which has an elevation of 9.664 feet above mean sea level. The survey of the well casings indicate that the site's surface elevations range from approximately 9 feet above mean sea level along the Alameda Avenue frontage, to approximately 8 feet at the rear of the property. The surface in the general area slopes gently southwest toward the Tidal Canal of the Alameda Harbor, which lies 3/8ths of a mile to the southwest.

The East Bay Plain is comprised of flat alluvial lowlands with bay and tidal marshes, much of which have been overlain with artificial fill. The geologic units beneath the site consist of unconsolidated, permeable-to-impermeable interbeds of fine to coarse-grained sediments of Quaternary Age alluvial and estuarine deposits. These unconsolidated deposits are estimated to occur from the ground surface to a depth of approximately 1000 feet, according to USGS Professional Paper 943.

The major groundwater-bearing materials beneath the East Bay Plain occur at depth ranging from 50 feet to 1,000 feet below ground surface. Groundwater from these aquifers is presently used mostly for irrigation and industrial purposes.

Groundwater-bearing soil layers within a shallow aquifer were encountered at a depth of approximately 5 feet and greater. The groundwater gradient was calculated from initial well measurements to be 0.003 feet per foot in a flow direction of S55°E, with depths-to-water in the range of 9.5 to 10.5 feet. The flow direction is shown on the Plot Plan, Plate No. 2. Depth to groundwater

data and wellhead elevations are presented in Table 2. The shallow aquifer was apparently intersected by the original tank installations, which have been documented to be deeper than 8.5 feet, allowing leakage of fuel hydrocarbons to impact groundwater.

FIELD PROCEDURES

To characterize the extent of the groundwater contamination, six borings will be drilled with a Geoprobe (cuttingless core) to depths of approximately 20 feet. Water samples will be obtained using a hydropunch at one elevation in each of these borings. This data will be used in confirmation of the proposed monitoring well locations. We will discuss the final monitoring well locations prior to installation with the Alameda County Health Care Services Agency.

Two monitoring wells, one upgradient and one down gradient, will also be installed to a maximum depth of 30 feet. This will bring the total number of monitoring wells on the site to five.

All borings will be logged in the field by an experienced geologist using the Unified Soil Classification System working under the direct supervision of a California Registered Geologist who will certify the boring logs. The following procedures will be used in the field during this investigation. A typical well construction diagram is included as Plate 3.

DRILLING AND SAMPLING PROCEDURES

1. Six Geoprobe borings will be drilled to depths of approximately three feet below the first-encountered groundwater depth. It is anticipated that the Geoprobe borings will be drilled to depths of between 10 and 20 feet in order to accomplish this. Water samples will be taken using a hydropunch and a decontaminated stainless steel bailer in each of the Geoprobe borings.

2. Two monitoring well borings will be drilled to depths of 25 to 30 feet using 8-inch hollow-stem augers. No water samples will be collected from the monitoring well borings at the time of drilling. Monitoring well depths will be based on actual geologic conditions encountered to

obtain samples in the upper water bearing zone and protection of lower confined aquifers. The previous well logs will be used as guides in evaluating subsurface conditions.

3. Three soil samples will be taken in each of the Geoprobe borings. It is anticipated that these samples will be taken at 5, 10, and 15 foot depths. For the monitoring wells, soil samples are routinely obtained at 5 foot intervals. Additional samples are taken whenever a change in lithology occurs or for any other reason at the discretion of the geologist.

4. For the monitoring well borings, when the hollow stem auger reaches the sampling depth, a split spoon sampler (California Modified or Standard Penetration) equipped with three six inch brass or stainless steel tubes is driven 18 inches by repeatedly dropping a 140 pound weight a height of 30 inches onto the sampler rods. The number of blows each for three consecutive 6 inch increments is recorded.

5. Soils brought up by the auger flights during drilling and soil recovered by the split spoon sampler are classified according to the Unified Soil Classification System (USCS), and recorded on a standard boring log form by a geologist under the direct supervision of a State Registered Geologist. In addition to the USCS classification, the soil is described by color, moisture content, strength, odor, and any other notable characteristics.

6. For monitoring well borings, soil from the driving tip and upper tube is inspected for the soil description. The middle tube is typically retained for screening for volatile organic vapors by head space analysis. Unless otherwise noted, the lower tube is designated for chemical analysis.

7. Any indication of odor from the cuttings or samples is recorded on the boring log. A more quantitative field screening for volatile organic vapors in soil is obtained from the Geoprobe or drive-tube samples by soil head space analysis as described in the next section.

8. All samples designated for analysis are sealed at each end with Teflon sheets and plastic caps. Care is taken to retain the samples with a minimum of disturbance and flush with the ends of the

tube if possible. The samples are immediately labeled, sealed with tape, and placed in a chilled cooler with blue ice. Care is taken to prevent freezing of samples.

9. A detailed Chain-of-Custody record is kept with the samples. The samples are kept in the custody of the geologist who obtained them until he signs them over to the next custodian of record. The samples are either kept within sight of the custodian, or in a locked place. Samples are delivered to the laboratory within 24 hours of collection.

10. The number of samples designated for analysis is dictated by the job specifications, field observations and agency involvement. Based on the previous sampling results, we anticipate analyzing one or two samples from each of the Geoprobe borings, and six soil samples from each of the monitoring well borings. Samples for analysis will be chosen based on the soil head space screening value. All samples collected are held in refrigeration by the lab for further analysis if initial test results indicate that more analyses may be needed.

11. All samples for laboratory analysis are logged on Chain-of-Custody forms and delivered in a chilled state to a certified laboratory within 24 hours of sampling. For this project, all soil samples will be analyzed for a gasoline and diesel by DHS-modified EPA Method 8015, and for BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes) by EPA Method 8020.

12. All sampling equipment is decontaminated after each sampling interval by complete disassembly of the sampler and wet brush cleaning of all parts in a nonphosphate solution bath, followed by a clear water rinse and a final rinse in deionized or distilled water. The hollow stem auger flights and bits are steam cleaned before arrival on site, between borings, and prior to leaving the site.

13. All soil cuttings generated during the drilling of the borings, wash water/soil rinsate generated during decontamination, and well development are collected in 55 gallon drums. The drums are then sealed and labeled with the date, boring identification, and contents. The drums are stored onsite pending laboratory analysis of the soil, which will determine the appropriate disposal method of the contents.

14. All soil borings will be grouted using the tremie method immediately upon completion.

SOIL HEAD SPACE SCREENING

1. All soil samples and soil cuttings suspected of containing concentrations of volatile organic compounds are screened in the field by head space analysis of a sample retained in a closed container.

2. Soils that are to be screened are transferred to a plastic ziplock bag and left at ambient temperature for a period of time (5-10 minutes).

3. After approximately 10 minutes, the tip of a flame ionization detector (FID) or Photoionization Detector (PID) is inserted through the side of the bag.

4. The FID is calibrated to a 50 ppmv Methane standard. The PID is calibrated to a 100 ppmv Isobutylene standard.

5. The maximum reading is recorded on the soil boring log as the concentration in parts per million-vapor (ppmv).

WELL CONSTRUCTION PROCEDURES

Permits for the installation of ground water monitoring wells and/or vapor extraction wells are obtained from the appropriate agency prior to construction. For this project, permits will be obtained from the Zone 7 Water Agency.

1. Unless otherwise specified, ground water monitoring wells are constructed of flush-jointed, threaded, Schedule 40, 4-inch PVC casing and factory-slotted PVC screen. No glues are used in constructing the wells.

2. The well construction will follow the format as outlined on the typical well diagram, Plate 3. The well screen and casing is installed through the hollow stem of the auger flights. The well screen and casing is set with a standard, clean, washed filter sand. For this site, Lonestar #2/12 sand and a 0.020-inch factory slotted casing will be used. The screen will be set 5 feet above the

piezometric surface and 10 feet below. The wells will not be allowed to penetrate into another confined water bearing unit other than the first target water bearing zone.

3. Well construction materials, i.e., sand pack, bentonite chips, and backfill grout, are placed through tremie pipes or through the annulus between the hollow stem auger and the well casing to prevent bridging.

4. The screened filter zone below groundwater is surged to maximize settlement and prevent bridging prior to placement of the bentonite seal. If necessary, additional filter sand is placed to meet design requirements. Alternatively, a filter overpack of smaller-grained sand may be placed above the filter pack to prevent the bentonite seal from entering the sand pack and the screen slots.

5. Bentonite chips placed above the sand pack are hydrated in place as they are added. The remainder of the annular space is then backfilled with a cement/bentonite grout to within 24 inches of the surface. The remaining 2 feet of the well is set in concrete.

6. The surface of the well is completed with a locking expansion plug and a water tight, traffic-rated well housing set in concrete. The well box is set slightly above the surrounding grade to prevent surface drainage from entering the well box.

7. A permanent mark is made at the top of the casing to indicate the top of casing measuring point for groundwater level surveys. (Survey to MSL)

8. The vertical and horizontal location of the wells will be established by a licensed surveyor or engineer. The survey will be tied into an on-site or nearby benchmark to determine the water level elevations.

9. Groundwater monitoring well design criteria, i.e. length and placement of well screen, thickness of bentonite seal, etc., will be detailed on the well construction diagrams in the well installation report.

WELL DEVELOPMENT

1. The well is developed after a minimum of 48 hours following placement of grout, backfill and surface housing to allow the cement and cement/bentonite to set.

2. The well is surged at least 20 minutes over 5-foot intervals with a 4-inch diameter stainless steel surge block or pump system to remove fines from the filter zone and create a gradation between filter materials and native soils.

3. Each well is then bailed to remove fine sediments drawn into the well by surging. A minimum of five casing volumes are removed from the well.

4. The temperature, pH, turbidity, and conductivity of the water is monitored periodically during development. The turbidity (content of fines) is monitored by either withdrawing 1000 ml samples of bailed water and allowing the fines to settle in an Imhoff cone, or by direct readings with an electronic turbidity meter. Final Imhoff cone readings are taken after 45 minutes of settlement.

5. The water quality parameters, volume of water extracted, and observable water quality conditions such as visual or olfactory evidence of contamination are recorded on field monitoring logs.

6. Development continues until water quality parameters stabilize and Imhoff cone readings are less than 10 ml/1000 ml.

7. All development water is drummed, labeled and stored on site pending disposal.

MONITORING WELL SAMPLING PROCEDURES

1. Prior to sampling, the depths to water and to the bottom of the well are measured with respect to the reference notch at the top of the casing using an electronic water level meter.

2. When sampling ground water is suspected of being contaminated by light nonaqueous-phase liquids (LNAPLs) such as gasoline or diesel fuel, a sample of the uppermost standing water in the well is collected prior to purging using a clear disposable bailer to check for free product.

3. Groundwater monitoring wells are purged of at least 3 casing volumes of water, unless slow recharge to the well makes this impossible to accomplish in one day. Very slow recharging wells are purged of at least the water content of the casing and filter pack, pumped or bailed dry, and allowed to recover. The wells are purged by either hand bailing with a decontaminated PVC bailer or with a downhole pump.

4. The purged water is periodically monitored for pH, temperature, specific conductivity and turbidity (NTU's). Dissolved oxygen and oxidation-reduction potential may also be monitored. No sample is taken until water quality parameters stabilize to no more than a 10% difference between two successive readings and turbidity is lower than 5 NTU.

5. At the completion of purging, the wells are allowed to recover to at least 80% of their static water level, or for a maximum period of 24 hours.

6. A groundwater sample is then obtained using a Teflon bailer with a control valve. Either a new, disposable Teflon bailer is used for each well, or a reusable bailer is used. If a reusable bailer is chosen to obtain the samples, it will be decontaminated between each well by washing with a non-phosphate solution bath and double rinsing with deionized water.

7. In some pumping wells, collecting the sample using a bailer may not be possible, and the sample must be taken from a discharge outlet at the surface.

8. Groundwater samples to be analyzed are collected in EPA approved 40 ml vials capped with teflon-backed septums. The sample is taken such that the entire vial is filled and the meniscus overtops the vial, with no air bubbles or head space. Samples for organic analysis are not filtered or chemically preserved.

9. Three 40 ml vials are collected for each analysis. Each vial is appropriately labeled, placed in a ziplock bag, and preserved in an ice chest at a temperature of 4 degrees Celsius.

10. Sampling data is recorded on appropriate forms. In addition to time, date, and location of sample, the physical condition of the sample, such as color, presence of free product, suspended material or air bubbles, is noted on the sampling form.

    All samples for laboratory analysis are logged on Chain-of-Custody forms and delivered in a chilled state to a certified laboratory within 24 hours of sampling. For this project, water samples from each well will be analyzed for a gasoline and diesel by DHS-modified EPA Method 8015, and for BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes) by EPA Method 8020.

11. If a purge pump is used, it will be cleaned prior to use and between wells. All sampling will proceed from the areas assumed to be the least impacted and finishing where the groundwater is likely to be the most impacted. All monitoring and sampling equipment is washed in a nonphosphate solution bath and triple rinsed between wells. Triple rinsing consists of a double rinse in clean water, followed by a final rinse in deionized or distilled water.

REPORT PREPARATION

all reports to County only

At the conclusion of the investigation, two reports will be issued. A monitoring well installation report will be prepared for submittal to the Regional Water Quality Control Board (RWQCB), and a Preparation of a Tier 1 RCBA Risk Assessment Report for submittal to the City of Oakland's Environmental Health Department. The monitoring well installation report will include:

- Brief summary of the site history;
- Description of the site hydrogeology, along with detailed boring logs;
- Scaled plot plan showing well locations, property improvements, and nearest streets;
- Plot plan showing groundwater contours, gradient, and thickness of free product (if any),

- Description of all field procedures;
- Summary tables of water quality parameter results from the well development and purging;
- Analytical summary tables for the soil sample and groundwater sample results;
- Discussion of the analytical and geological findings;
- Conclusions and recommendations based on the analytical and geological findings;
- Copies of all original laboratory report and QA/QC data;
- Signature by a California Registered Geologist.

Hold until site properly characterized

The Tier 1 RCBA Risk Assessment Report will be based on ASTM guideline Designation ES 1739-95: Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, and on applicable addendums to this document issued by the RWQCB. This report will satisfy all of the requirements required by ASTM ES-1739-95 for a Tier 1 screening level, as required by Barney Chan of the Alameda County Health Care Services Agency. The Tier 1 RCBA report will include:

- Development of Tier 1 screening levels, given in an evergreen "look-up" table containing conservative risk-based screening levels, for hazardous materials known to be present at the site;
- Comparison of the site conditions with Tier 1 screening levels;
- Deciding if Tier 1 screening target levels are met.

The goals of this project include:

- Qualify the subject as Low Risk;

- Minimization of future monitoring well monitoring;
- End need for further characterization;
- Confirm that remediation is not needed.

If you have any further questions or concerns regarding the proposed procedures for this investigation, please contact the undersigned at (415) 330-3000, extension 126.

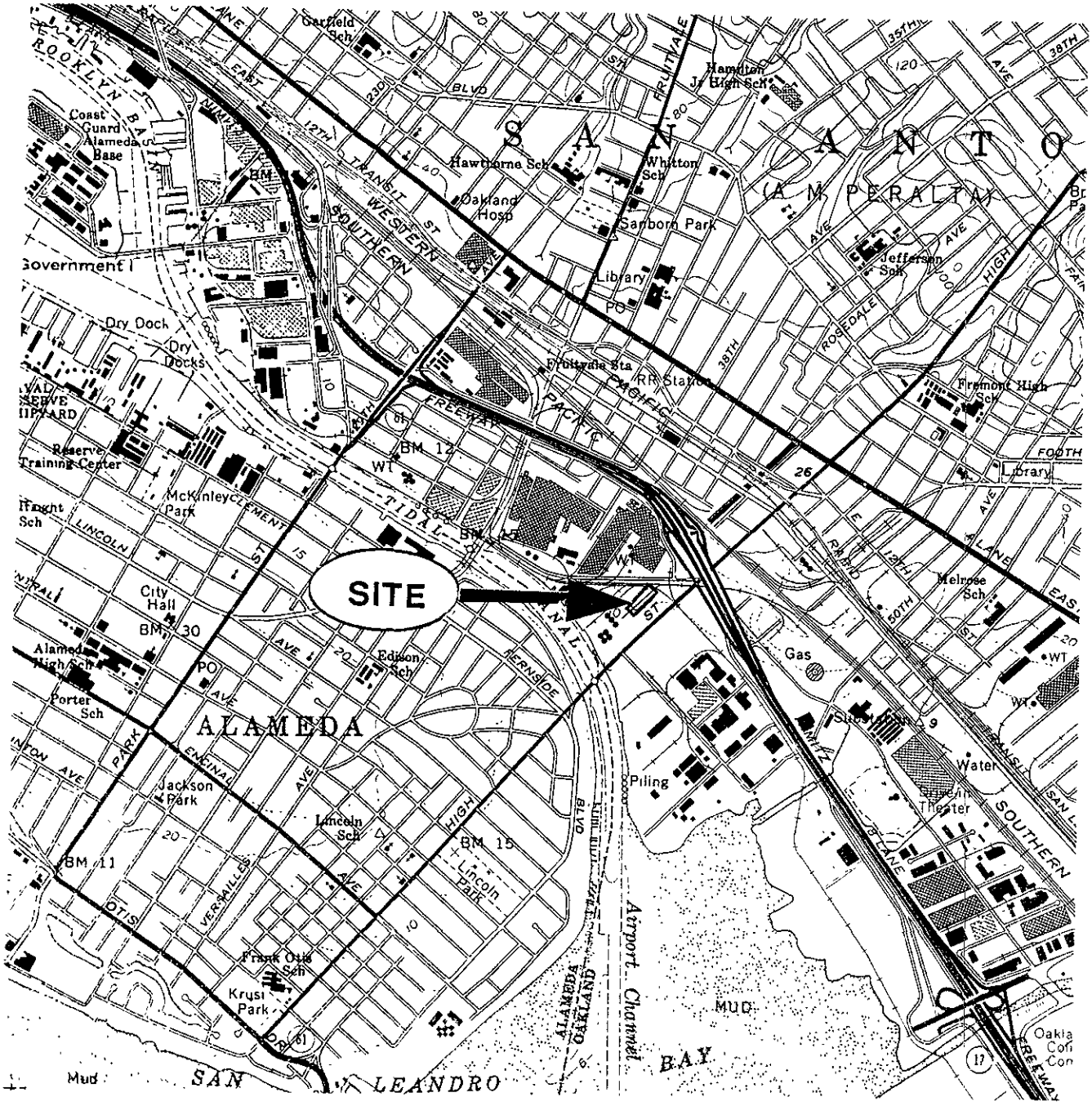
Respectfully Submitted,
SMITH-EMERY GEOSERVICES

MILES GRANT, R.G.
Registered Geologist 5367
Project Geologist

Reviewed and Approved by

KRIS JOHNSON, R.G., C.E.G.
Registered Geologist 5932
Certified Engineering Geologist 191
Vice President

SCALE: 1" = 2000'



REFERENCE:
U.S.D.I. - GEOLOGICAL SURVEY
OAKLAND EAST QUADRANGLE
ALAMEDA COUNTY, CALIFORNIA

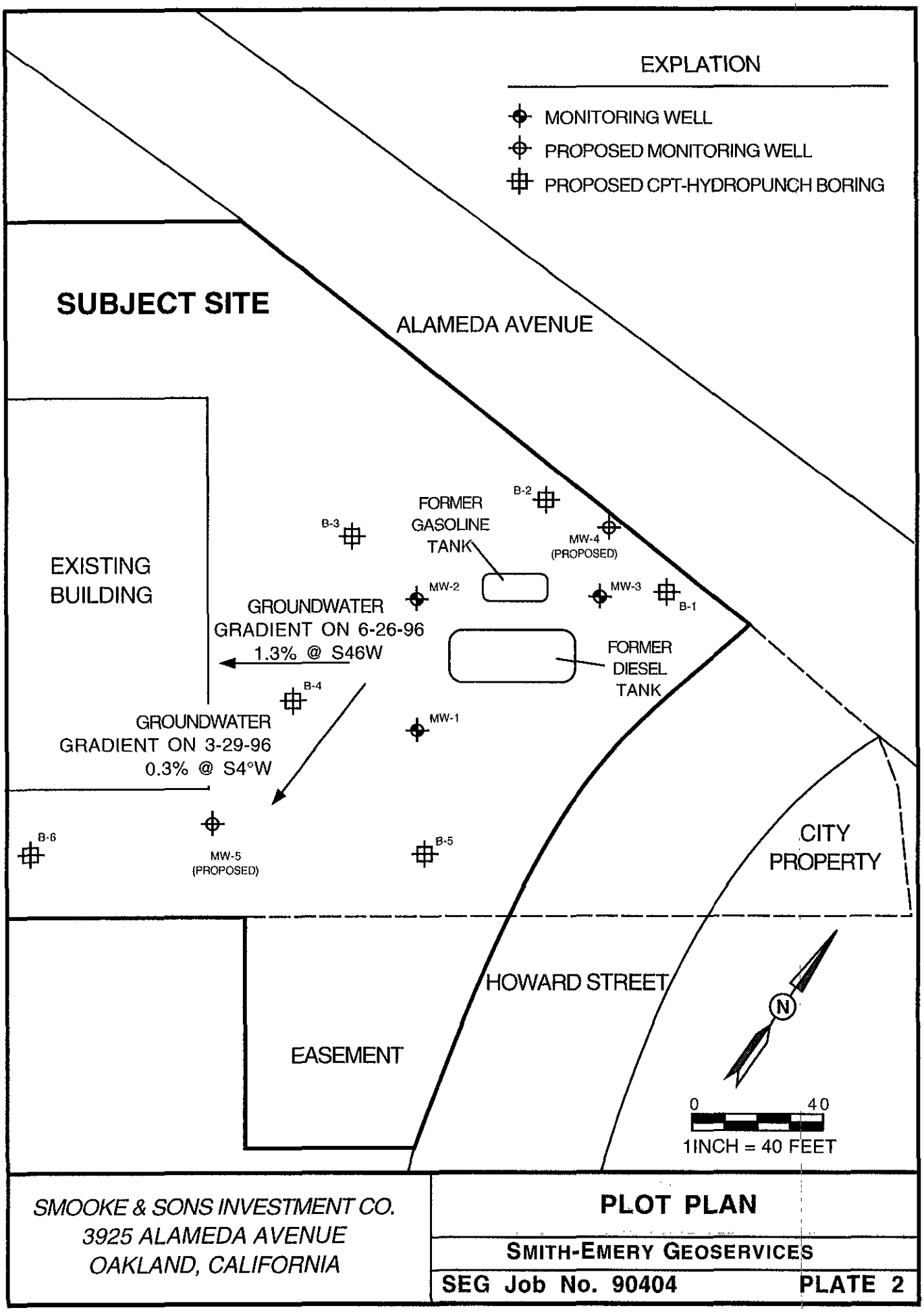
VICINITY MAP

FILE REVIEW
SMOOKE & SONS
3925 ALAMEDA AVENUE
OAKLAND, CALIFORNIA

SMITH-EMERY GEOSERVICES

JOB NO: 90404

PLATE 1



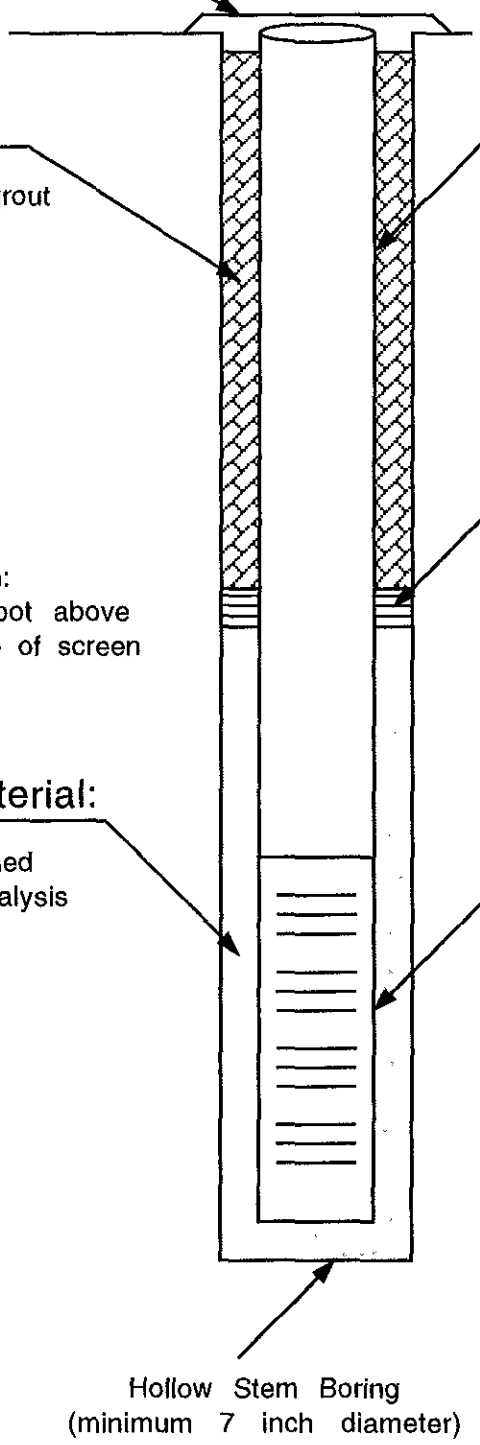
SMOOKE & SONS INVESTMENT CO.
3925 ALAMEDA AVENUE
OAKLAND, CALIFORNIA

PLOT PLAN

SMITH-EMERY GEOSERVICES

SEG Job No. 90404 **PLATE 2**

TYPICAL WELL DIAGRAM



Above Grade Well Cover
Set in Concrete

Blank Casing

Diameter: 2 inch, minimum
Type: PVC

Grout Seal:

Type: Cement grout

Seal:

Type: Bentonite-granular or pellets.
Thickness: 1 foot minimum.

Top filter depth:
minimum 1-foot above top of screen

Filter Material:

To be determined from sieve analysis

Screen:

Type: PVC
Diameter: 2 inch minimum
Slot size: 0.01 inch
Length: Maximum 30 feet, 5 feet above static water level and 10 feet below.

Hollow Stem Boring
(minimum 7 inch diameter)

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PLATE 3