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HAGEMAN-AGUIAR, INC.
Environmental & Water Resources Engineering
Groundwater Consultants

PROPOSED WORKPLAN

FOR

SUBSURFACE INVESTIGATION

SIEGEL & STRAIN PROPERTY

1295 - 59th Street
Emeryville, California

December 1, 1998

11100 SAN PABLO AVE., SUITE 200-A • EL CERRITO, CALIFORNIA 94530 • (510) 620-0891 • FAX (510) 620-0894

I. INTRODUCTION

The site location is the Siegel & Strain property at 1295 - 59th Street, Emeryville, California. The location of the site is shown in Figure 1. The current layout of the site is shown in Figure 2.

Background Information

The original owner of the property, Paul Metz, used the property for the location of his masonry brick business. Upon Paul Metz's death, his son, Arnold Metz, inherited the property. Arnold Metz used the building on the property to house his personal effects. Sometime in the Fall of 1992, Arnold Metz sold the property to Eric Schmier.

In order to evaluate and document the environmental conditions of the property prior to the close of an upcoming real estate transaction between Eric Schmier and the current owner (Siegel & Strain), a Level I Environmental Site Assessment investigation was conducted by Hageman-Aguiar, Inc. The results of the investigation were presented in the "*RESULTS OF LEVEL I ENVIRONMENTAL SITE ASSESSMENT, Property at 1295 59th Street, Emeryville, CA*" by Hageman-Aguiar, Inc., dated April 19, 1993.

During the site walk-through in 1993, there was obvious evidence that an underground storage tank was present on the site. The evidence consisted of a large rectangle of settled soil located in the storage yard, near the 59th Street driveway. According to various inquiries of one or more persons associated with the property, a small underground

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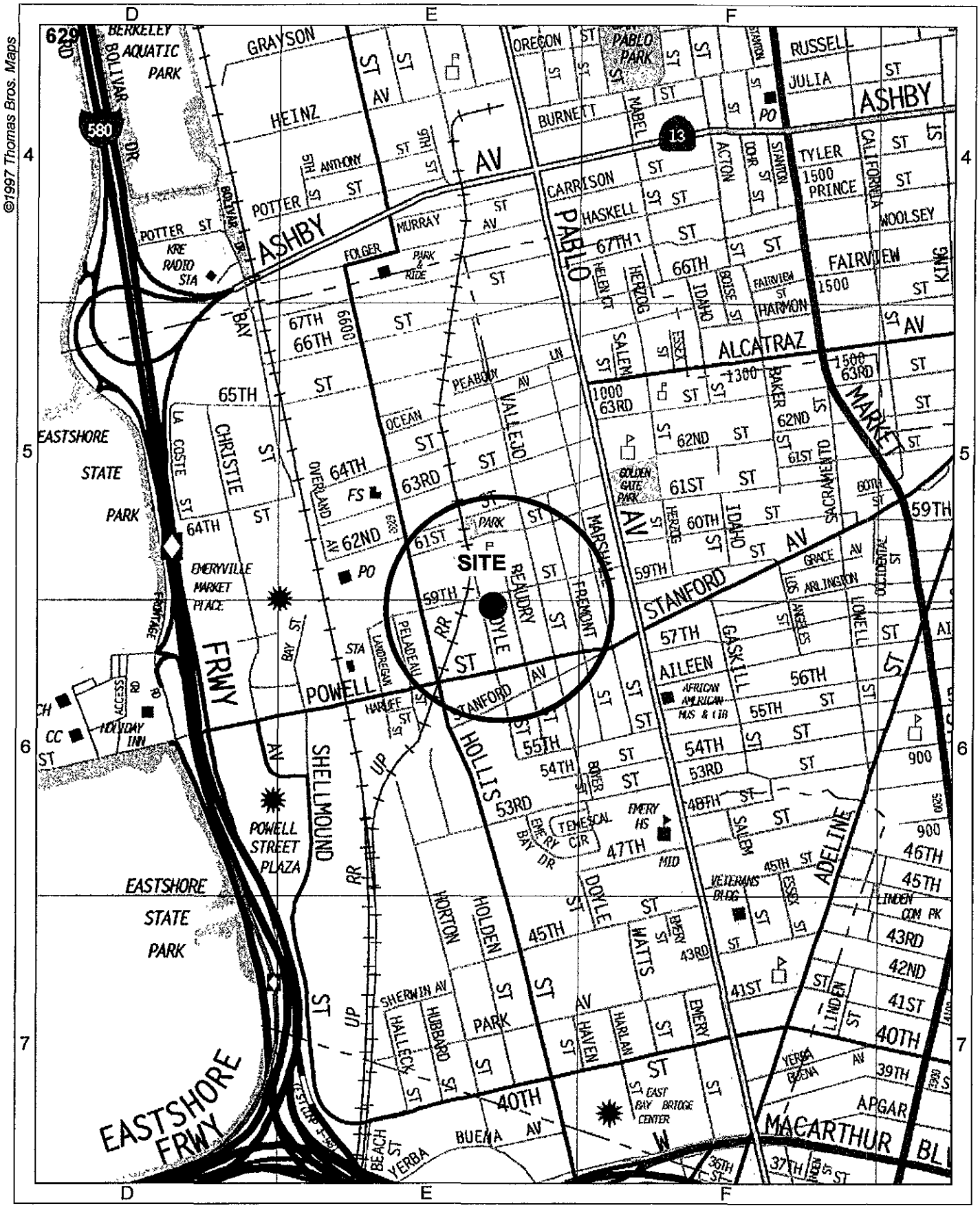


● *1295 59th St, Emeryville, 94608, Page & Grid 629 E6*

FIGURE 1.

Site Location Map.

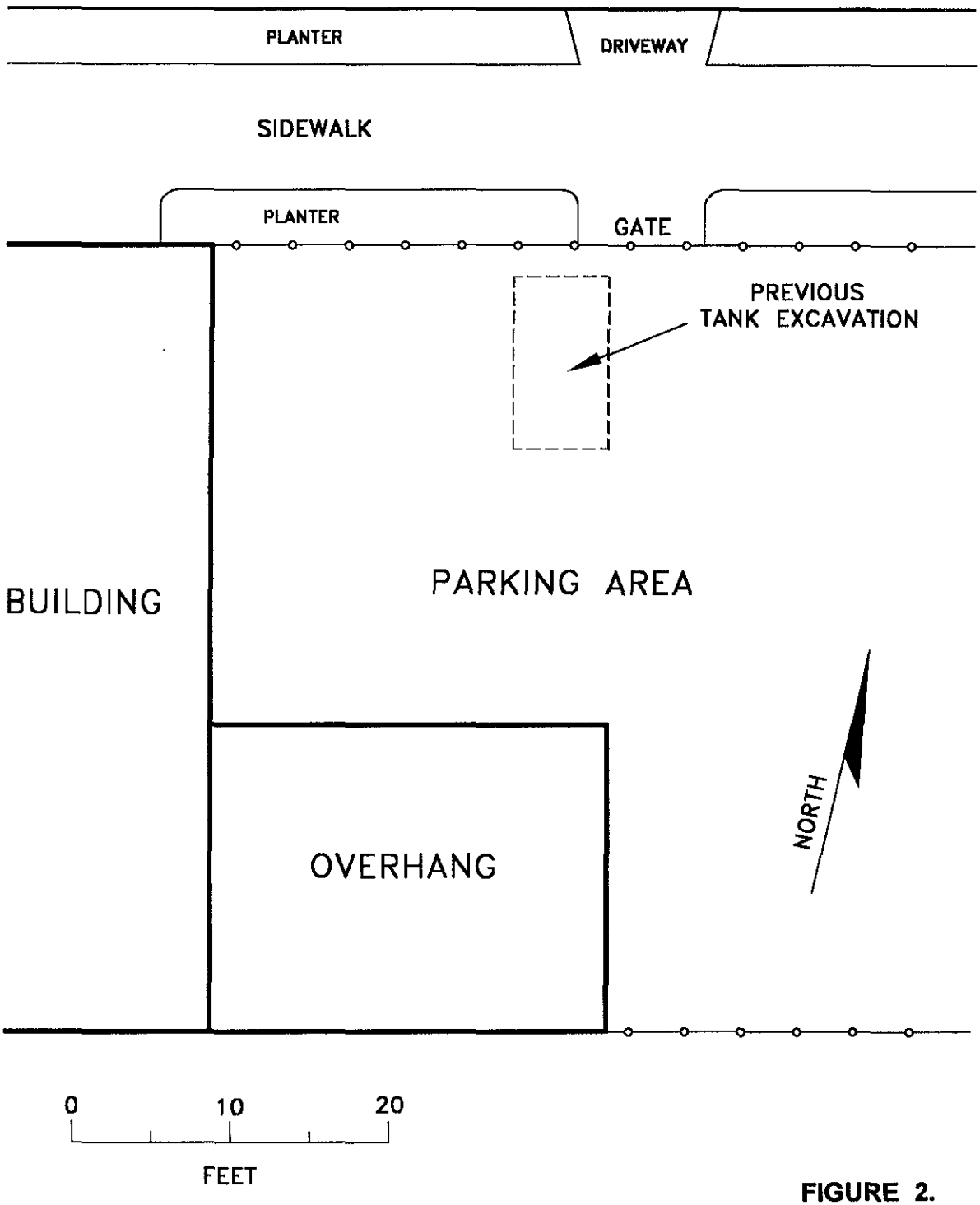


FIGURE 2.

Site Map.

storage tank was removed from the site some time prior to 1993. According to witnesses of the tank removal, the tank was empty of product and there was no visual evidence of soil or groundwater contamination. Little else seems to be known about the tank. There is no record of the tank at either the Emeryville Fire Department or at the Alameda County Office of Environmental Health. It is likely that the tank was never registered with any local or state agency.

At the request of Eric Schmier, a limited subsurface investigation was conducted by Hageman-Aguiar, Inc., as a follow-up to the Level I Environmental Site Assessment. The scope of work involved soil sampling and "grab" shallow groundwater sampling at two locations within the area of the suspected previous underground storage tank location. The results of the investigation were presented in the "*REPORT OF LIMITED LEVEL II ENVIRONMENTAL SITE ASSESSMENT, Property at 1295 59th Street, Emeryville, California*" by Hageman-Aguiar, Inc., dated May 10, 1993. For this investigation, soil and groundwater samples were analyzed for Gasoline, BTEX and Extractable Petroleum Hydrocarbons. The results of the investigation indicated the presence of Gasoline and Diesel in the shallow groundwater perched within the excavation backfill at concentrations of 11,000 μg/L (ppb) and 1,100 μg/L (ppb), respectively. In addition, Benzene was detected in the shallow groundwater at a concentration of 23 μg/L (ppb).

Purpose of Subsurface Investigation

The purpose of this proposed subsurface investigation is to collect soil and groundwater samples at several boring locations in order to assess the subsurface environmental conditions both up- and down-gradient of the previous underground tank location. The scope of work is intended to collect enough data so that either 1) the case can be immediately closed by Alameda County Environmental Health in the event that all samples are "non-detect", or 2) a sensitive receptor survey and RBCA-type risk assessment can be performed for the site in order to achieve case closure.

II. SITE DESCRIPTION

Hydrogeologic Setting

The location of the site with respect to surface topography and various hydrologic features is shown in Figure 3. The soils beneath the site consist of Quaternary Alluvium overlying Franciscan bedrock (Geologic Map of California, San Francisco Sheet, State of California Division of Mines and Geology, 1980). Bedrock is likely to occur at a depth of greater than 50 feet beneath the site. On this portion of the low-lying Bay Plain in close proximity to San Francisco Bay, the soils beneath the site can be expected to consist primarily of fine grain soils (silts and clays), with the majority of shallow groundwater movement occurring in thin sand and gravel layers and/or "stringers". In addition to naturally occurring alluvium, artificial fill overlying young Bay Mud can be found throughout this portion of Emeryville.

Based upon the surface topography, as well as the various hydrologic features shown on the vicinity map, the general regional shallow groundwater can be expected to flow from the Berkeley Hills (area of groundwater recharge) and move westward toward San Francisco Bay (area of discharge).

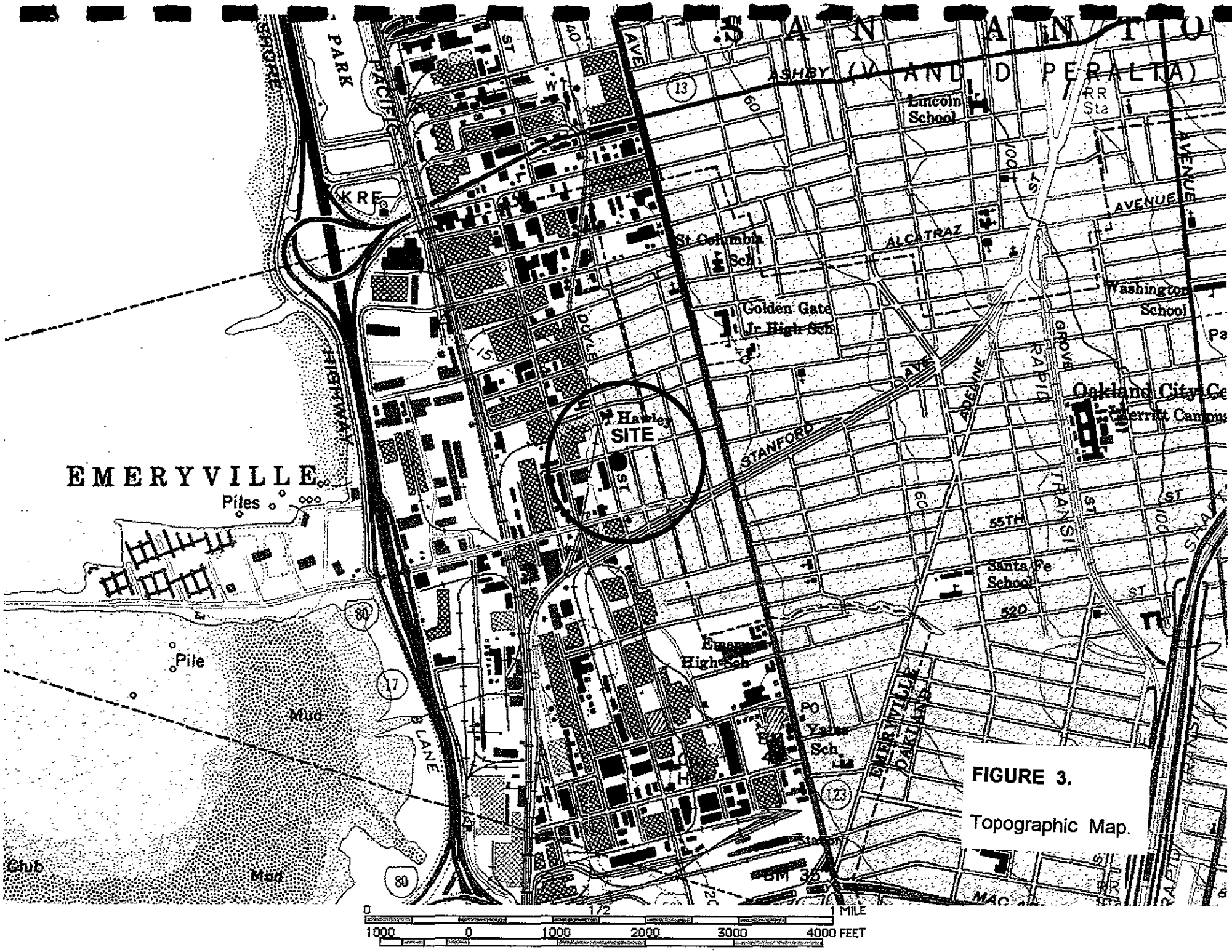


FIGURE 3.

Topographic Map.

III. PROPOSED SCOPE OF WORK

Sampling Locations

The proposed boring locations are shown in Figure 4. The locations have been selected based upon an attempt to assess the subsurface environmental conditions both up- and down-gradient of the previous underground tank location.

Soil Sampling

At each boring location, soil samples will be collected by Hageman-Aguiar, Inc., personnel using a 3-inch diameter hand-auger. At each location, soil samples for chemical analyses will be collected at depth intervals of 5 feet until the shallow groundwater table is encountered. In the event that the shallow groundwater table is found to be less than 5 feet below ground surface, an attempt to collect a soil sample immediately above the water level in the borehole. If very shallow groundwater is encountered, it may not be practical to collect any soil samples.

After hand auguring to the desired depth, a soil sample will be collected by driving directly into undisturbed soil using a 2-inch diameter, 6-inch long, solid barrel sampler fitted with a brass tube. The ends of the brass tube will be sealed with Teflon film, over which will be placed plastic end-caps. The end-caps will then be sealed onto the brass tube with clean plastic adhesive tape. All soil samples will immediately placed on ice, then transported under chain-of-custody to the laboratory by the end of the work day.

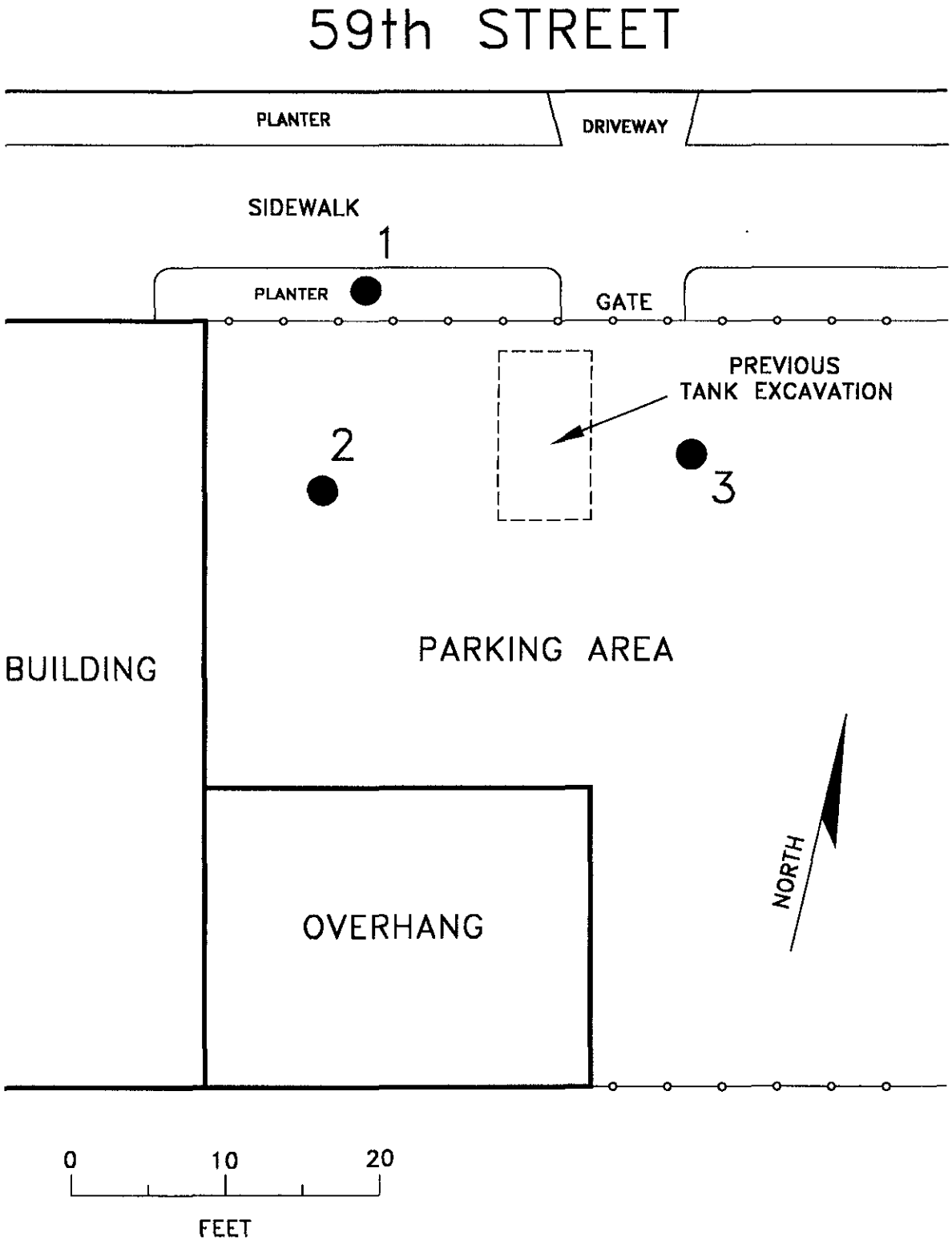


FIGURE 4.

Proposed Boring Locations.

Shallow Groundwater Sampling

Upon completion of each hand boring, a "grab" groundwater sample will be collected using a new disposable sampling bailer. The water samples will be placed inside 40 ml VOA vials and 1-liter amber bottles free of any headspace. The groundwater samples will be immediately placed on ice, then delivered under chain-of-custody to the laboratory by the end of the work day.

Boring Logs

The soil sampling operation will be conducted under the supervision of Gary Aguiar (Registered Civil Engineer #34262). Completed boring logs will be provided in the final investigation report.

Hole Sealing

Following the completion of the groundwater sampling operation, each boring will be filled with neat cement grout.

Equipment Decontamination

Prior to the conduct of field work, all equipment, including augers, drive samplers, and brass tubes will be decontaminated by washing in a water & TSP solution, followed by a double water rinse.

Waste Generation

All soil cuttings will be stockpiled on-site and covered with plastic sheeting, until the results of laboratory analyses are obtained.

IV. LABORATORY ANALYSIS

All analyses will be conducted by a California State DOHS certified laboratory in accordance with EPA recommended procedures.

All soil and groundwater samples will be analyzed for:

1) Total Petroleum Hydrocarbons as Gasoline
(EPA method 8015 Modified).

2) Benzene, Toluene, Ethylbenzene, and Total Xylenes
(EPA method 8020).

3) Total Petroleum Hydrocarbons as Diesel
(EPA method 8015 Modified).

4) Methyl Tertiary Butyl Ether (MTBE)
(EPA method 8020 Modified).

V. REPORT

A report will be written that will provide a description of all field work and all laboratory results. The report will include, but not be limited to, the following:

1) a map showing sampling locations.
2) soil and formation conditions.
3) geologic logs.
4) depths to groundwater.
5) results of laboratory analyses.

VI. SITE SAFETY PLAN

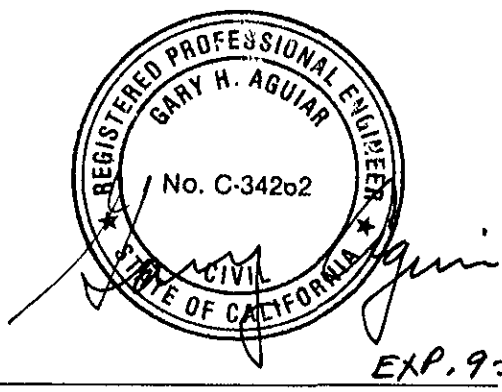
A site-specific set of health and safety operating procedures is included in Attachment A. In order to maintain a safe working environment for field personnel, a copy of these operating procedures will be kept on-site during the field operations, and will be followed in accordance with the magnitude of any contamination encountered.

PROPOSED WORKPLAN FOR SUBSURFACE INVESTIGATION

SIEGEL & STRAIN PROPERTY

1295 59th Street, Emeryville, CA.

December 1, 1998



EXP. 9-30-99

Gary Aguiar **RCE 34262**

ATTACHMENT A

SITE HEALTH & SAFETY PLAN

SITE HAZARD INFORMATION

FC 1006 (05-11-90)

**PLEASE PROVIDE THE FOLLOWING INFORMATION FOR THE SITE*

Owners Name: Siegel and Strain Architects

Site Address: 1295 59th Street

Emeryville, CA 94608

Directions to Site: (from the East) I-80 West. Exit Powell Street and turn left over the freeway. Turn left onto Hollis Street. Turn right onto 59th Street. The site is near the corner of Doyle and 59th Streets.

Consultant On Site: Hageman-Aguiar, Inc., Gary Aguiar Phone Number: (510) 620-0891

Site Safety Officer: Gary Aguiar Phone Number: (510) 620-0891

Type of Facility: Architect Offices

Site Activities: ☒ Drilling ☐ Construction ☐ Tank Excavation ☐ Soil Excavation ☐ Work in Traffic Area

☐ Groundwater Extraction ☐ Vapor Extraction ☐ In Situ Remediation ☐ Above Ground Remediation

☐ Other:

Hazardous Substance

Name (CAS#)	Expected Concentration ☐ Soil ☒ Water ☐ Air	Health Affects
Gasoline	less than 5 ppb	Eye irritation, dizziness.
Diesel	less than 5 ppb	Mild irritation to skin and upper respiratory tract, headache, dizziness, nausea.

Physical Hazards

☒ Noise ☐ Excavations/Trenches

☐ Traffic ☐ Other

☒ Underground Hazards (possible)

☐ Overhead Hazards

Potential Explosion and Fire Hazards (Flammable Range = 1% to 10% Gas Vapor): LEL meter will be on-site. Maintain vapors at less than 10% LEL.

Level Of Protection Equipment

☐ A ☐ B ☐ C ☒ D ☒ See Personal Protective Equipment

Personal Protective Equipment

R = Required A = As Needed

R	Hard Hat	A	Safety Eyewear (Type)
R	Safety Boots	A	Respirator (Type) 1/2-face negative pressure respirator
A	Orange Vest		Filter (Type) Carbon/HEPA
R	Hearing Protection	R	Gloves (Type) Nitrile
A	Tyvek Coveralls		Other
	5 Minute Escape Respirator		

SITE HAZARD INFORMATION

FC 1006 (05-11-90)

Monitoring Equipment on Site

☒	Organic Vapor Analyzer	☒	PID with lamp of 10.6 eV
☒	Oxygen Meter	☐	Draeger Tube _____
☐	Combustible Gas Meter	☐	Passive Dosimeter
☐	H_2S Meter	☐	Air Sampling Pump
☐	W.B.G.T.	☐	Filter Media _____

Site Control Measures Public access will be restricted by a temporary barrier, signs, and CAUTION tape. The site will be continuously supervised.

Decontamination Procedures Sampling equipment will be washed with TSP on-ste. Rinseate will be stored in DOT 17H 55-gallon drums. Gloves and tyvek suits will be disposed of in the facility's solid waste disposal bin. Personnel will wash with soap and water before leaving the site.

Hospital/Clinic Alta Bates Phone (510) 204-4444

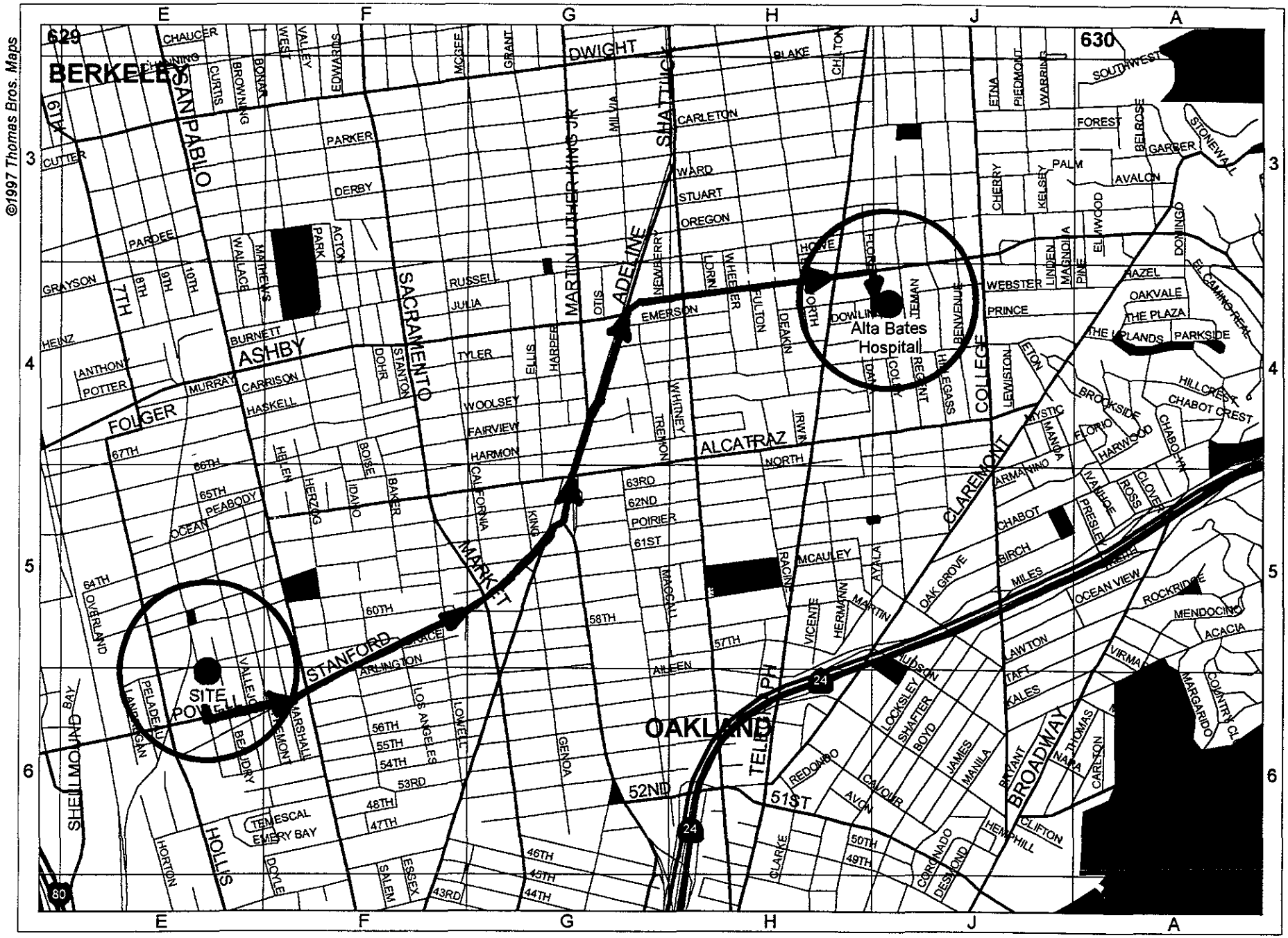
Hospital Address 2450 Ashby Avenue, Berkeley, CA 94705

Paramedic 911 Fire Dept. 911 (510) 596-3750 Police Dept. 911 (510) 596-3700

Emergency/Contingency Plans & Procedures Use emergency shut-off on the drill rig. Clear the area. Meet at a pre-designated staging location. Call 911.

Site Hazard Information Provided By: Renee' L. Athey (Print) Phone Number: (510) 620-0891

Renee' L. Athey (Signature) Date: November 30, 1998



- *SITE: 1295 59th St, Emeryville, 94608, 629 E6*
- *Alta Bates Hospital: 2450 Ashby Avenue, Berkeley, 94705, 629 J4*

HAGEMAN - AGUIAR, INC.

Standard Operating Procedure HS-01

HEALTH AND SAFETY PROCEDURES

FOR

FIELD INVESTIGATION OF UNDERGROUND SPILLS OF
MOTOR OIL AND PETROLEUM DISTILLATE FUEL

November 1998

CONTENTS

1. PURPOSE

This operating procedure establishes minimum procedures for protecting personnel against the hazardous properties of motor oil and petroleum distillate fuels during the performance of field investigations of known and suspected underground releases of such materials. The procedure was developed to enable Hageman-Aguiar, Inc., health and safety personnel and project managers to quickly prepare and issue site safety plans for investigations of such releases.

2. APPLICABILITY

This procedure is applicable to field investigations conducted by Hageman-Aguiar, Inc., of underground releases of the substances listed below and involving one or more of the activities listed below:

2.1 Substances

Motor oil (used and unused)
Leaded and unleaded gasoline
No. 1 Fuel oil (kerosene, JP-1)
No. 1-D Fuel oil (light diesel)
No. 2 Fuel oil (home heating oil)
No. 2-D Fuel oil (medium diesel)
No. 4 Fuel oil (residual fuel oil)
No. 5 Fuel oil (residual fuel oil)
No. 6 Fuel oil (Bunker C fuel oil)
JP-3, 4 & 5 (jet fuels)
Gasahol

2.2 **Activities**

-- Collection of samples of subsurface soil with aid of truck-mounted drill rig, hand-held power auger or hand auger.

-- Construction, completion and testing of groundwater monitoring wells.

-- Collection of groundwater samples from new and existing wells.

-- Observing removal of underground fuel pipes and storage tanks.

This procedure must not be used for confined space entry (including trench entry).

No safety plans are needed for non-intrusive geophysical surveys, reconnaissance surveys and collection of surface soil, surface water and biota.

3. RESPONSIBILITY & AUTHORITY

Personnel responsible for project safety during Hageman-Aguiar, Inc., field activities are the Corporate Health and Safety Officer (**HSO**), the Project Manager (**PM**) and the Site Safety Officer (**SSO**).

The **HSO** is responsible for reviewing and approving site safety plans and any addenda and for advising both PM and SSO on health and safety matters. The **HSO** has the authority to audit compliance with the provisions of site safety plans, suspend work or modify work practices for safety reasons, and to dismiss from the site any individual whose conduct on site endangers the health and safety of others.

The **PM** is responsible for having site safety plans prepared and distributed them to all field personnel and to an authorized representative of each firm contracted to assist with on-site work. The **PM** is also responsible for ensuring that the provisions of safety plans and their addenda are carried out.

The **SSO** is responsible for assisting the **PM** with on site implementation of site safety plans. Responsibilities include:

1. Maintaining safety equipment supplies.
2. Performing or supervising air quality measurements.
3. Directing decontamination operations and emergency response operations.
4. Setting up work zone markers and signs if such zones are specified in the site safety plan.
5. Reporting all accidents, incidents and infractions of safety rules and requirements.
6. Directing other personnel to wear protective equipment when use conditions (described in **Section 5.0**) are met.

The **SSO** may suspend work anytime he/she determines that the provisions of the site safety plan are inadequate to ensure worker safety and inform the **PM** and **HSO** of individuals whose on-site behavior jeopardizes their health and safety of the health and safety of others.

4. HAZARD EVALUATION

Motor oil and petroleum distillate fuels are mixtures of aliphatic and aromatic hydrocarbons. The predominant classes of compounds in motor oil, gasoline, kerosene and jet fuels are the paraffins (e.g., benzene, toluene). Gasoline contains about 80 percent paraffins, 6 percent naphthenes, and 14 percent aromatic. Kerosene and jet fuels contain 42- 48 percent paraffins, 36-38 percent naphthenes, and 68-78 percent non-volatile aromatic. These heavier fuels contain almost no volatile aromatic compounds. Chemicals are usually added to automotive and aviation fuels to improve their burning properties. Examples are tetraethyl-lead and ethylene dibromide. Most additives are proprietary materials.

4.1 Flammability

Crude oil and petroleum distillate fuels possess two intrinsic hazardous properties, namely, flammability and toxicity. The flammable property of the oil and fuels presents a far grater hazard to field personnel than toxicity because it is difficult to protect against and can result in catastrophic consequences. Being flammable, the vapors of volatile components of crude oil and the fuels can be explosive when confined.

The lower flammable or explosive limits (LFL or LEL) of the fuels (listed in Section 2.1) range from 0.6 percent for JP-5 to 1.4 percent for gasoline. LFL and LEL are synonyms. Flash points range from -36°F for gasoline to greater than 150°F for No. 6 fuel oil. JP-5 has a flash point of 140°F. Although it has a lower LEL than gasoline, it can be considered less hazardous because its vapors must be heated to a higher temperature to ignite.

Crude oil and petroleum distillate fuels will not burn in the liquid form; only the vapors will burn and only if the vapor concentration is between the upper and lower flammable limits, sufficient oxygen is present, and an ignition source is present. If these conditions occur in a confined area an explosion may result.

The probability of fire and explosion can be minimized by eliminating any one of the three factors needed to produce combustion. Two of the factors -- ignition source and vapor concentration -- can be controlled in many cases. Ignition can be controlled by prohibiting open fires and smoking on site, installing spark arrestors on drill rig engines, and turning the engines off when LELs are approached. Vapor concentrations can be reduced by using fans. In fuel tanks, vapor concentrations in the head space can be reduced by introducing dry ice (solid carbon dioxide) into the tank; the carbon dioxide gas will displace the combustible vapors.

4.2 Toxicity

Crude oil and petroleum distillate fuels exhibit relatively low acute inhalation and dermal toxicity. Concentrations of 160 to 270 ppm gasoline vapor have been reported to cause eye, node and throat irritation after several hours of exposure. Levels of 500 to 900 ppm can cause irritation and dizziness in one hour, and 2000 ppm produces mild anesthesia in 30 minutes. Headaches have been reported with exposure to 25 ppm or more of gasoline vapors measured with a photoionization meter. Must fuels, particularly gasoline, kerosene and jet fuels are capable of causing skin irritation after several hours of contact with the skin.

Petroleum fuels exhibit moderate oral toxicity. The lethal dose of gasoline in children has been reported to be as low as 10-15 grams (2-3 teaspoons). In adults, ingestion of 20- 50 grams of gasoline may produce severe symptoms of poisoning. If liquid fuel aspirated (passes into the

lungs), gasoline and other petroleum distillate fuels may cause secondary pneumonia.
Some of the additives to gasoline, such as ethylene dichloride, ethylene dibromide, tetraethyl and tetramethyl lead, are highly toxic; however, they are present in such low concentrations that their contribution to the overall toxicity of gasoline and other fuels is negligible in most instances.

OSHA has not developed permissible workplace exposure limits for crude oil and petroleum distillate fuels. It recommends using permissible exposure limits for individual components, such as benzene. The American Conference of Government Industrial Hygienists (ACGIH) has established a permissible exposure limit of 300 ppm for gasoline. The limit took into consideration the average concentration of benzene in gasoline (one percent) as well as its common additives. Exposure limits established by other countries range from 250 to 500 ppm. Chemical data sheets, prepared for the U.S. Coast Guard's Chemical Hazard Information System (CHRIS), list 200 ppm as the permissible exposure limit for kerosene and jet fuels. This limit was not developed by NIOSH/OSHA or ACGIH.

5. HEALTH AND SAFETY DIRECTIVES

5.1 Site-Specific Safety Briefing

Before field work begins, all field personnel, including subcontractor employees, must be briefed on their work assignments and safety procedures contained in this document.

5.2 Personal Protective Equipment

The following equipment should be available on-site to each member of the field team:

- NIOSH-approved full or half-face respirator with organic vapor cartridges (color coded black)
- Saranex or polyethylene-coated Tyvek coveralls
- Splash-proof safety goggles
- Nitrile or neoprene gloves
- Neoprene or butyl boots, calf-length with steel toe and shank
- Hardhats

5.2.1 Equipment Usage

Chemical-resistant safety boots must be worn during the performance of work where surface soil is obviously contaminated with oil or fuel, when product quantities of oil or fuel are likely to be encountered, and within 10 feet of operating heavy equipment.

Respirators must be worn whenever total airborne hydrocarbon levels in the breathing zone of field personnel reach or exceed a 15-minute average of 25 ppm. If total airborne hydrocarbons in the breathing zone exceeds 100 ppm, work must be suspended, personnel directed to move a safe distance from the source, and the HSO or designee consulted.

Chemical resistant gloves must be worn whenever soil or water known or suspected of containing petroleum hydrocarbons is collected or otherwise handled.

Chemical resistant coveralls must be worn whenever product quantities of fuel are actually encountered and when oil for fuel-saturated soil is handled.

Safety goggles must be worn when working within 10 feet of any operating heavy equipment (e.g., drill rig, backhoe). Splash-proof goggles or face shields must be worn whenever product quantities of oil or fuel are encountered.

Hardhats must be worn when working within 10 feet of an operating drill rig, backhoe or other heavy equipment.

Operators of some facilities, such as refineries, often require all personnel working within facility boundaries to wear certain specified safety equipment. Such requirements shall be strictly observed.

5.3 Vapor Monitoring

5.3.1 Required Equipment

--- Organic vapor meter the flame or photoionization detector

--- Combustible gas meter

5.3.2 Monitoring Requirements and Guidelines

Vapor monitoring shall be performed as often as necessary and whenever necessary to protect field personnel from hazardous vapors. Monitoring must be performed by individuals trained in the use and care of the monitoring equipment.

During drilling operations, vapor emissions from boreholes must be measured whenever the auger is removed from the boring and whenever flights are added or removed from hollow- stem augers. This requirement does not apply to borings less than five feet deep and borings of any depth made to install monitoring wells in uncontaminated solid. Measurements should be made initially with an organic vapor meter, followed with a combustible gas meter if vapor levels exceed the highest concentration measurable with the organic vapor meter.

Initially measurements shall be made about 12 inches from the bore hole, both upwind and downwind positions. If the total hydrocarbon concentrations exceed the respirator use action level, measurements must be made in the breathing zone of the individual(s) working closest to the borehole. Decisions regarding respiratory protection should be made using vapor concentrations in the breathing zone.

Organic vapor meter capable of being operated continuously without attention may be operated in that fashion if desired. However, the instrument must be equipped with an alarm set to sound when vapor concentrations reach 25 ppm and must be protected against physical damage and spoilage.

If total organic vapor concentrations within 12 inches of the borehole exceed the capacity of the organic vapor meter, a combustible gas meter (CGM) must be used to determine if explosive conditions exist. Operations must be suspended, the drill rig motor shot down, and corrective action taken if combustible gas concentrations reach 40 percent of LEL within a 12-inch radius of the borehole of 10 percent of LEL at a distance greater than 24 inches from the borehole. This procedure must also be followed whenever the organic vapor meter goes off-scale at its highest range and no CGM is available. If corrective action cannot be taken, field personnel and all other individuals in the vicinity of the borehole must be directed to move to a safe area and the local fire department and facility management must be alerted.

Organic vapor meter with flame ionization detectors (FID) are much more sensitive to paraffins, with the major component of gasoline,

kerosene, and jet fuels, then are meters with 10.0 or 10.2 eV photoionization detectors. As the data in Table 1 show, an FID instrument, such as the Century Systems OVA (Foxboro Analytical), will detect 70-90 percent of actual paraffin concentrations, whereas PID instruments, such as the HNU Model PI-101, AID Model 580, and Photovac TIP with 10.0 to 10.2 eV lamp will detect only 17-25 percent of actual paraffin concentrations when calibrated with benzene and only 24-35 percent when calibrated with isobutylene. Both types of meters are equally sensitive to most aromatic, including benzene, toluene, xylene and ethylbenzene. For these compounds, meter readings equal or exceed 100 percent of actual concentrations. PIDs with 11.7 eV lamps are extremely sensitive to paraffins and aromatic. When calibrated to isobutylene, an 11.7 eV PID will register about twice actual paraffin concentrations and 100 percent or more of actual concentrations of benzene, toluene, and xylene.

An FID meter, recently calibrated with methane and in good working condition, can be expected to provide readings close enough to actual petroleum hydrocarbon concentrations to make corrections unnecessary. Value obtained with a PID must be corrected when measured for paraffins. For 10.0 and 10.2 eV PIDs, the meter reading should be multiplied by 5 if the instrument is calibrated with benzene. If the instrument is calibrated with isobutylene, the meter readings should be multiplied by 3. If the instrument is equipped with an 11.7 eV probe and is calibrated with isobutylene, the meter reading should be divided by 2.

5.4 Area Control

Access to hazardous and potential hazardous areas of spill sites must be controlled to reduce the probability of occurrence of physical injury and chemical exposure of field personnel, visitors and the public. A hazardous or potentially hazardous area includes any area where:

1. Field personnel are required to wear respirators.
2. Borings are being drilled with powered augers.
3. Excavating operations with heavy equipment are being performed.

The boundaries of hazardous and potentially hazardous areas must be identified by cordons, barricades, or emergency traffic cones or posts, depending on conditions. If such areas are left unattended, signs warning of the danger and forbidding entry must be placed around the perimeter if the areas are accessible to the public.

Trenches and other large holes must be guarded with wooded or metal barricades spaced no further than 20 feet apart and connected with yellow or yellow and black nylon tape not less than 3/4-inches wide. The barricades must be placed no less than two feet from the edge of the excavation or hole.

Entry to hazardous areas shall be limited to individuals who must work in those areas. Unofficial visitors must not be permitted to enter hazardous areas while work in those areas are in progress. Official visitors should be discouraged from entering hazardous areas, but may be allowed to enter only if the agree to abide by the provisions of this document, follow orders issued by the site safety officer and are informed of the potential dangers that could be encountered in the areas.

5.5 Decontamination

Field decontamination of personnel and equipment is not required except when contamination is obvious (visually or by odor). Recommended decontamination procedures follow:

5.5.1 Personnel

Gasoline, kerosene, jet fuel, heating oil, gasahol and diesel oil should be removed from skin using a mild detergent and water. Hot water is more efficient than cold. Liquid dishwashing detergent is more effective than hand soap. Motor oil and the heavier fuel oils (No. 4-6) can be removed with dishwashing detergent and hot water also; however, if weathered to an asphaltic condition, mechanic's waterless hand cleaner is recommended for initial cleaning followed by detergent and water.

5.5.2 Equipment

Gloves, respirators, hardhats, boots and goggles should be cleaned as described under personnel. If boots do not become clean after washing with detergent and water, wash them with a strong solution of trisodium phosphate and hot water.

Sampling equipment, augers, vehicle under-carriages and tires should be steam cleaned. The steam cleaner is a convenient source of hot water for personnel and protective equipment cleaning.

5.6 Smoking

Smoking and open flames are strictly prohibited at sites under investigation.

TABLE 1

RELATIVE SENSITIVITIES OF FID AND PID INSTRUMENTS TO SELECTED COMPONENTS OF OILS AND PETROLEUM DISTILLATE FUELS

	Sensitivity in Percent of Standard		
	FID	**PID**	
Component		10.2 eV[a]	11.7 eV[b]
Paraffins			
Pentane	65	--	141
Hexane	70	22 (31)	189
Heptane	75	17 (24)	221
Octane	80	25 (35)	--
Nonane	90	--	--
Decane	75	--	--
Napthenes			
Cyclopentane	--	--	--
Methylcyclopentane	80	--	--
Cyclohexane	85	34 (40)	--
ethylcyclohexane	100	--	--
Aromatic			
Benzene	150	100 (143)	122
Toluene	110	100 (143)	100
Ethylbenzene	100	--	--
p-Xylene	116	114 (60)	--
Cumene	100	--	--
n-Propylbenzene	--	--	--
Napthaline	--	--	--

[a] Values are relative to benzene standard. Values in parentheses are relative to isobutylene standard and were calculated.

[b] Values are relative to isobutylene standard.