WORK PLAN FOR ADDITIONAL SITE INVESTIGATION

PROJECT SITE:

MOTOR PARTNERS
1234 40TH AVE.
OAKLAND, CALIFORNIA
StID #3682

PREPARED FOR:

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SUBMITTED TO:

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PROJECT NO. 1004

September 13, 1997

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INTRODUCTION

PROJECT DESCRIPTION

This work plan outlines continued Phase II investigation activities to be performed at the Motor Partners site, 1234 40th Ave., Oakland, California. The project includes; 1) drilling one additional soil boring down gradient of the former tank area for further characterization and 2) evaluation of the need for conversion of the boring to an additional monitoring well.

This work is to be performed under the direction of the Alameda County Environmental Health Division.

SITE LOCATION AND DESCRIPTION

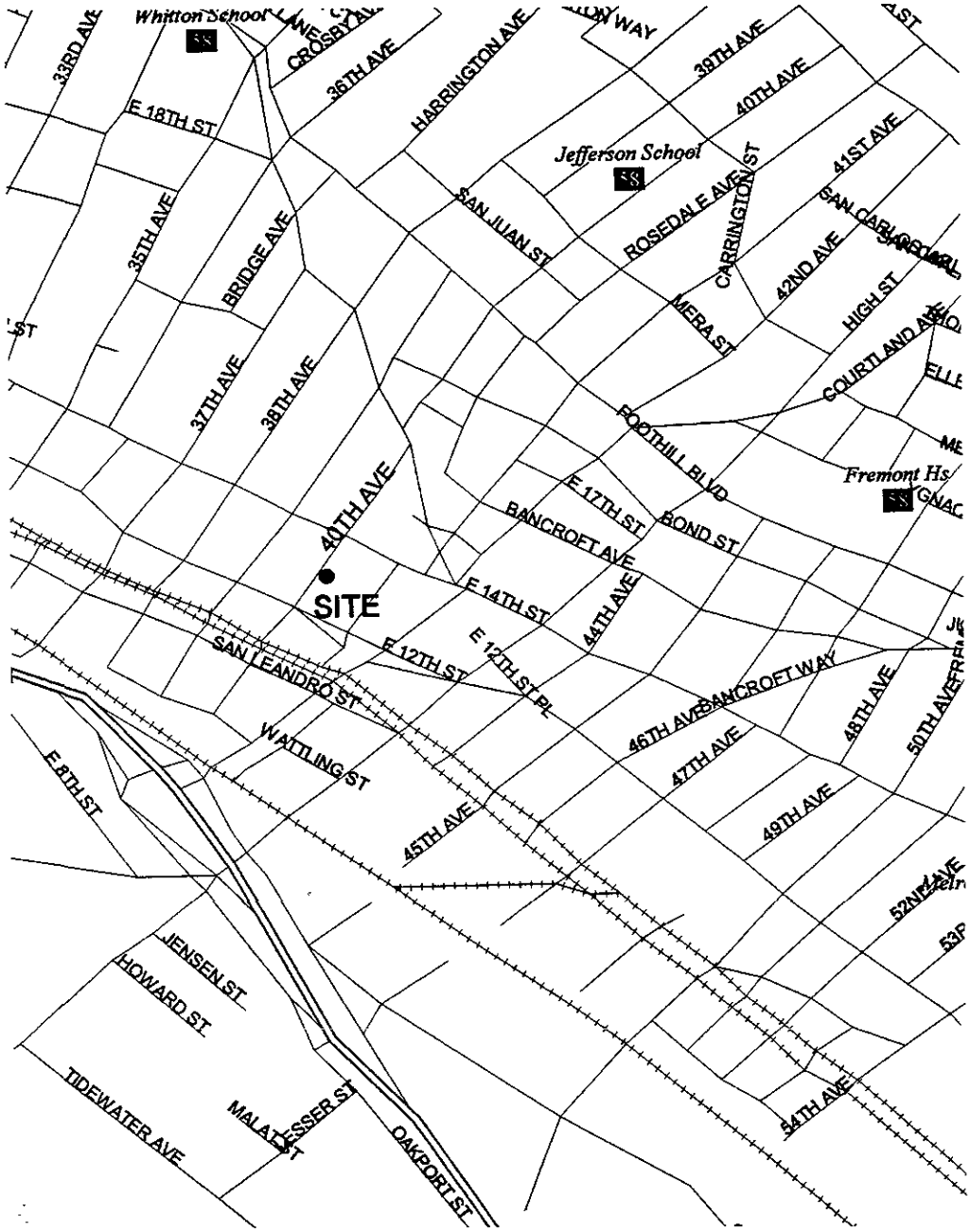
Motor Partners is located at 1234 40th Avenue near Nimitz Highway (880) in the Fruitvale District of Oakland, California (Figure 1). The BART rail tracks are about 500 ft. west of the site and San Leandro Bay is less than one mile to the southwest. The elevation of the site is approximately 25 feet above mean sea level.

Motor Partners utilized the site for auto repair shops. Two underground storage tanks were maintained outside the 1234 40th Avenue building. A 1,000-gallon underground gasoline tank and a 500-gallon underground waste oil tank were located below the sidewalk (Figure 2). No reliable records exist to determine if inventory was lost.

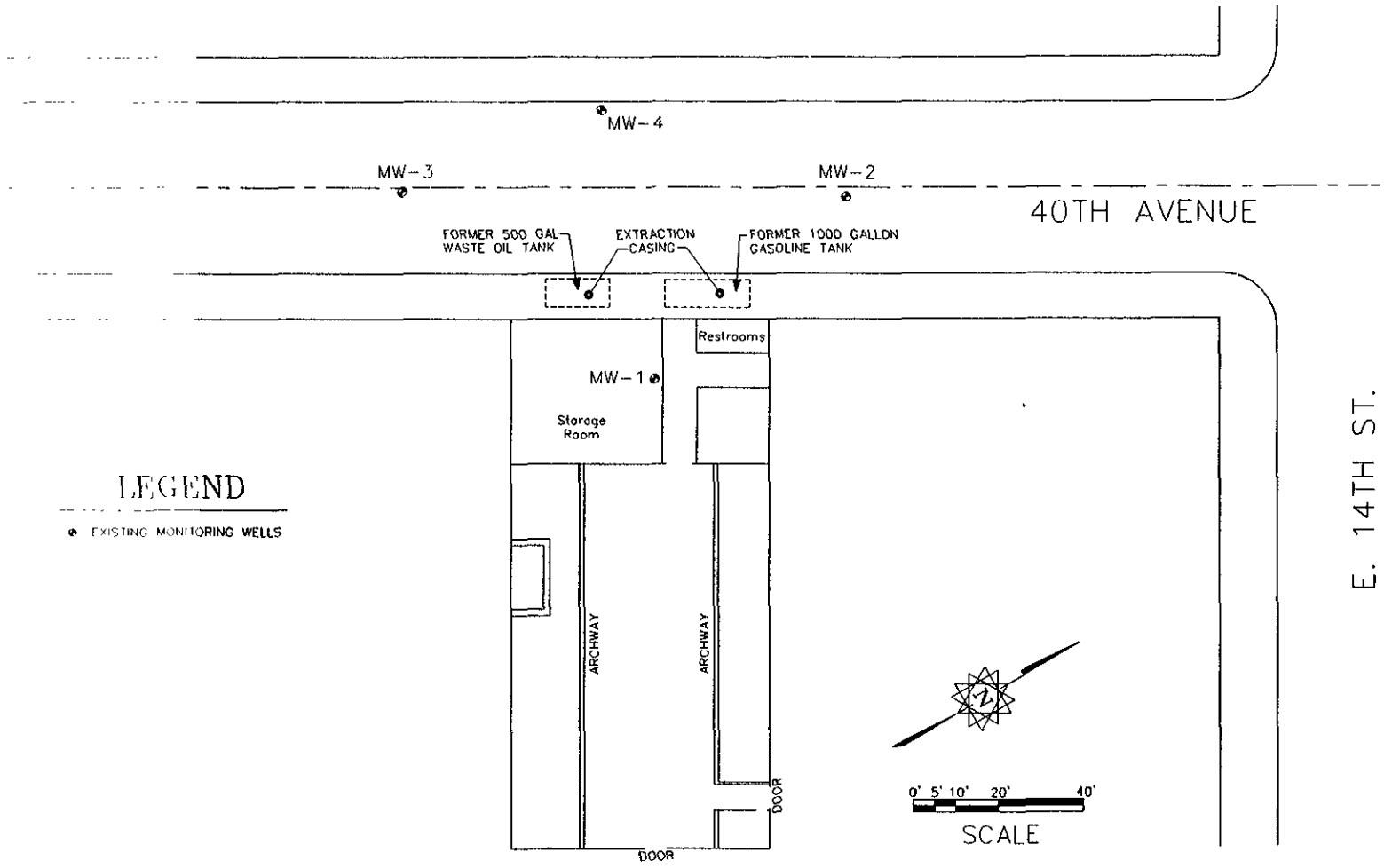
Previous Subsurface Investigations

On Oct. 12, 1990, Semco, Inc. of Modesto, California removed both the 1,000-gallon gasoline tank and the 500-gallon waste oil tank. The concentration of total petroleum hydrocarbons in the gasoline range (TPH-G) below the 1,000-gallon tank was 1,600 mg/Kg. The TPH-G and TPH-D concentrations below the 500-gallon tank were 570 mg/Kg and 650 mg/Kg, respectively. There was no record of groundwater in the excavations. The excavations were backfilled to grade with original spoils.

In January, 1994, SEMCO re-excavated the area to remove contaminated soil, and dispose of the contaminated backfill. During the course of over excavation, it was noted that contamination extended beneath the building and into the street. Utilities prevented further excavation. The over excavation was halted and samples taken from the sidewalls of each excavation. An extraction well casing was installed in each excavation. Clean imported soil was used to backfill the two areas and the sidewalk was resurfaced with Christy boxes housing the two extraction casings.



GARY ROGERS, PH.D. ENVIRONMENTAL CONSULTANT 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DESCRIPTION: Site Location			FIGURE: 1
	PROJECT/LOCATION: Motor Partners 1234 40th Ave., Oakland, CA			
DRAWN BY: GLR	DRAWING DATE: 9 13/97	PROJECT NUMBER: 1004	FILE NAME: 1004-WP2 DWG	PROJECT MANAGER: GLR



GARY ROGERS, PH.D. ENVIRONMENTAL CONSULTANT 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY: GLR DRAWING DATE: 9/13/97 REVISION BY:	PROJECT NUMBER: 1004 FILE NAME: 1004-WP2.DWG PROJECT MANAGER: GLR CHECKED BY:	DESCRIPTION: Site Layout PROJECT/LOCATION: Motor Partners 1234 40th Ave., Oakland	FIGURE: 2

Sampling conducted on January 11, 1994 indicated levels of TPH-gasoline for the former waste oil tank area between 100 and 700 ppm. Levels of TPH-gasoline for the former gasoline tank area ranged from 150 to 1,200 ppm.

GROWTH Environmental completed soil borings at the property between May and June of 1994. Eleven borings were drilled and three monitoring wells were installed. Both soil and groundwater samples were collected from the borings. Soil and groundwater contamination was found in nearly every boring. Levels of TPH-D up to 2,700 ppm were observed on the west side of the building. A sample from inside the building had a TPH-D level of 520 ppm.

Groundwater samples had highest concentrations near the former tank excavations. The highest level of TPH-G was 64,000 ppb. BTEX compounds were found in groundwater samples from all the borings.

The monitoring wells were sampled on June 17, 1994 and December 7, 1994. Contamination was reported in all three wells. Levels of TPH-G were up to 17,000 ppb and Benzene levels were up to 1,200 ppb in MW-1.

An additional quarterly monitoring sampling event was completed on November 29, 1995. All of the wells showed increased TPH-G and BTEX levels when compared to the previous sampling event. TPH-G levels were up to 67,000 ppb in MW-1. The groundwater gradient was calculated to be in a southwesterly direction.

Table 1. Summary of Soil Sampling Results
Motor Partners Site, 1234 40th Ave., Oakland, California

Sample I.D. Number	Date Collected	Depth (ft)	TPH-D (mg/kg)	TPH-G (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl Benzene (mg/kg)	Total Xylenes (mg/kg)
B-1-2 @ 9'	5-17-94	9	260	850	0.55	0.63	0.42	3.6
B-2-2 @ 9.5'	6-1-94	9.5	1,000	1,900	ND	5.0	36	29
B-3-1 @ 6'	5-17-94	6	ND	910	ND	0.026	0.049	0.092
B-4-1 @ 3'	6-1-94	3	ND	ND	ND	ND	ND	ND
B-4-2 @ 7.5'	6-1-94	7.5	44	83	0.087	0.20	0.21	0.46
B-4-3 @ 11'	6-1-94	11	450	1,000	5.6	8.4	15	71
B-5-2 @ 12'	5-17-94	12	2,700	1,100	15	3.7	13	24
B-6-1 @ 9.5'	5-17-94	9.5	140	260	0.49	0.53	3.9	13
B-7-1 @ 6'	6-1-94	6	ND	3.0	0.01	ND	ND	0.019
B-7-2 @ 10.5'	6-1-94	10.5	280	1,100	0.38	1.9	3.4	5.9
B-8-1 @ 6'	6-1-94	6	ND	ND	ND	ND	ND	ND
B-8-2 @ 11'	6-1-94	11	ND	ND	ND	ND	ND	ND
B-9-1 @ 6'	6-2-94	6	ND	ND	ND	ND	ND	0.008
B-9-2 @ 11'	6-2-94	11	ND	1.8	ND	ND	ND	0.01
B-10-1 @ 4'	6-2-94	4	ND	ND	ND	ND	ND	ND
B-10-2 @ 9'	6-2-94	9	ND	2.3	ND	ND	0.007	0.01
B-11-1 @ 4.5'	6-2-94	4.5	ND	ND	ND	ND	ND	ND
B-11-2 @ 9.5'	6-2-94	9.5	520	30	ND	ND	ND	0.073
B-16-3	11-30-95	11.5	640	190	0.1	ND	ND	3.2
B-15-3	11-30-95	14.5	ND	ND	ND	ND	ND	ND
B-19-2	11-30-95	14.5	ND	ND	ND	ND	ND	ND
B-14-2	2-7-96	12	ND	ND	ND	ND	ND	ND
B-13-2	2-7-96	11	ND	ND	ND	ND	ND	ND
B-12-2	2-7-96	11	150	200	ND	0.084	0.62	0.8
B-18-2	2-7-96	11	ND	ND	ND	ND	ND	ND
MW-4-2	2-1-96	10	350	470	0.05	0.14	4.3	1.8
VP-1-1	2-7-96	2 5	240	31	0.01	ND	0 24	0 038
VP-1-2	2-7-96	7 5	ND	ND	ND	ND	ND	ND

Notes: All soil results in mg/kg (ppm) ND = Not Detected NA = Not Analyzed

Table 2. Summary of Groundwater Sampling Results
Motor Partners Site, 1234 40th Ave., Oakland, California

Sample I.D. Number	Date Collected	TPH-D (μg/L)	TPH-G (μg/L)	Benzene (μg/L)	Toluene (μg/L)	Ethyl Benzene (μg/L)	Total Xylenes (μg/L)
B-1-W-1	5-17-94	16,000	16,000	210	46	150	190
B-2-W	6-1-94	7,000	8,100	220	34	220	60
B-3-W-4	5-17-94	620	910	5.3	2.5	3.0	5.0
B-4-W	6-1-94	4,900	38,000	3,200	1,800	2,000	7,100
B-5-W-2	5-17-94	2,100	3,700	370	25	180	160
B-6-W-3	5-17-94	8,600	64,000	2,900	5,200	3,800	13,000
B-7-W	6-1-94	4,500	12,000	380	36	520	170
B-8-W	6-1-94	470	570	6.8	3.2	1.7	5.7
B-9-W	6-2-94	ND	160	2.8	0.62	ND	0.61
B-10-W	6-2-94	1,700	6,100	28	29	14	62
B-11-W	6-2-94	94	750	6.8	3.2	1.7	5.7
B-16	11/30/95	300	2000	ND	2	ND	65
B-15	11/30/95	80	ND	ND	ND	ND	ND
B-19	11/30/95	ND	ND	ND	ND	ND	ND
B-14	2/7/96	ND	ND	ND	ND	ND	ND
B-13	2/7/96	ND	400	3	ND	2	3
B-12	2/7/96	16000	22000	250	7	210	120
B-18	2/7/96	ND	ND	ND	ND	ND	ND
California Drinking Water MCL (μg/L)		None Listed	None Listed	1.0	1000	680	1750
Detection Limit		50	50	0.5	0.5	0.5	0.5

Notes:
All groundwater results in μg/L (ppb)
ND = Not Detected
NA = Not Analyzed

GEOLOGY AND HYDROGEOLOGY

Regional Geology. The site is located on the East Bay Plain about 1.0 mile west of the Oakland Hills, about 1.0 mile east of the San Francisco Bay, and about 0.5 miles north of San Leandro Bay. The property is bounded on the northeast by 14th Street.

The site rests on Quaternary Deposits of various physical and compositional properties. The predominant formation is the Temescal Formation consisting of contemporaneous alluvial units of different origin, lithology, and physical properties. The material ranges from irregularly bedded clay, silt, sand and gravel to lenses of clay, silt, sand, and gravel with Claremont Chert.

The Hayward Fault is approximately 1.5 miles East of the site and is an active historic Fault. The Hayward Fault is the only active fault in the Oakland East Quadrangle.

Regional Hydrogeology. The site is located within the East Bay Plain which makes up the ground water reservoir in the area. The water bearing capacity varies within the area due to the juxtaposed positions of the various types of soils and strata encountered underneath the East Bay Plain.

In General the water bearing capacities of the Younger Alluvium range from moderately permeable to low permeable soils. Below the Younger Alluvium at a depth of approximately 70 feet lies the Older Alluvium, which yields large to small quantities of well water.

Site Geology. The site soils were characterized using the United Soil Classification System (USCS). During on-site subsurface drilling, CEC (GROWTH) encountered up to two feet of baserock (fill) followed by a 4 to 5 foot layer of dark sandy clay (CL). Below the dark clay to a depth between 7 and 15 feet, a grey sandy gravel was found. Below the sandy gravel the soil varied between a clayey sand to a sandy silty clay (SC). The gravels are poorly sorted, angular to rounded clasts ranging in size from 0.2 cm to 3.0 cm.

Site Hydrogeology. The depth of first water ranged from 8 to 10 feet below the ground surface (bgs) in the borings. Groundwater was encountered within the grey clayey sandy gravel layers.

SITE WORK

Site work will be conducted in a step-wise manner to allow changes in the scope of work as additional information is gathered. The overall project is outlined below.

1. Work Plan

The Work Plan will be submitted to Mr. Barney Chan, Alameda County, Environmental Health Services Division. Any necessary drilling or encroachment permits will be obtained for the work.

2. Notifications

Underground Service Alert (USA), (800) 227-2600, will be notified 48 hours prior to commencement of work. In addition, Mr. Barney Chan of Alameda County, Environmental Health Services, (510) 567-6765, will be notified 48 hours prior to commencement of site work.

3. Soil and Groundwater sampling

This task includes drilling one additional soil boring as part of the Phase II investigation to further delineate the lateral and vertical extent of soil and groundwater contamination. Drilling at this site will be completed using a Geoprobe hydraulic coring system. The boring will be drilled to approximately twenty five feet below grade. The proposed boring location is shown on Figure 3.

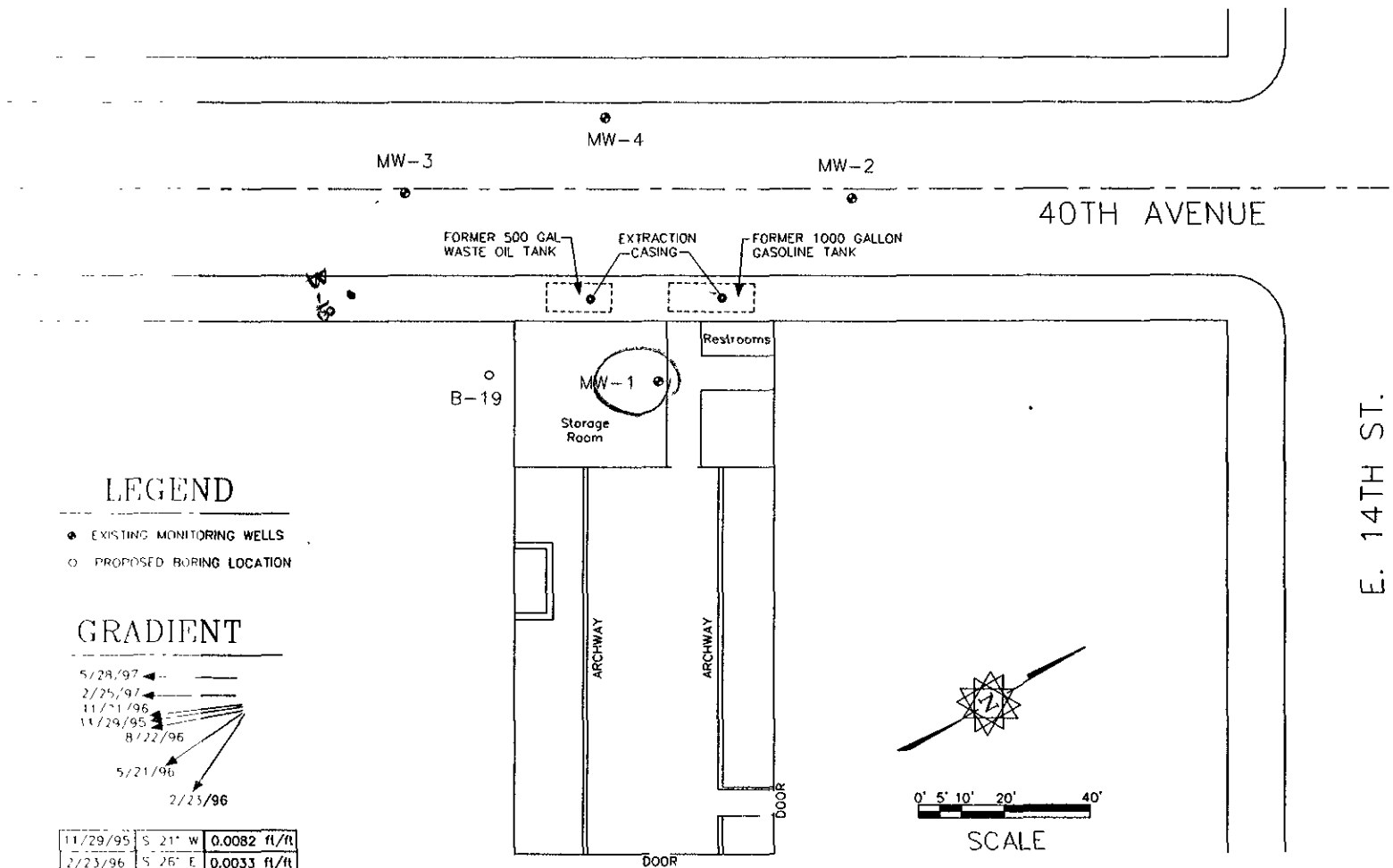
A registered geologist or civil engineer will supervise the preparation of geologic logs from continuous soil cores, the collection of soil samples at five foot intervals or changes in lithology, and the submittal of an appropriate number of soil samples for certified analysis. All soil cuttings and/or impacted groundwater generated onsite during field activities will be tested and prepared for appropriate disposal.

Sampling and Analysis

One soil and one groundwater sample collected from the boring will be submitted under chain of custody documentation to a state certified laboratory. The samples will be analyzed for TPH-g, TPH-d, and BTEX (EPA Method 8015/8020).

4. Monitoring Well Installation

If contamination is encountered in the soil and groundwater samples collected from the boring above, the boring will be converted to a monitoring well (MW-5). A 1" diameter pre-pack well will be installed in the boring to a depth of approximately 25 feet below ground surface. The well will be developed, purged, and sampled. The monitoring well installation report will be a section of the final report.



11/29/95	S 21° W	0.0082 ft/ft
2/23/96	S 26° E	0.0033 ft/ft
5/21/96	S 5° E	0.0064 ft/ft
8/22/96	S 19° W	0.0077 ft/ft
11/21/96	S 23° W	0.0062 ft/ft
2/25/97	S 30° W	0.0076 ft/ft
5/28/97	S 31° W	0.0071 ft/ft

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DRAWN BY: GLR	PROJECT NUMBER: 1004	DESCRIPTION: Proposed Boring Location	FIGURE: 3
DRAWING DATE: 9/13/97	FILE NAME: 1004-WP2.DWG		
REVISION BY:	PROJECT MANAGER: GLR	PROJECT/LOCATION: Motor Partners 1234 40th Ave., Oakland	
REVISION BY:	CHECKED BY:		

The ground water samples will be analyzed for TPH-G (EPA Modified Method 8015 and Method 5030), TPH-D (EPA Modified Method 8015 and Method 3550) and BTEX (EPA Method 8020 and Method 5030). The well will be surveyed to determine the top of casing elevation in relation to other wells at the site.

Proposed Well design specifications. Criteria used to determine well design specifications are contained in Appendix A. The filter pack material (No. 2./14 sand) and screen size (0.010 in.) were selected on the assumption of a sandy clay soil. The screened interval and well depth will be determined on the basis of depth to groundwater. A sketch of the well design is shown in Figure 4, Appendix A. The well will be developed no less than 24 hours after completing the grout seal.

Specifications for monitoring well will be as follows:

Total Depth	25.0 ft.
Bore Diameter	2 in.
Casing Diameter	1 in.
Well Seal Type	bentonite pellets
Well Seal Interval	4.0 - 5.0 ft. bgs
Filter Pack Material	No. 2/14 Lonestar sand
Filter Pack Interval	5.0 - 20.0 bgs
Screen Slot Size	0.010 in
Screened Interval	7.0 - 25.0 bgs

5. Report Preparation

A report will be prepared describing all procedures and findings with Certified Analytical Reports and chain of custody documentation appended. The report is to follow Alameda County LUFT guidelines for content and format. The report is to include background information (from Work plan), geologic logs showing lithography, sample locations, and zones of discoloration and/or petroleum odor, tabulated data summaries, engineering calculation sheets/curves, and the ground water flow gradient. The report and drawings are to be signed and stamped by a California registered engineer or geologist.

Stanley L. Klemetson Ph.D., P.E.
P.E No. 40087

APPENDIX A

Standard Methods

SP-01 Geoprobe Soil Sampling Method

OVERVIEW

The Geoprobe sampling system consists of a hydraulically driven sampler for collecting subsurface samples of soil, groundwater and/or gas vapors. The Geoprobe sampler is a narrow diameter (approximately 1" diameter) direct push probe. Unlike conventional drill rigs, the Geoprobe system does not generate soil cuttings. In addition, the sampling procedure is relatively quick allowing greater amounts of information to be gathered in a shorter period of time.

PROCEDURE

For sample collection, the US EPA standards for field sampling (EPA SW 846) will be followed. Samples will be collected every 5 feet or at changes in lithology using the Geoprobe sampler. The samples will be collected in 1-in. i.d., 6-in. long tubes.

Each of the sample tubes will be sealed at the ends with Teflon sheeting and PVC end caps. Samples will be labeled with the project name (or number), sample number, boring/well number, sample depth, date and time, and sampler's initials. All of the samples will be stored in an ice chest with ice, maintained at approximately 4° C, and transported under chain-of-custody to a State-certified laboratory.

DOCUMENTATION

A sample location sketch will be recorded in the field notebook. In addition, the collection methods, signs of contamination, soil type, names of regulators and contractors, and any other appropriate information will also be recorded.

DECONTAMINATION

The sampler will be decontaminated after each use by washing in a trisodium phosphate solution, followed by tap water rinses. All rinseate used in the decontamination process will be collected in 5-gallon buckets and stored on site in steel, DOT-approved drums. Drums used to store rinseate will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. Drums will then be sealed and left on-site for subsequent disposal pending analytical results.

QUALITY CONTROL

One field duplicate sample will be collected and analyzed for every sample set up to 10 samples. The field duplicate will be collected identically to and immediately after a randomly chosen sample. This will provide second sample confirmation and a means of determining sample precision.

SP-02 Water Sampling in Wells and Geoprobe Boreholes

OVERVIEW

The Geoprobe sampling system consists of a hydraulically driven sampler for collecting subsurface samples of soil, groundwater and/or gas vapors. The Geoprobe is a narrow diameter (approximately 1" diameter) direct push probe. Unlike conventional drill rigs, the Geoprobe system does not generate soil cuttings. In addition, the sampling procedure is relatively quick allowing greater amounts of information to be gathered in a shorter period of time.

SAMPLE COLLECTION

Borings will be sampled either by using a new, clean, disposable Teflon bailer attached to new, clean string or by drawing groundwater from well points installed in the borings. Sample vials and bottles will be filled to overflowing and sealed so that no air is trapped in the vial or bottle. Once filled, samples will be inverted and tapped to test for air bubbles. Samples will be contained in vials and bottles approved by the US EPA and the RWQCB, San Francisco Bay Region. Some analyses may require separate sample containers in accordance with EPA methods described in 40 CFR, Part 136 and SW-846.

Water samples intended for volatile hydrocarbon analysis will be contained in 40 ml VOA vials prepared according to EPA SW-849 and capped with Teflon-lined septa caps. Samples to be analyzed using EPA Method 602/8020 will contain a small amount of preservative (HCl). Samples to be analyzed using EPA Method 601/8010 and EPA Method 624/8240 will not be preserved with HCl. Water samples to be analyzed for low level TPH-D will be stored in dark glass, 1-liter bottles to reduce degradation by sunlight. Antimicrobial preservative (HCl) may be added to the sample bottle if a prolonged holding time is expected prior to analysis.

Sample containers will be labeled with self-adhesive, preprinted tags. Labels will contain the following information in waterproof ink; 1) project number (or name), 2) sample number (or name), 3) sample location (well number, etc.), 4) date and time samples were obtained, 5) treatment (preservative added, filtered, etc.), and 6) name of sample collector.

All purged water will be stored on site in steel, DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. Drums will then be sealed and left on-site for subsequent disposal pending analytical results.

DOCUMENTATION

Sampling information will be recorded in ink in a bound notebook with consecutively number pages. Pages may not be removed for any reason. Alternatively, specially formatted field data sheets may be used to record the information collected during water quality sampling. Errata may be marked out with a single line, and initials of person making the change. The log book and data sheets will be placed in the project file when sampling is completed.

DECONTAMINATION

All sampling equipment, such as buckets and stands, will be decontaminated after each use by washing in a trisodium phosphate solution followed by tap water rinses. Equipment will be stored in plastic bags or other sealed containers to prevent contact with solvents, dusts or other contamination.

All rinseate used in the decontamination process will be stored on site in steel, DOT-approved drums Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. Drums will then be sealed and left on-site for subsequent disposal pending analytical results.

SP-03 Design, Installation, and Sampling of Monitoring Wells

GENERAL PRACTICES

Each monitoring well will be designed to register the potentiometric surface, facilitate soil sampling, and permit water sampling. The standard procedures for well installation and soil/water sampling meet guidelines set forth by the EPA, California State Regional Water Quality Control Board, San Francisco Bay Region and the County Health Agency. Drilling, construction, and completion of all exploratory borings and monitoring wells will be in conformance with procedures in this manual.

DRILLING PROCEDURES

Monitoring wells will be drilled with a hollow-stem, continuous-flight auger. All boring and logging will be overseen by a geologist or civil engineer with special attention given to avoiding the contamination of clean aquifers underlying contaminated zones. The following procedures used to prevent pollution of underlying aquifers:

1. Drilling will cease if 5.0 ft. of saturated impermeable material is encountered. It will be assumed that any significant saturated, impermeable layer, such as a clay layer, is an aquitard separating the shallow and deep aquifers and should not be penetrated.

2. Drilling will be terminated 20 ft. below any perched or unconfined water table.

3. Drilling will be terminated at 50 ft. below ground surface if groundwater is not encountered. This is above nearly all deep aquifers currently supplying groundwater in the Bay Area.

The drill rig operator and the geologist will discuss significant changes in material penetrated by the drill, changes in drilling conditions, hydraulic pressure, and drilling action. The geologist will be present during the drilling of exploratory borings and will observe and record changes in relative moisture, content, lithology, and degree of induration, and will note water producing zones. This record will be used later to prepare a detailed lithologic log. Lithologic descriptions will include soil or rock type, color, grain, size, texture, hardness, degree of induration, carbonate content, presence of fossils and other materials (gypsum, hydrocarbons) and other pertinent information as appropriate. A copy of the logs will be retained in the field file at the project site.

Soil Cuttings

Soil cuttings generated during drilling will be placed in steel, DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, name and phone number of technical contact, and name of generator. Drums will be sealed and left on-site for subsequent disposal pending analytical results. Disposal of soil cuttings will be the responsibility of the owner/generator, although consultant may arrange for disposal.

SOIL SAMPLING IN BOREHOLES

U.S. Environmental Protection Agency standards serve as the foundation for all field sampling operations. EPA SW-846 is the primary publication from which procedures are derived. While some aspects of field and laboratory work may be delegated to the California Department of Health Services, the California Water Resources Control Board, the San Francisco Regional Water Quality Control Board, and the County Health Agency establish the general and specific criteria for sampling.

Sample Intervals

Undisturbed soil samples will be obtained for laboratory analysis and geotechnical classification at 5-ft. intervals or at distinct lithologic changes, beginning at 5 ft. below grade. In addition, one soil sample will be collected immediately above the water table (from the capillary fringe) in each hole. If only one hole is bored, it will be logged continuously from five 5 ft. below grade to the bottom of the bore.

Soil samples will be screened using an OVM. In general, samples with hydrocarbon vapor readings over 100 ppm or the appearance or odor of contamination will be submitted for laboratory analysis. Unless hydrocarbon vapors are detected with the OVM, only the soil sample from the capillary fringe will be submitted for laboratory analysis.

Collection Devices

Samples will be collected using a 2- or 2.5-inch-i.d. Modified California split spoon sampler containing three, six-inch-long brass tubes. The sampler and tubes will be decontaminated before and after each use by steam cleaning, or an Alconox solution wash, and tap water followed by deionized water rinses. The sampler will be driven ahead of the augers using a 140 pound drop hammer. The average blow counts required to drive the sampler the last 12 inches will be recorded on the boring logs.

Preservation and Handling

Sample tubes will be labeled, sealed at each end with Teflon sheeting and PVC end caps, placed in ziplock bags, and stored in an ice chest with dry ice. Samples will be delivered under chain of custody to a State-certified laboratory.

Soils Classification

Soils exposed at the ends of each brass tube will be examined by a geologist for obvious signs of contamination and classified according to the Unified Soil Classification System. These observations will be recorded in the boring logs.

Sample Labeling and Chain of Custody

Samples selected for analysis will be labeled with self-adhesive, preprinted labeled indicating project name (or number), sample number, boring/well number, sample depth, date and collection time. The same information will be recorded on the chain of custody.

Screen and Casing

The monitoring well assembly will consist of new, schedule 40 PVC casing from the bottom of the boring to the ground surface.

From the base of the well to approximately 2.0 ft. feet above the ground water surface, casing will consist of perforated casing (well screen); the remainder of the well will be solid PVC casing. Perforated casing (well screen) will be factory slotted. Screen sizes are not intended to provide optimum flow but to provide hydraulic connection between the borehole and the monitoring well. The perforation size is selected to retain 70 to 90% of the filter pack material.

Upon completion of drilling, well casing will be assembled and lowered to the bottom of the boring. Casing will be connected with dry threads or slip joints, since using glue to connect casing sections could cause false analytical interpretations of water quality. The bottom of the casing will be approximately flush with the bottom of the boring and will be capped with a threaded PVC cap or plug. Using the lithologic log for control, the geologist will specify the exact depths of screened intervals so that the well screen is within the water-bearing zone to be monitored

Where possible, the casing will extend six inches above the ground surface. When monitoring wells are placed in traffic areas where they cannot extend above the surface, pre-cast concrete or cast iron boxes and covers will be installed

Filter Pack

After the monitoring well assembly has been lowered to the specified depth, filter pack will be placed in the annular space between the well casing and borehole from the bottom of the well to approximately 2 ft. above the top of the well screen. The depth to the top of the filter pack will be verified using the tremie pipe or a weighted steel tape. Filter pack will be at least 95% silica sand. Sand will be hard, durable, well rounded, spherical grains that have been washed until free of dust and contamination.

ASTM recommends the following guidelines for screen slot and filter pack selection based on the anticipated strata:

Anticipated Soil Type	Recommended Well Screen Slot Size (inches)	Recommended Filter Pack Material (U.S. sieve sizes)
Sand & Gravel	0.030	20 to 4
Silt & Sand	0.020	30 to 8
Clay & Silt	0.010	50 to 16

Reference: 1988, Development methods for water wells: an anthology: NWWA Water Well Journal.

Grout Seal

A layer of bentonite pellets approximately one foot thick will be placed above the filter pack and charged with water. The depth to the top of the bentonite pellets layer will be verified using the tremie pipe or a weighted steel tape.

A cement-bentonite grout mixture will be tremied into the annular space from the bentonite seal to the top of the well. The grout material will be a mixture of Portland Type I/II cement (94 lb.) to five gallons of clean water or a sand-cement slurry with a minimum of 11 sacks of Portland Type I/II cement per cubic yard. Only clean water from a municipal supply shall be used to prepare the grout.

Capping Wells

After emplacing the grout, a steel or pre-cast concrete well vault (or valve box) will be completed below ground surface. A metal tag containing well number and construction data will be permanently attached to the well vault. A steel well cover clearly marked "monitoring well" will be bolted to the vault. A suitable watertight, locking well cap will be fitted to the riser casing to prevent the entry of surface runoff or foreign matter.

WELL DEVELOPMENT

When well installation is complete, the well will be developed by surging, and/or bailing, and/or pumping to remove fines from the formation and filter pack. Well development generally restores natural hydraulic properties to the adjacent soils and improves hydraulic properties near the borehole so the water flows more freely in the well. Wells will be developed no less than 24 hours after emplacing the grout seal.

At the least, pumping should continue until water in casing storage has been removed There are at least two common methods for determining that water in casing storage has been removed and water is flowing freely from the aquifer (1) Monitor water level while pumping. When the pumping water level has "stabilized," it is likely that little or no water from casing storage is being pumped (2) Monitor the temperature, pH, conductivity, and turbidity of the water

while pumping. When these parameters "stabilize," it is probable that little or no water from casing storage is being pumped and most of the water is coming from the aquifer.

During development, pH, specific conductance, and temperature of the return water from the water pump will be measured. Well development will proceed until these field-measured water quality parameters have stabilized and the water is, in the judgment of the geologist, at its greatest possible clarity.

Temperature, pH, specific conductance, and turbidity meters shall be calibrated per manufacturers guidelines.

Temperature will be measured with a good grade mercury-filled Centigrade thermometer, bimetallic-element thermometer, or electronic thermistor.

pH measurements will be made as soon as possible after collection of the sample preferably within a few minutes.

Conductivity will be measured by dipping the conductivity probe in the water source or sample. The probe must be immersed above the vent. The temperature of the sample will be used to calculate specific conductance from the conductivity measurement. Conductivity will be reported in units of micromhos per centimeter (mmho/cm) at 25° C.

Turbidity will be measured by placing a vial of development/purge water into a turbidity meter for measurement. The instrument will be calibrated to read in a range between 1 and 400 Nephelometric turbidity units (NTUs). This is a measure of the amount of light scattered at right angles to the path of light passing through the water. The greater the NTU reading, the greater the amount of light scattered by particles in the water, therefore, the greater the turbidity.

WELL PURGING AND WATER SAMPLING

Purging and sampling will be in accordance with procedures in Appendix A, SF-02, Water Sampling in Wells and Boreholes.

DOCUMENTATION

A well construction diagram for each monitoring well will be completed by the geologist and submitted to the project manager when the work has been completed. In addition, the details of well installation, construction, development, and field measurements of water quality parameters will be summarized as daily entries in a field notebook or data sheets which will be submitted to the project manager when the work has been completed.

DRILLING EQUIPMENT DECONTAMINATION PROCEDURES

The sampler will be decontaminated before and after each use by steam cleaning or washing in an Alconox solution, followed by tap water and deionized water rinses. Only clean water from a municipal supply will be used for decontamination of drilling equipment. Equipment will be sealed in plastic bags or other sealed containers to prevent contact with solvents, dusts or other contamination.

All rinseate used in the decontamination process will be stored on site in steel DOT approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number, sealed and left on-site for subsequent disposal pending analytical results.

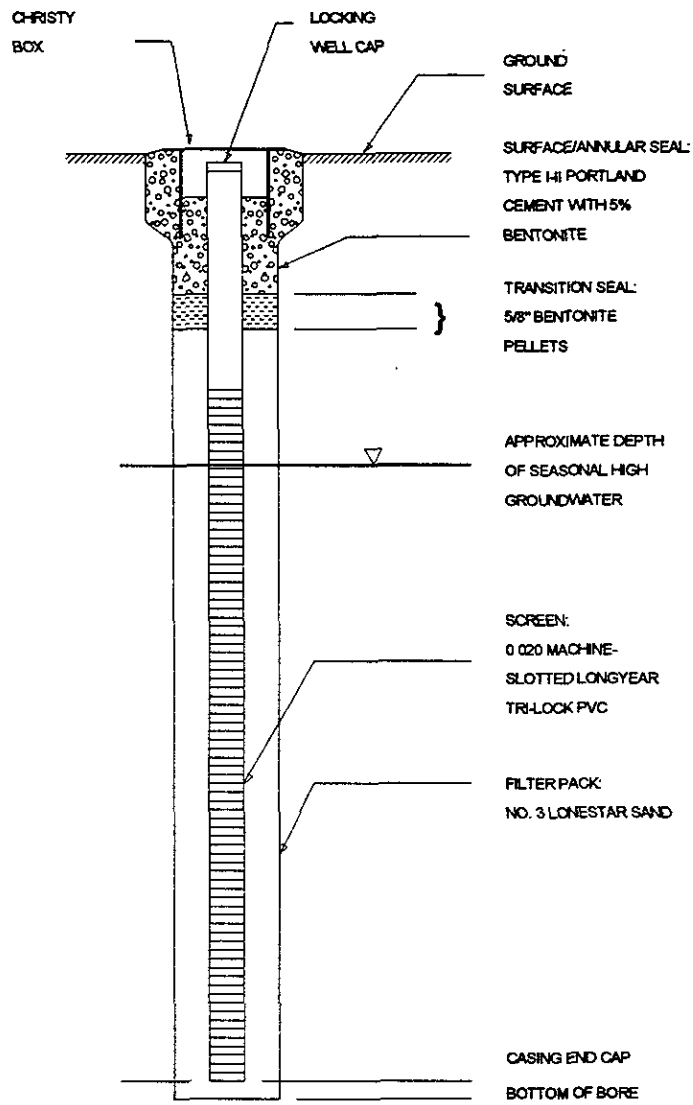


Figure 4

Monitoring Well Design

APPENDIX B

Site Specific Health and Safety Plan

SITE SPECIFIC HEALTH AND SAFETY PLAN

MOTOR PARTNERS SITE
1234 40TH AVE.
OAKLAND, CA

I. Overview

This Health and Safety Plan has been prepared for Mr. Bill Owens prior to conducting environmental site work at the Motor Partners site, 1234 40th Ave., Oakland, California. The following plan will be reviewed by all workers and visitors prior to site entry to prepare for potential on-site emergencies and to minimize adverse health risks to workers.

II. Site Characteristics

A. Site Location	Motor Partners 1234 40th Ave. Oakland, CA
B. Past Use	Auto Repair -- 2 UST's (1,000 gallon waste oil & 5,000 gallon gasoline)
C. Present Use	Mexican Restaurant
D. Topography	Site is generally flat, surface drainage is westerly toward San Francisco Bay
E. Accessibility	There should be no access problems
F. Weather Conditions	Warm weather conditions, wind velocity generally below 10 mph.

III. Site Work

A. Work Description	The present site work will include drilling soil borings for soil and groundwater sampling and installation of monitoring well.
B. Personnel	Environmental engineer and Drilling Contractors.

Personnel and Project Assignments

Assignment	Name	Phone Number
Project Manager	Gary Rogers, Ph.D.	(510) 791-7157
Site Safety Officer	Gary Rogers, Ph.D.	(510) 791-7157
Owner Representative	Bill Owens	(510) 935-3840

IV. SITE HAZARDS

A. Chemicals of Concern

Threshold Limit Values

Substance	OSHA PEL[1]	ACGIH TVL[2]	NIOSH REL[3]
Benzene	10 ppm	10 ppm	0.1 ppm

[1] OSHA PEL -- Occupational Safety and Health Administration -- Permissible Exposure Limits.
[2] ACGIH TLV -- American Conference of Governmental Industrial Hygienists -- Threshold Limit Values.
[3] NIOSH REL -- National Institute for Occupational Safety and Health -- Recommended Exposure Limits.

B. Toxicology

Human exposure to benzene concentrations in excess of 150 ppm may cause headache, weariness, and loss of appetite. Vapors at high concentrations may cause smarting of the eyes and dermatitis. Benzene appears to be poorly absorbed through skin.

C. Physical Hazards

Slip, trip and fall hazards
Hazards due to heavy equipment
Excessive noise
Heat Stress/Stroke
Electrical

D. Other Hazards	Dispersion of Volatile compounds i.e. gasoline and benzene
E. Description of Wastes	Soil and groundwater in southwest corner of property adsorbed in soil matrix and in groundwater
F. Range of Concentrations	TPH-G levels in soil are up to 1,900 ppm. TPH-G concentrations up to 67,000 μg/l have been shown in groundwater. Benzene levels have been reported up to 3,200 μg/l in groundwater.

V. PERSONAL PROTECTIVE EQUIPMENT

A. Level of Protection	Level D
B. Respiratory Protection	Half mask dual cartridge respirator with organic vapor cartridges should be available, but, will only be required if airborne concentrations are above action levels (below).
C. Protective Clothing	• Hard hat (required) • Work boots (required) • Safety Glasses (optional) • Hearing Protection (optional) • Protective gloves (optional)
D. Action Levels	Don respirators if organics in the breathing zone exceed a constant 30 ppm

VI. EXPOSURE MONITORING PLAN

A. Monitoring Requirements	Air should be monitored every 30 minutes using an organic vapor meter while excavating and sampling in contaminated areas.
B. Methodology	Monitor downwind in the breathing zone.

VII. DECONTAMINATION PROCEDURES

A. For PPE

Leave the work area and remove clothing, respirator last. All non-reusable clothing will be disposed of in garbage containers.

B. Sampling Equipment

All sampling equipment, such as buckets and samplers will be decontaminated after each use by washing in a trisodium phosphate solution followed by tap water rinses. All rinseate used in the decontamination process will be stored on site in steel, DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. Drums will then be sealed and left on-site for subsequent disposal pending analytical results.

VIII. PROTECTION OF GENERAL PUBLIC

A. Procedures

The on-site safety officer will redirect pedestrian traffic around the work area using temporary fencing, or barricades and warning ribbon. Only authorized personnel will be permitted within 10 ft. of heavy equipment.

IX. EMERGENCY RESPONSE

A. Command and Control

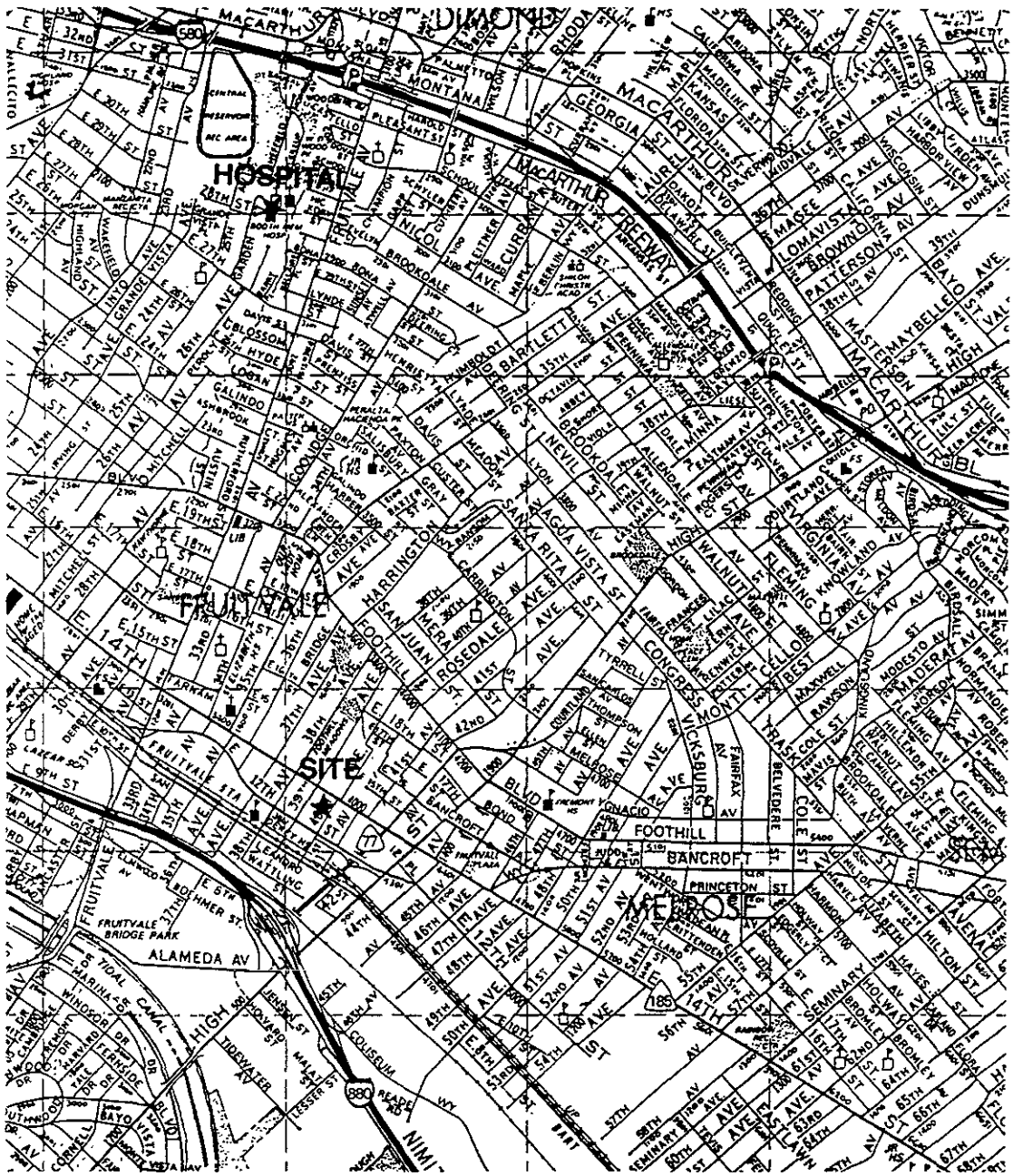
The on-site safety officer will be responsible for enforcing health and safety procedures issues related to sampling and drilling.

B. Emergency Procedures

1. Assist the injured or exposed worker out of the sampling area.
2. Call for medical help.
3. Administer CPR/first aid as needed.
4. If possible, carefully remove the victim's PPE and begin decontamination procedures.

Emergency Agencies with Telephone Numbers

Emergency Service	Name/Agency	Telephone
Ambulance	Oakland	911
Hospital (See Attached Route Map)	Booth Memorial Hospital 2794 Garden St. Oakland, CA	(510) 535-5088
Police	Oakland	911
Fire Department	Oakland	911
Public Health	Barney Chan Department of Environmental Health	(510) 567-6765
Emergency Spills	CalEPA	(415) 974-8131
Worker Health and Safety	OSHA	(800) 648-1003
CHEMTREC	CHEMTREC	(800) 424-9300
Utilities	Underground Service Alert	(800) 227-2600



GARY ROGERS, PH.D. ENVIRONMENTAL CONSULTANT 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DESCRIPTION: Route to Hospital			FIGURE: 5
	PROJECT LOCATION: Motor Partners 1234 40th Ave., Oakland, CA			
DRAWN BY: GLR	DRAWING DATE: 9 13 97	PROJECT NUMBER: 1004	FILE NAME: 1004-WP2 DWG	PROJECT MANAGER: GLR

SIGNATURE PAGE

The following individuals have reviewed the Health and Safety Plan prior to entry to the site.

Printed Name	Signature	Date
Printed Name	Signature	Date
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