PS

BRUNSING ASSOCIATES, INC.
1607 Industrial Way, Belmont, CA 94002
(415) 637-0170 FAX (415) 637-1196

January 6, 1992

29.6

Mr. Paul Smith
Alameda County Health Care Services
Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

RE: SUBMITTAL OF INTERIM REMEDIAL ACTION WORKPLAN
PACIFIC SUPPLY COMPANY SITE
1735 24TH STREET
OAKLAND, CALIFORNIA

Dear Mr. Smith:

Brunsing Associates, Inc. (BAI), has prepared an Interim Remedial Action (IRA) Workplan for the Pacific Supply Company site, located at 1735 24th Street, Oakland, California on behalf of Pacific Coast Building Products. This IRA Workplan addresses the implementation of a vapor extraction pilot study and quarterly groundwater monitoring.

If you have any questions regarding the content of this IRA Workplan, please contact me at (415) 637-0170 or Normita Callison of Pacific Coast Building Products at (916) 645-3341.

Sincerely,

Michael E. Velzy
Regional Manger

WFC:wfc

cc: Normita Callison - Pacific Coast Building Products
Larry Halsey - Pacific Coast Building Products
Lester Feldman - Regional Water Quality Control Board
Tom Brunsing - BAI

INTERIM REMEDIAL ACTION WORKPLAN

PACIFIC SUPPLY COMPANY
1735 24TH STREET
OAKLAND, CALIFORNIA

JANUARY 6, 1992

BRUNSING ASSOCIATES, INC.

INTERIM REMEDIAL ACTION WORKPLAN

PACIFIC SUPPLY COMPANY
1735 24TH STREET
OAKLAND, CALIFORNIA

JANUARY 6, 1992

submitted to

ALAMEDA COUNTY HEALTH CARE SERVICES
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS PROGRAM
80 Swan Way, Room 200
Oakland, CA 94621

prepared for

PACIFIC COAST BUILDING PRODUCTS
P.O. Box 160488, 3001 I Street
Sacramento, CA 95816

prepared by

BRUNSING ASSOCIATES, INC.
1607 Industrial Way
Belmont, CA 94002

Author: William F Creger
William F. Creger
Project Engineer

Reviewer: Michael E. Velzy
Michael E. Velzy
Regional Manager

BRUNSING ASSOCIATES, INC.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

The Interim Remedial Action Workplan (Workplan) has been prepared by Brunsing Associates, Inc. (BAI) on behalf of Pacific Coast Building Products of Sacramento, California to address the site soil remediation associated with the unauthorized release of petroleum hydrocarbons as gasoline to the subsurface at the Pacific Supply Company (PSC) site, located at 1735 24th Street in Oakland, California. The site location is shown on Figure 1, Vicinity Map.

The Workplan is intended to comply to the written requests of May 6, 1991 and September 30, 1991 by the Alameda County Health Care Services, Department of Environmental Health, Hazardous Materials Division to prepare a workplan that addresses both remedial action and quarterly groundwater monitoring. The remedial option tentatively selected for this site is based on the soil and groundwater investigation Report of Findings (ROF), prepared by BAI, dated November 30, 1990. The referenced ROF included a complete review of all previous field and analytical investigatory work associated with on-site and off-site subsurface soils and groundwater.

1.1. STATEMENT OF SCOPE OF WORK

The Workplan has been prepared for the PSC site to address the use of vapor extraction technology to reduce petroleum hydrocarbon in the subsurface soils and to begin quarterly groundwater monitoring. A single well vapor extraction pilot study is proposed at this time to verify the feasibility of employing this technology to remediate the site subsurface soils. Sections 3.0 and 3.1 discuss the technical basis for using the vapor extraction method for this site. Section 3.2 discusses the details of the pilot study.

At the completion of the vapor extraction pilot study, a ROF will be prepared which will summarize the following tasks completed as part of the proposed Scope of Work:

- Results of the vapor extraction pilot study, including a feasibility evaluation to determine the effectiveness of vapor extraction, a final remedial measure;
- Final remedial design recommendations for vapor extraction, if appropriate.

Section 4.0 discusses the proposed quarterly groundwater monitoring program which includes five on-site monitoring wells. This section provides details concerning sampling, analytical testing and reporting.

1.2. BACKGROUND

In May of 1987, efforts were initiated to abandon a single 1000-gallon gasoline underground storage tank (UST) at the referenced property in West Oakland. Subsequent exploratory boreholes were drilled and soil and vapor samples were analyzed by gas chromatography revealing that subsurface soils in the vicinity of the UST were contaminated with gasoline and that the groundwater may have been impacted.

1.3. SITE HISTORY

1.3.1. Description of Site Operations

PSC currently uses the referenced property to store and sell residential and commercial building products. The former UST was used to store fuel for the PSC vehicles. See Figure 2, Site Plan, for the location of the former 1000-gallon gasoline UST.

Failed UST leak tests in March of 1987 prompted the subsurface soil and soil vapor testing. During the removal of the UST by Erickson Industrial Services, substantial deterioration of the tank body and gasoline odors were noted. The age of the UST is unknown. The total quantity of product lost is unknown since it is uncertain as to when the tank or piping began leaking or the rate at which it leaked. There are no other known unauthorized releases at the site.

1.3.2. Previous Subsurface Work At Site

Anatec performed soil analyses on May 4 and 8, 1987 and determined that the subsurface soils had been impacted by the leaking UST. On May 11, 1987, CHIPS Environmental Consultants, who conducted soil and vapor testing, determined that the soil contamination was nonlocal and that the groundwater may have been impacted.

BAI conducted a two phase soil and groundwater investigation to determine the extent of the vertical and lateral impact on the soil and groundwater below and immediately adjacent to the Pacific Supply Company site. Phase I of the investigation, conducted in September 1988, consisted of constructing five on-site monitoring wells and analyzing soil and groundwater samples in an effort to characterize the presence of petroleum hydrocarbons in the subsurface. The ROF, dated November 30, 1990 indicated that gasoline is present in the fill material above the Bay Mud and in the upper reaches of the Bay Mud and is confined to an area approximately 600 square feet. However, the lateral limits of soils containing petroleum hydrocarbons have not been completely defined. The vertical limits of contamination are estimated to be approximately ten feet.

The groundwater analytical results indicated a progressively decreasing concentration of petroleum hydrocarbons in the groundwater between the 1988 and

1989 sampling events. The December 1989 groundwater sampling and analyses indicates low levels of all hydrocarbon components including Total Petroleum Hydrocarbons as gasoline, and benzene, toluene, ethylbenzene, and xylene.

In December 1990, Phase II of the investigation which included the construction of two off-site monitoring wells (one immediately adjacent to Yellow Cab Company on Willow Street and the other immediately adjacent to C & L Trucking Company on 24th Street) was completed. Additionally, the five on-site monitoring wells were resampled and the samples analyzed. The November 30, 1990 ROF concluded that it was not likely that either of the potential off-site sources contributed to the contamination below the PSC site.

2.0 SITE DESCRIPTION

2.1. VICINITY DESCRIPTION AND HYDROGEOLOGIC SETTING

Borehole logs (reference Appendix A of the November 30, 1990 ROF) for the five monitoring wells to a depth of 20 feet indicate that approximately five feet of sandy fill material overlies organic clayey silts comprising the Bay Mud. Regional geologic information derived from nearby sites in the West Oakland area reveal that the Bay Mud typically extends to a depth of approximately 50-60 feet overlaying an alluvium. The Bay Mud is comprised of a gray to black silty clay with abundant organic material such as grasses and mollusk shells.

The Bay Mud generally exhibits a very low permeability [less than 10^{-5} centimeter per second (cm/sec)]. A downhole submersible pump extracted less than five gallons of water per minute from MW-2 during well development and purging operations on October 10, 1988. The groundwater gradient is influenced by on-site and off-site factors and generally appears to have a westerly, easterly and northerly component. Figure 2, Site Plan, shows the approximate location of the former UST and the location of the groundwater monitoring wells.

2.2. EXISTING GROUNDWATER AND SOIL ANALYTICAL RESULTS

A summary of the existing analytical results for soil and groundwater performed to date are shown in Tables 1 through 3.

The depth of the groundwater seems to be approximately nine feet below grade. For results of the groundwater monitoring well water elevations (at Mean Sea Level) measured at four different times from October 1988 to March 1990, see Table 4, Groundwater Elevation Data.

3.0 PLAN FOR INITIAL PHASE OF SOIL REMEDIATION

PSC proposes a pilot study, to investigate the potential effectiveness of employing vapor extraction technology, as a remedial measure to reduce petroleum hydrocarbons within the subsurface soils above the saturated zone. Vapor

extraction has tentatively been identified as a potential soil remediation method for this site because soils laden with volatile contaminants such as, petroleum hydrocarbons as gasoline have historically responded well to vapor extraction.

3.1. BACKGROUND

As indicated by soil chemical analyses of samples collected during the construction of the on-site monitoring wells, a presence of Total Petroleum Hydrocarbons and Benzene, Toluene, Ethylbenzene, and Xylene is evident. Soil sampling occurred at or near the unsaturated zone/groundwater interface for monitoring wells MW-1 through MW-3 at depths of between 7.5 and 8.5 below the surface grade, just above the groundwater level of approximately nine feet below grade.

3.2. PILOT STUDY

A vapor extraction pilot study employing a single vapor extraction well is proposed to determine the effectiveness of this technology on soils at depths between approximately 4.0 and 8.0 feet. The approximate location of pilot study vapor extraction well is shown on Figure 3, Proposed Location of the Pilot Study Vapor Extraction/Monitoring Wells.

The pilot study will employ a series of vapor probe monitoring wells at various distances radially away from the extraction well. The probes will be set at a radial distance of 10, 15 and 20 feet away from the extraction well at approximately 120 degrees apart. Additionally, at each monitoring well location probes will be placed at depths of between 4.0 and 4.5 feet, and 8.0 and 8.5 feet, subject to change in the field depending on depth to groundwater. The total number of vapor probes would be six, two in each of the three monitoring wells at various depths. This configuration of vapor probes around the extraction well would provide data necessary to determine the effective radius of influence of a vapor extraction well based on actual field conditions. The radius of influence will then be used to determine the optimal geometric configuration of the vapor extraction well layout as part of final remedial action.

3.2.1. Vapor Extraction Well Construction

The single vapor extraction well will be installed to a depth of eight feet, subject to change in the field depending upon the depth to groundwater. The bore hole will be drilled to a maximum of two inches in diameter. Well casing will be a one-inch diameter PVC. The screen interval will be from approximately 4.0 and 8.0 feet and incorporate an approximately 0.03 inch screen slot PVC pipe. A course Monterey sand will be used as a gravel pack placed around the slotted casing. The gravel pack will extend from the bottom of the boring to a depth of approximately five feet below grade. Above the gravel pack will be a two foot bentonite seal. A bentonite/grout seal will be placed above the bentonite seal to within six inches of

the existing ground surface. Figure 4, Vapor Extraction and Monitoring Well Details, shows the construction details for this well. The extraction well will be secured by a traffic rated Christy box.

3.2.2. Monitoring Well Construction

As mentioned above, the pilot study will incorporate a total of six different probes, two each in the three vapor monitoring wells. Each multicompletion monitoring well will provide for two vapor probes. Figure 4 shows the construction details of the monitoring well in cross section. Within each 2.5 inch diameter well boring, two teflon tubes will be placed to depths of 4.0 and 8.0 feet, respectively. A stainless steel or high density plastic porous probe will be attached to the bottom of each PVC pipe teflon tube to allow the free flow of vapor to enter. The openings in the probes will be small enough to prevent sand particles from entering the tube and restricting the air flow. The porous probes will be packed in gravel as shown on Figure 4. A two foot bentonite seal separates each gravel pack and another two foot bentonite seal would be placed above the upper sandpack. A grout seal will be placed above the upper bentonite seal to within six inches of the existing grade. Each of the two teflon tubes will extend to the surface to allow for vapor monitoring.

3.2.3. Equipment and Set-Up

Figure 3 shows where the vapor extraction equipment will be set up to extract vapor from VEW-1. A regenerative blower, similar to model EI454XP (manufactured by EG&G Rotron), with a maximum flow of 127 static cubic feet per minute (SCFM) would be employed for the project. This blower is equipped with explosion proof motors and starters. Two granular activated carbon (GAC) filter treatment units, similar to the 55-gallon units (manufactured by Cameron-Yakima, Inc.), would be connected in parallel to treat the subsurface gases before releasing them to the atmosphere. Catalog cuts describing the blower and activated carbon treatment units are included in Appendix B. The equipment will be stored outside and secured within an area surrounded by barricades.

The vapor extraction well will feed into a sampling port which connects to a two-inch diameter PVC intake line. Flow from the intake line will pass through the following components in the order of flow prior to the exhaust pipe:

- Ambient Air Dilution Valve;
- Moisture Separator;
- In-line Filter;
- Pressure Gauge;
- Blower (115/230 V @ 1.5 HP, 60 Hz).

The exhaust will be treated by GAC filter units prior to venting. Figure 5, Vapor Extraction System Equipment, shows an elevation of a typical equipment set-up for a vapor extraction system. Construction of the vapor extraction system will be in compliance with the 1990 edition of the National Electric Code.

3.2.4. Vapor Monitoring

The performance of a vapor extraction/venting system must be monitored in order to ensure efficient operation. Within the short term duration of a pilot study, vapor and pressure monitoring will provide the data to determine the extraction well layout of the final remedial system. Each monitoring well will be monitored for organic vapors using a Foxboro Organic Vapor Analyzer (OVA) or a Photovac Photo Ionization Detector (PID). Vapor will be recorded in parts per million (ppm) on a daily field activity log.

At each probe a measure of negative pressure in inches of water (gauge) will be obtained to determine the effectiveness of the extraction system to create a flow of air into the extraction pump. Pressure measurements will be obtained at every probe using a magnahelic gauge.

Vapor and pressure monitoring will be performed daily over the course of the project which is anticipated to be approximately four to five days.

3.3. SOIL SAMPLING METHOD

Soil samples will be collected continuously from the vapor extraction well boring. The proposed vapor extraction well will be drilled to a depth of approximately nine feet (estimated depth to groundwater). Selected soil samples will be obtained continuously from the monitoring well borings. Monitoring well borings will be drilled to an estimated depth of eight feet. All soil borings will be obtained using a two-inch diameter hydraulic drive-sampling system which incorporates a double rod system.

Down-hole equipment will be decontaminated before use at each boring location by steam cleaning. All sampling equipment will be decontaminated before use by the following triple rinse procedure:

- Nonphosphate detergent wash;
- Tap Water Rinse;
- Distilled water final rinse.

All borings will be logged by a qualified geologist or engineer according to the Unified Soil Classification System (USCS).

The sampling tubes containing soil samples will be removed from the sample driver and the ends will be covered with aluminum foil, capped and taped. The soil samples will be labeled and placed in individual zip-lock bags. The soil samples obtained from the vapor extraction well boring will be kept in a cooler containing frozen blue ice and transported to a California certified analytical laboratory for analysis under chain of custody procedures.

3.4. SOIL ANALYSES

Soil samples will be collected for chemical and physical analyses. Soil samples obtained from the vapor extraction well boring at depths of approximately five and nine feet will be obtained for chemical soil analyses. These depths correspond to the proposed depths of the screen intervals of the vapor monitoring wells. The analytical testing prescribed for these two soil samples follows the analytical methods previously used during earlier soil investigations. These tests include:

- Total Petroleum Hydrocarbon-Gasoline (TPHg) (EPA Method 5030/8015);
- Benzene, Toluene, Ethylbenzene, Xylene (BTEX) (EPA Method 8020).

Secondly, a soil sample will be obtained from the vadose zone for laboratory air permeability testing and the determination of the void ratio. The vapor extraction well boring will be continuously logged to determine lithology and depth to groundwater. As recommended by the RWQCB in the Tri-Regional Board Staff Recommendations for Evaluation and Investigation of Underground Tank Sites [Tri-Regional Recommendations (August 1990)], the reporting limits are 1.0 ppm for TPHg and 0.005 ppm for BTEX.

3.5. REPORTING AND SCHEDULE

3.5.1. Report of Findings

Upon termination of the pilot study a report will be prepared which summarizes the data collected. This data includes:

- Boring logs of extraction and monitoring wells;
- Well completion details;
- Field analytical data;
- Vapor extraction equipment performance;
- On-site pressure measurements.

The above data will be used to make a determination if vapor extraction technology is a soil remediation option effective in reducing petroleum hydrocarbon concentrations in the subsurface. Furthermore, the ROF will include a determination of the effective radius of influence for a vapor extraction well. This information will be used to layout an optimal spacing of the extraction wells at the site for final soil remediation. The report of findings will also provide recommendations regarding possible equipment and procedural changes, if appropriate. Additionally, recommendations on a determination of the lateral extent of soil containing petroleum hydrocarbons will also be included in the report.

3.5.2. Schedule

The installation of the vapor extraction well and the associated monitoring wells will take approximately one to two days to complete. The pilot study is anticipated to take four to five days. For each day the pilot study is in progress, data will be collected. The preparation of the report of findings will take approximately two to three weeks following the completion of field activities.

It is estimated that the entire pilot study project will require five to six weeks following approval from the Alameda County Hazardous Materials Division (ACHMD) and PSC.

3.6. PERMITS

A well installation permit will be filed with the ACHMD for the installation of the vapor extraction well (VEW-1) and associated monitoring wells. No permits are required through the Bay Area Air Quality Management District (BAAQMD) for the short term pilot study. However, a BAAQMD permit will be required if vapor extraction is selected as the final remediation technology.

4.0 QUARTERLY GROUNDWATER MONITORING

BAI recommends that quarterly groundwater monitoring commence immediately upon approval of the Interim Remedial Action Workplan and continue for a period of one year. At the conclusion of the fourth quarterly groundwater monitoring report, BAI will provide recommendations, based on the analytical results, as to a future course of action, if any is required. The quarterly groundwater monitoring will consist of a groundwater elevation survey of all seven monitoring wells and chemical analyses results of groundwater samples collected from each of the five on-site monitoring wells. The existing on-site monitoring wells include MW-1, MW-2, MW-3, MW-4, and MW-5 and the two existing off-site monitoring wells include MW-6 and MW-7. The location of these wells are shown on Figure 2.

4.1. GROUNDWATER SAMPLING PLAN

4.1.1. Groundwater Sampling Method

The groundwater samples will be collected from each of the five on-site monitoring wells. The four two-inch and one four-inch monitoring wells will be bailed at least until the volume of water withdrawn is equal to four to ten well casing volumes. To assure that the water sample is representative of the in-situ groundwater, periodic measurements of the temperature, pH, and specific conductance will be performed. The sample will be collected only when the temperature, pH, and specific conductance reach relatively constant values.

A hand operated polyethylene or teflon bailer will be used to empty the well casing (purging) of the monitoring well. Water samples will be collected using a

polyethylene or teflon bailer. Sample containers will be obtained directly from the analytical laboratory or other approved source. Purged groundwater will be stored on-site in appropriately labelled 55-gallon drums until appropriate disposal action is implemented as discussed in Section 5.2.

4.1.2. Groundwater Analyses

The groundwater analyses for each of samples obtained will be as indicated below which follows the RWQCB recommended minimum verification analyses [Tri-Regional Recommendations (August 10, 1990)] for leaking underground storage tanks containing gasoline:

- Total Petroleum Hydrocarbon - Gasoline (TPHg) (EPA Method 5030/8015);
- Benzene, Toluene, Ethylbenzene, Xylene (BTEX) (EPA Method 602);
- Total Lead (EPA Method 7421).

Detection limits for all analyses under this plan will conform to the report limits suggested by the RWQCB in the Tri-Regional Recommendations. A single round of groundwater sampling will be conducted immediately after the monitoring wells have stabilized from purging as discussed in Section 4.1.1, resulting in the collection of five groundwater samples to be submitted to a California Department of Health Services certified analytical laboratory.

4.2. REPORTING AND SCHEDULING

Each quarterly report will summarize all sampling and analytical protocols used as well as summarize all analytical data and groundwater elevation data for the quarter. Copies of the original laboratory reports will also be included along with a map showing the groundwater elevation contours. Groundwater level measurements and flow gradient determination will also be provided. The fourth quarter report will include recommendations for further action, if appropriate. The first quarterly report would be submitted in February 1992, depending on the approval date of the Interim Remedial Action Workplan, and quarterly thereafter.

5.0 SOIL, GROUNDWATER, AND CARBON UNIT DISPOSAL PLAN

5.1. DRILLING MUD/SOIL DISPOSAL

Soil generated during drilling activities will be stored on-site in covered 55-gallon drums, appropriately labelled. A representative sample will be collected and submitted for TPHg and BTEX analyses. Based on the results of these analyses, a determination regarding appropriate disposal will be made. An appropriate landfill will be selected based on the analytical results.

5.2. WELL PURGE WATER DISPOSAL

The purged well water from well development and sampling will be collected for on-site storage in appropriately labelled and covered 55-gallon drums until chemical analyses of the rinse water is obtained. Purge water will be disposed in a manner appropriate with the analytical results.

5.3. RINSEATE WATER DISPOSAL

Care shall be taken to collect all excess solutions resulting from the sampling equipment cleaning procedures. These solutions will be stored in the same 55-gallon drums used to store purged well water. Rinseate water will be disposed in a manner appropriate with the analytical results.

5.4. ACTIVATED CARBON UNIT DISPOSAL

Activated carbon used during the pilot study will either be incorporated into a long term treatment system if not spent, or will be disposed of in an appropriate manner following the pilot study.

6.0 DECONTAMINATION PROCEDURES

6.1. DRILLING EQUIPMENT

All down hole drilling equipment will be steam-cleaned before use and between borings. Soil cuttings generated during drilling operations will be stored on site in 55-gallon drums pre Section 5.1.

6.2. SAMPLING EQUIPMENT

Sampling equipment used to collect soil and groundwater samples will be cleaned after each use at each sampling location. Thermometers, pH electrodes, and conductivity probes shall also be cleaned after sampling of each monitoring well at a particular location.

Triple rinse cleaning procedures shall be accomplished as follows:

- Scrub with a detergent-potable water solution or other solution deemed appropriate using a hard bristle brush;
- Rinse with potable water;
- Rinse with organic-free or deionized water;
- Air-dry;
- Package and seal equipment in plastic bags or other appropriate containers to prevent contact with solvents, dust, and other contaminants.

7.0 SAMPLE HANDLING PROCEDURES

7.1. SAMPLE LABELLING PROCEDURES

Sample containers will be labelled with self-adhesive tags. Field personnel will label each tag, using waterproof ink, with the following information:

- Project number;
- Sample identification;
- Date and time samples were obtained;
- Treatment (preservative added, filtered, etc...);
- Initials of sample collector(s).

After properly sealing and labelling soil and groundwater samples, they will be placed in a cooled ice chest (less than or equal to 4 degrees Centigrade) and delivered to a California Department of Health and Safety (DHS) certified laboratory for analyses.

7.2. LABORATORY SAMPLE DOCUMENTATION

A field log book or individual log sheets shall be maintained throughout the sampling operations. The following information is recorded:

- Sample number;
- Date and time sampled;
- Sampling location;
- Types of sampling equipment used;
- Name of sampler(s).

7.3. CHAIN-OF-CUSTODY PROCEDURES

After samples have been collected and labeled, they will be maintained under Chain-of-Custody procedures. These procedures document the transfer of custody of samples from the field to a designated laboratory.

A Chain-of-Custody Record will be filled out for each shipment of samples to be sent to the laboratory for analysis. Information contained on the duplicate form shall include:

- Date and time the sample was taken;
- Sample number and the number of containers;
- Analyses required;
- Remarks including preservatives added and any special conditions;
- Container number in which sample has been packaged.

Any blank spaces on the Chain-of-Custody Record between the last sample number listed and signatures at the bottom of the sheet will be crossed out.

After carefully packaging the samples into numbered containers for transfer to the laboratory, the field sampler will sign the Chain-of-Custody Record and record the time and date. The original imprint of the Chain-of-Custody Record will accompany the sample containers. The duplicate copy will be retained by the BAI representative on the site.

8.0 SITE SAFETY PLAN

The negligible exposure possible during drilling and sampling operations indicate that Level D Protection is adequate for performance of this site investigation work. Air monitoring is not planned for site activities. All personnel will expected to wear hard hats and steel-toed boot during drilling activities. All field work will be performed in accordance with applicable California OSHA standards as outlined in the California Code of Regulations (CCR), Title 8, Construction Safety Code during the site investigation. A copy of the site specific Health and Safety Plan is included as Appendix A. This plan will be explained to all field personnel during an on-site safety meeting prior to initiating field activities.

9.0 STATEMENT OF QUALIFICATIONS

The manager for this project will be Michael E. Velzy, BAI Regional Manager, under the direct supervision of Dr. Thomas Brunsing, a registered civil engineer in the State of California. Dr. Brunsing is also a California Registered Environmental Assessor. The final report of findings will be certified by Dr. Brunsing.

TABLES

TABLE 1
SUMMARY OF PREVIOUS SOIL ANALYTICAL RESULTS
PACIFIC COAST BUILDING SUPPLY - #29.6
1735 24TH STREET
OAKLAND, CALIFORNIA

OFF-SITE SOIL SAMPLES

BOREHOLE ID (Sample Depth)	TPH-G mg/kg	TPH-D mg/kg	TPEH Kerosene mg/kg	TEPH Motor Oil mg/kg	Benzene mg/kg	Ethyl-Benzene mg/kg	Toluene mg/kg	Xylene mg/kg	Organic Lead mg/kg
MW-6 @ 5.5'	370	NA	NA	NA	ND	ND	ND	ND	1.5
MW-7 @ 5.5'	<2.5	<1.0	<1.0	160	ND	ND	ND	ND	1.7

From Table 1, Results of Off-Site Soil Chemical Analyses, from Report of Findings prepared by BAI, dated March 23, 1990.

ON-SITE SOIL SAMPLES

BOREHOLE ID (Sample Depth)	TPH mg/kg	Benzene mg/kg	Toluene mg/kg	Xylene mg/kg
MW-1 @ 8.0'-8.5'	26	ND	0.22	0.85
MW-2 @ 7.5'-8.0'	1,400	0.99	0.70	1.10
MW-3 @ 7.5'-8.0'	1,300	0.53	5.90	22.00
MW-3 @ 8.0'-8.5'	3,700	2.40	8.90	12.00

From page 2 of Report of Findings prepared by BAI, dated January 27, 1989.

NA - Not Applicable
ND - Not Detected

Table 3
Results Of Off-Site Groundwater Chemical Analyses

Borehole ID	TPH-Gasoline mg/L	TEPH-Diesel mg/L	TEPH-Kerosene mg/L	TEPH-Motor Oil mg/L	Benzene mg/L	Toluene mg/L	Ethylbenzene mg/L	Xylene mg/L	Organic Lead mg/L
MW-6 1100 ppb	1.1	ND	2.1	ND	0.0054	0.0045	ND	ND	ND
MW-7	ND	ND	ND	ND	ND	ND	ND	ND	0.235
MCL (mg/L)[1]	N/A	N/A	N/A	N/A	0.001	1.0	0.68	1.75	N/A
Action Levels (mg/L)[2]	N/A	N/A	N/A	N/A	0.0007	0.1	0.68	0.62	N/A
Detection Limits (mg/L)[3]	0.50	0.50	0.50	0.50	0.0003	0.0003	N/A	0.0006	N/A

Notes
1. Minimum Containment Level, Section 6444.5, Article 5.5, Division 4, Title 22 CCR.
2. DHS: Recommended Drinking Water Action Levels, January 1987.
3. California Regional Water Quality Control Board: Leaking Underground Fuel Tank Field Manual, October 1989.
4. N/A = Not Applicable; ND = Nondetect

This Table 3 is copied in its entirety from the Report of Findings prepared by BAI, dated March 23, 1990.

Table 4
Groundwater Elevation Data

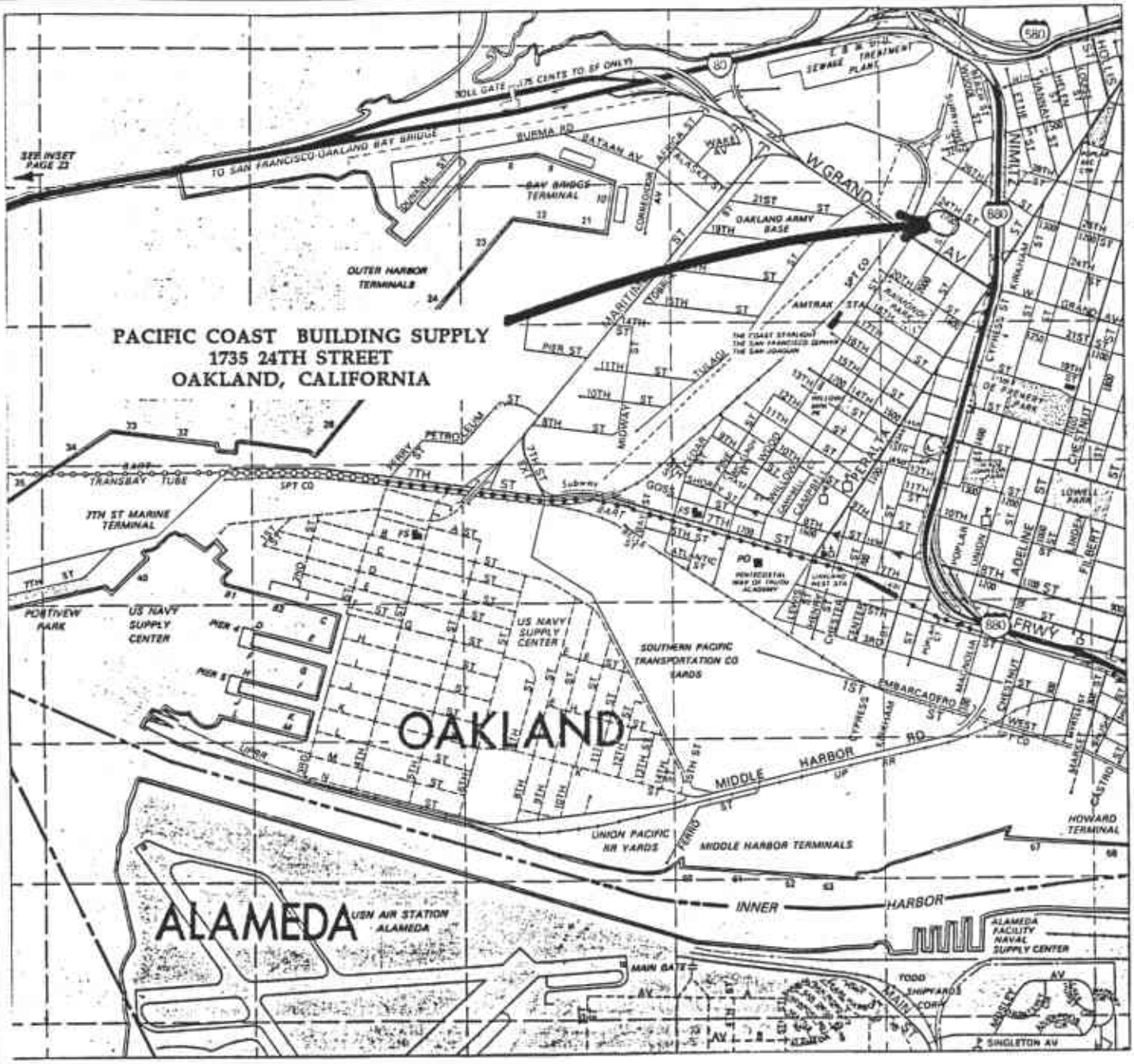
Monitoring Well ID (Elevation[2] of Well Casing)	Groundwater Elevations 10-Oct-88 (feet, MSL)		Groundwater Elevations 08-Dec-88 (feet, MSL)		Groundwater Elevations 29-Dec-89 (feet, MSL)		Groundwater Elevations 05-Mar-90 (feet, MSL)
		DTW		DTW			
On-Site							
MW-1 (8.87', MSL)	0.88	7.99	1.11	7.76	1.13		1.31
MW-2 (8.14', MSL)	0.85	7.29	1.01	7.13	1.27		0.98
MW-3 (9.13', MSL)	0.88	8.25	1.05	8.08	1.34		1.69
MW-4 (9.07', MSL)	0.74	8.33	0.87	8.20	0.99		1.05
MW-5 (8.93', MSL)	0.89	8.04	1.28	7.69	1.53		1.81
Off-Site							
MW-6 (5.63', MSL)	N/A		N/A		0.61	5.02	0.58
MW-7 (4.53', MSL)	N/A		N/A		-3.82	8.35	-6.17

Notes

1. N/A = Not Applicable
2. Reference elevations to top of well casing with respect to Mean Sea Level (MSL).

Groundwater Elevations obtained from Table 4 of the Report of Findings prepared by BAI, dated March 23, 1990. The Top of Well Casing Elevations obtained from Appendix B, Monitoring Well Completion Details, of the Report of Findings prepared by BAI, dated November 30, 1990.

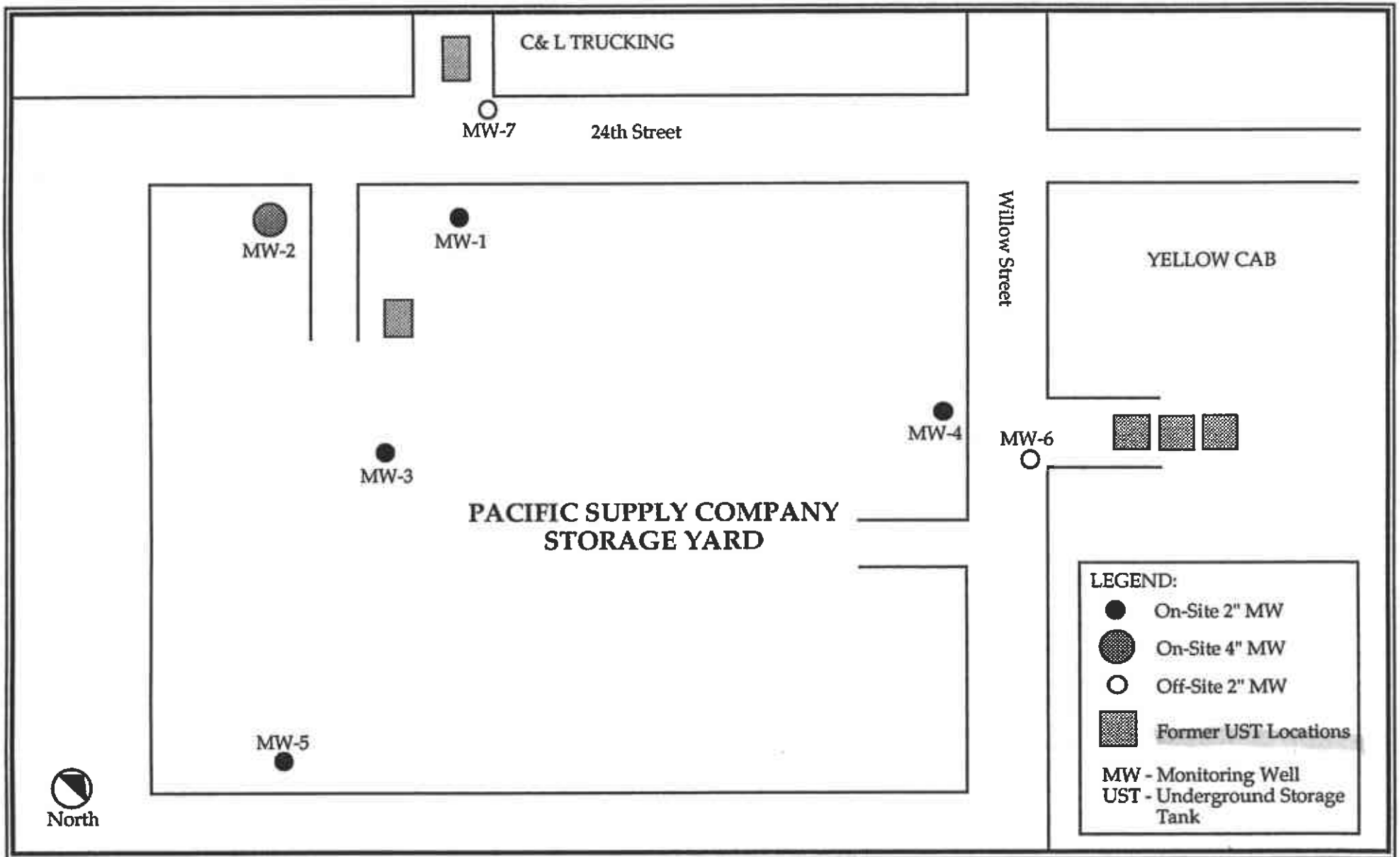
FIGURES



PROJECT NO.: 29.6		
DRAWING NO.:29.6-01		
DRAWN BY:	WFC	12/18/91
APPROVED BY:	MEV	12/ /91
SCALE: As Indicated		

BRUNSING ASSOCIATES, INC.

FIGURE 1
VICINITY MAP
PACIFIC SUPPLY COMPANY
1735 24TH STREET
OAKLAND, CALIFORNIA

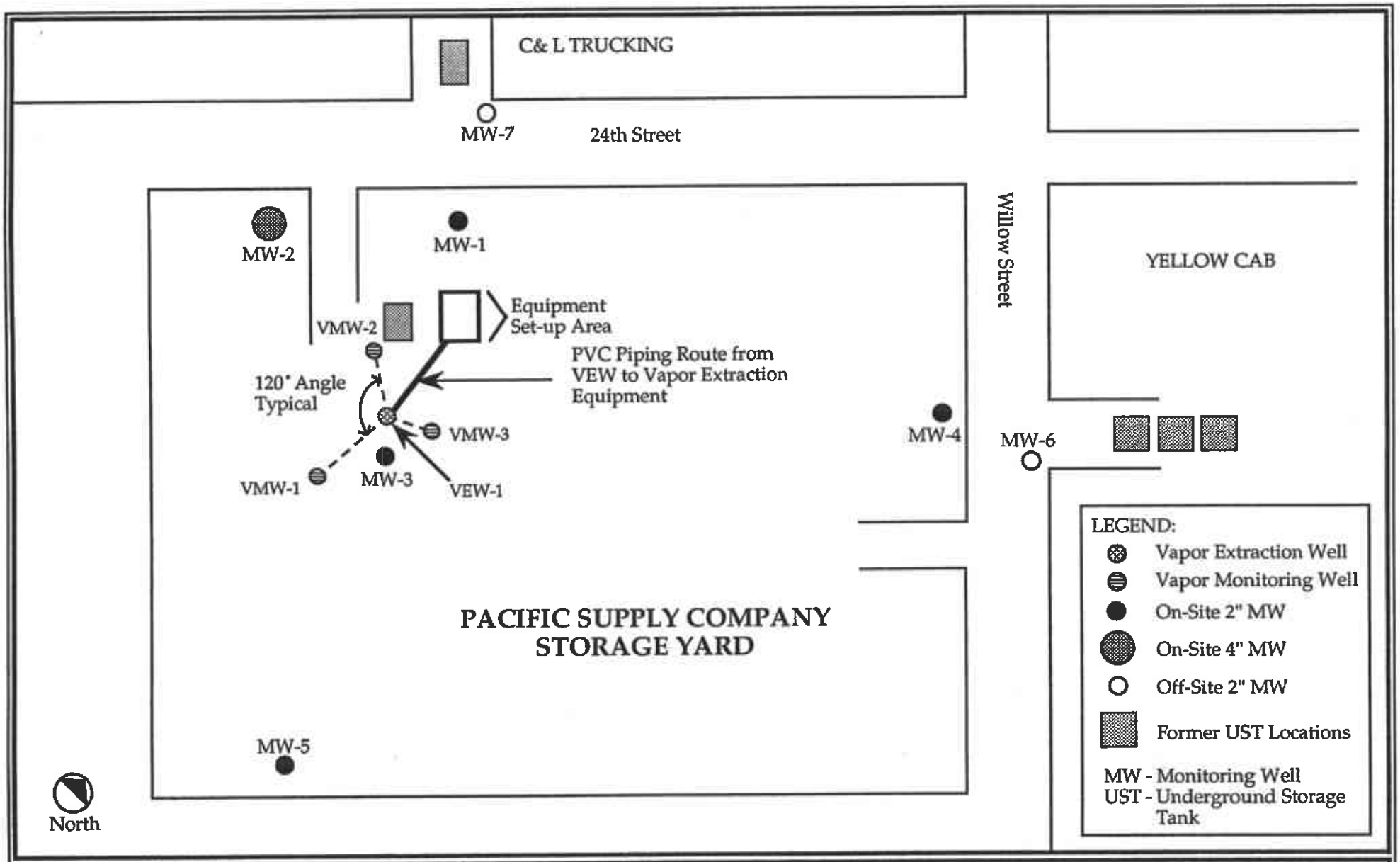


PROJECT NUMBER: 29.6 PACIFIC SUPPLY COMPANY OAKLAND, CALIFORNIA		
DRAWING NUMBER: 29.6-02		
DRAWN BY:	WFC	12/20/91
APPROVED BY:	MEV	1/3/92
SCALE: 1 Inch = 30 Feet		

BRUNSING ASSOCIATES, INC.

FIGURE 2

SITE PLAN AND
EXISTING MONITORING
WELL LOCATIONS

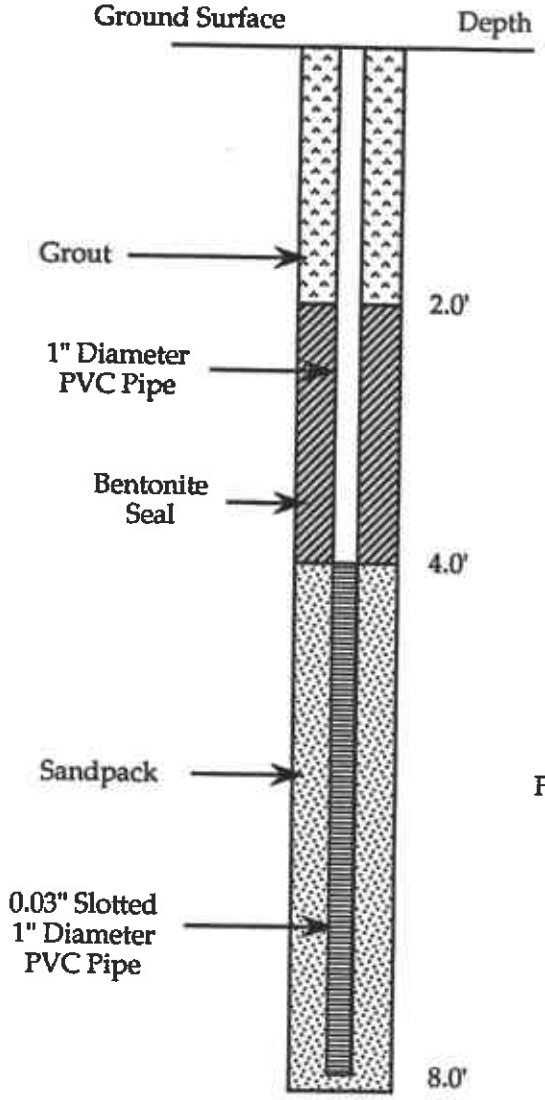


PROJECT NUMBER: 29.6 PACIFIC SUPPLY COMPANY OAKLAND, CALIFORNIA		
DRAWING NUMBER: 29.6-03		
DRAWN BY:	WFC	12/23/91
APPROVED BY:	MEV	1/3/92
SCALE: 1 Inch = 30 Feet		

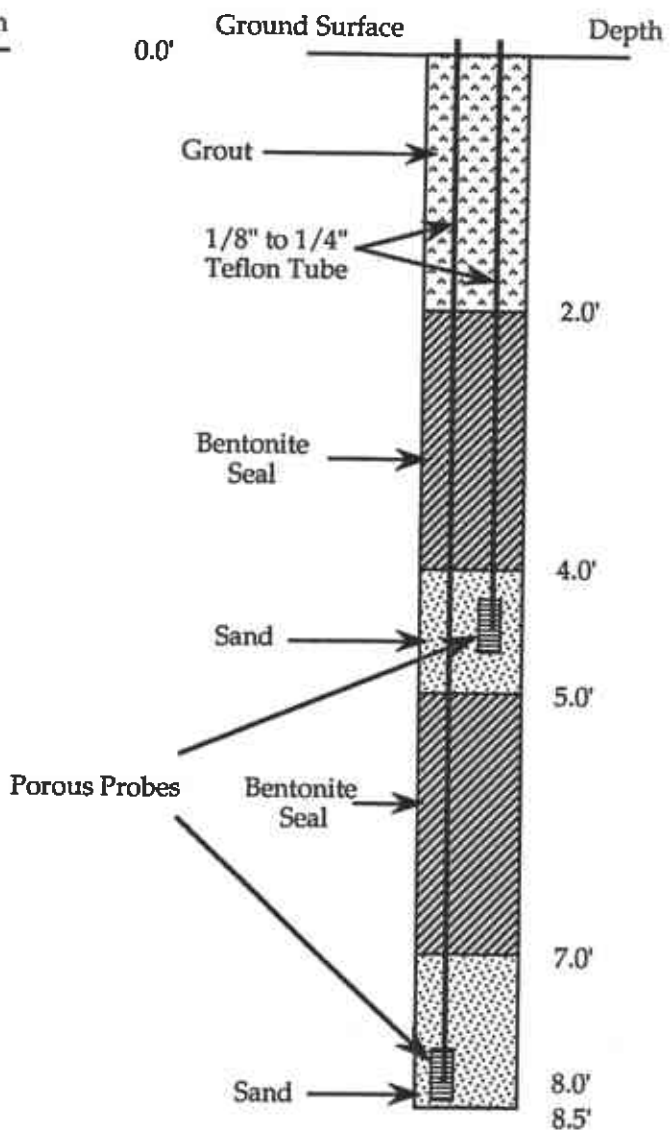
BRUNSING ASSOCIATES, INC.

FIGURE 3

PROPOSED LOCATION OF
PILOT STUDY
VAPOR EXTRACTION/
MONITORING WELLS



Vapor Extraction Well (VEW)



Vapor Monitoring Well (VMW)

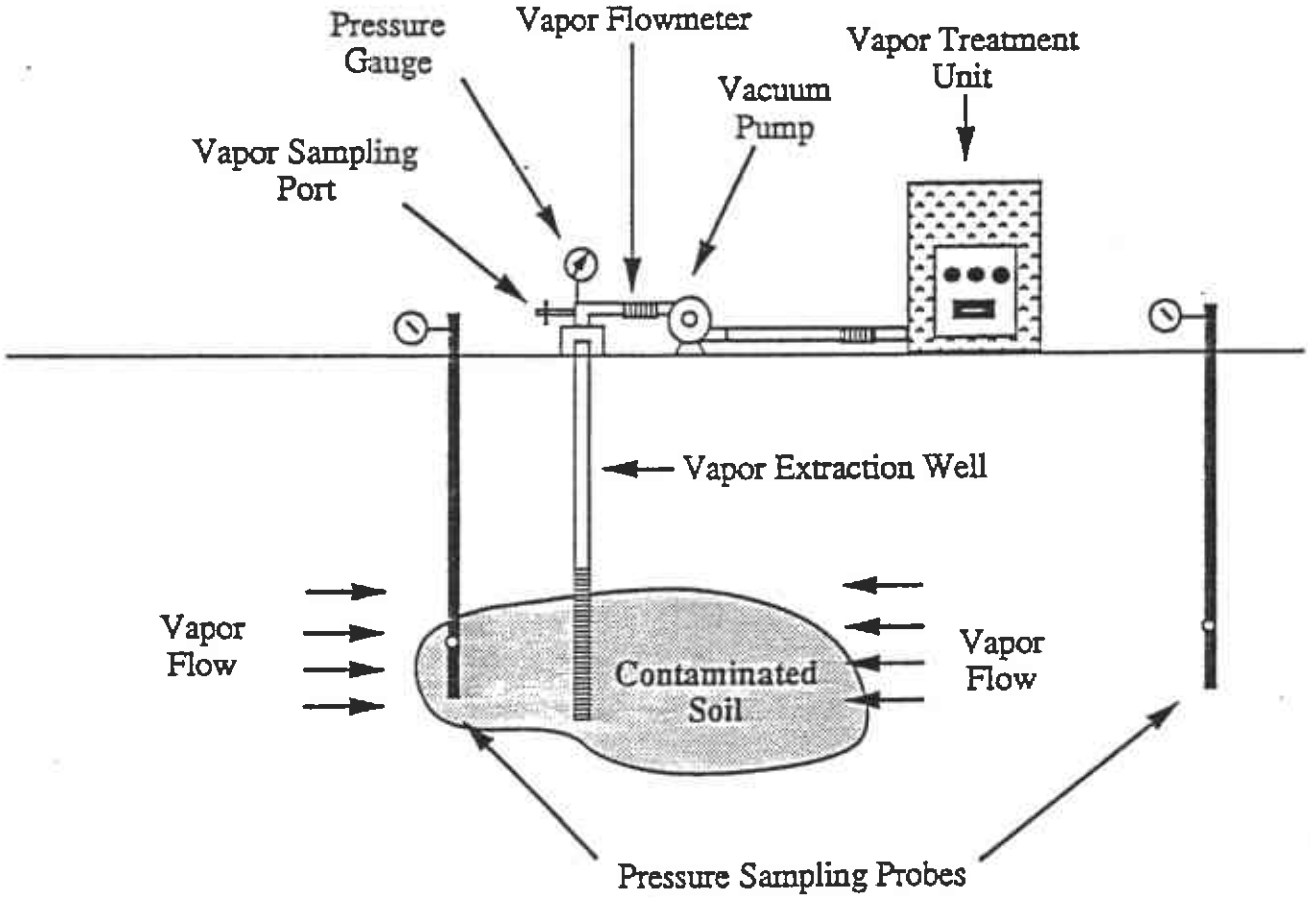
Note:
Teflon tubes in monitoring well are attached to a porous probe .

PROJECT NUMBER: 29.6 PACIFIC SUPPLY COMPANY OAKLAND, CALIFORNIA		
DRAWING NUMBER: 29.6-04		
DRAWN BY:	WFC	1/3/92
APPROVED BY:	MEV	1/3/92
SCALE: Not to Scale		

BRUNSING ASSOCIATES, INC.

FIGURE 4

VAPOR EXTRACTION AND MONITORING WELL DETAILS



PROJECT NO.: 29.6		
DRAWING NO.:29.6-05		
DRAWN BY:	WFC	12/23/91
APPROVED BY:	MEV	1/3/92
SCALE: NOT TO SCALE		

BRUNSING ASSOCIATES, INC.

FIGURE 5

VAPOR EXTRACTION SYSTEM EQUIPMENT
PACIFIC SUPPLY COMPANY
OAKLAND, CALIFORNIA

APPENDIX A

SITE HEALTH AND SAFETY PLAN

1735 24th Street
Oakland, California

January 1992

1.0 INTRODUCTION

This section outlines recommended health and safety procedures to be followed during the drilling and soil sampling at Pacific Coast Building Supply, 1735 24th Street, Oakland, California. The procedures presented herein are intended to serve as guidelines; they are not a substitute for the sound judgement of on-site personnel. As work is completed, appropriate revisions shall be made and approved by the Project Manager. The following is a list of Brunsing Associates, Inc. personnel responsible for the recommended health and safety procedures.

Health and Safety Management Team

Dr. Thomas Brunsing	Project Principal
Michael Velzy	Project Manager/Health and Safety Officer
William F. Creger	Project Engineer/Site Safety Officer

Level D protection is adequate for performance of the approved site work based on:

- Anticipated low hydrocarbon concentrations in site soils associated with the UST excavation, based on analytical data from soil samples collected during excavation procedures.
- Anticipated negligible exposure to contaminated soil during drilling and sampling operations.

Air monitoring will not be performed during site operations, unless deemed necessary by the Health and Safety Officer. All site personnel will be expected to wear hard hats and steel-toed boots during drilling activities. All field work will be done in accordance with 29 CFR (Code of Federal Regulations) 1910.120 and 8 CCR (California Code of Regulations) Articles 1509 - 1547.

All sampling equipment used will be triple bucket washed and/or steam cleaned after use. Before the drill rig leaves the site, the Site Safety Officer will determine, by observations of the presence of dust on the drill rig and equipment, how extensive and rigorous de-contamination procedures of the drill rig and equipment will be.

All decontamination water generated during any procedures on site will be labelled and contained in 55-gallon drums. Any stored wash water will be sampled and

analytically tested. Results of the analytical tests will be used to determine proper disposal methods.

2.0 TRAINING

All field personnel shall be certified as having completed a registered 40 hours of health and safety training as mandated by OSHA requirements under 29 CFR 1910.120. All field operations will be undertaken only by trained personnel familiar with the procedures and this Health and Safety Protocol. The number of personnel and equipment on-site will be minimized consistent with site operations.

3.0 HAZARD ASSESSMENT

In dealing with any hazardous or potentially hazardous substance, personnel must protect themselves from the four basic routes of exposure: inhalation, skin absorption, ingestion, and eye contact. Due to the relatively low amounts of contamination associated with the excavation, and the drilling methods to be used, it is anticipated that level D protection will be sufficient to protect personnel.

Individual Hazard Evaluation Parameters (per ACGIH, 1989-1990)

- Gasoline: TWA = 300 ppm or 890 mg/m
  STEL = 500 ppm or 1,480 mg/m
- Benzene: TWA = 10 ppm or 30 mg/m
  STEL = 25 ppm or 75 mg/m
- Toluene: TWA = 100 ppm or 377 mg/m
  STEL = 150 ppm or 565 mg/m
- Ethylbenzene: TWA = 100 ppm or 434 mg/m
  STEL = 125 ppm or 543 mg/m
- Xylene: TWA = 100 ppm or 434 mg/m
  STEL = 150 ppm or 651 mg/m

(Note: m = cubic meter)

4.0 PROTECTION FROM EXPOSURE

4.1 Inhalation

Breathing a gas, vapor, mist, fume, or dust is the most common accidental form of exposure; this route of entry is the most likely to cause systemic illness. Half-face masks with the appropriate cartridges or dust filters may be required while

conducting sampling or well installation operations. No excessive facial hair, which interferes with a satisfactory fit of the mask-to-face seal, will be allowed on personnel required to wear respiratory protective equipment.

4.2 Skin Absorption

Skin exposure to hazardous materials may result in skin irritation or penetration. Skin penetration is the second most common accidental means of entry of chemicals into the body. The following precautions may be required when performing any on-site activities described in this work plan.

- Ensure that all skin areas which may be contacted are protected during site work by wearing rubber boots and disposable coveralls and gloves.
- After completing the day's work, remove and dispose of contaminated coveralls.
- Contaminated rags and other disposable items such as gloves should be bagged for disposal in appropriate on-site containers; care should be taken to avoid skin contact with these items.
- Equipment which has come in contact with the soil at the site should be thoroughly cleaned before leaving the site.
- Unnecessary contact with potentially contaminated surfaces should be avoided. Whenever possible personnel should avoid walking through mud, puddles, and other discolored surfaces; kneeling on the ground; leaning, sitting, or placing equipment on drums, other containers, vehicles, or the ground.

4.3 Ingestion

Hazardous materials may be carried to the mouth by hand when eating, drinking, chewing gum or tobacco, or smoking. Therefore, these activities are prohibited during and after work until contaminated clothing has been removed. Furthermore, liquids will not be syphoned by mouth under any circumstances.

Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other ingestion occurs.

Medically prescribed drugs used by personnel during field activities where the potential for inhalation, absorption, or ingestion of toxic substances exists should be used only after consultation with a qualified physician.

4.4 Eye Contact

The eyes may be harmed by chemicals in solid, liquid, or vapor form. Irritant effects vary in degree from mild to severe. The following precautions to avoid eye injury will be taken when at the site:

- Do not rub eyes while working.
- Do not wear contact lenses when working or while wearing contaminated gloves or other contaminated clothing.
- Safety goggles or glasses (without side perforations) may be required by the site engineer or geologist.

5.0 EMERGENCIES

The following procedure should be used in the event of an accident (physical injury or exposure to toxic materials):

1. Remove the injured or exposed person(s) from immediate danger.
2. Render FIRST AID if necessary.
3. Call AMBULANCE [911] for transport to local hospital. **These first three steps should be followed even if there is no apparent serious injury.** EMERGENCY NUMBERS AND THE FASTEST ROUTE TO THE NEAREST HOSPITAL SHALL BE READILY AVAILABLE ON SITE AND ARE INCLUDED WITH THIS DOCUMENT.
4. Relocate other on-site personnel to a safe place until the Project Manager determines that it is safe for work to resume.
5. Steps to prevent a recurrence of the accident should be implemented immediately.

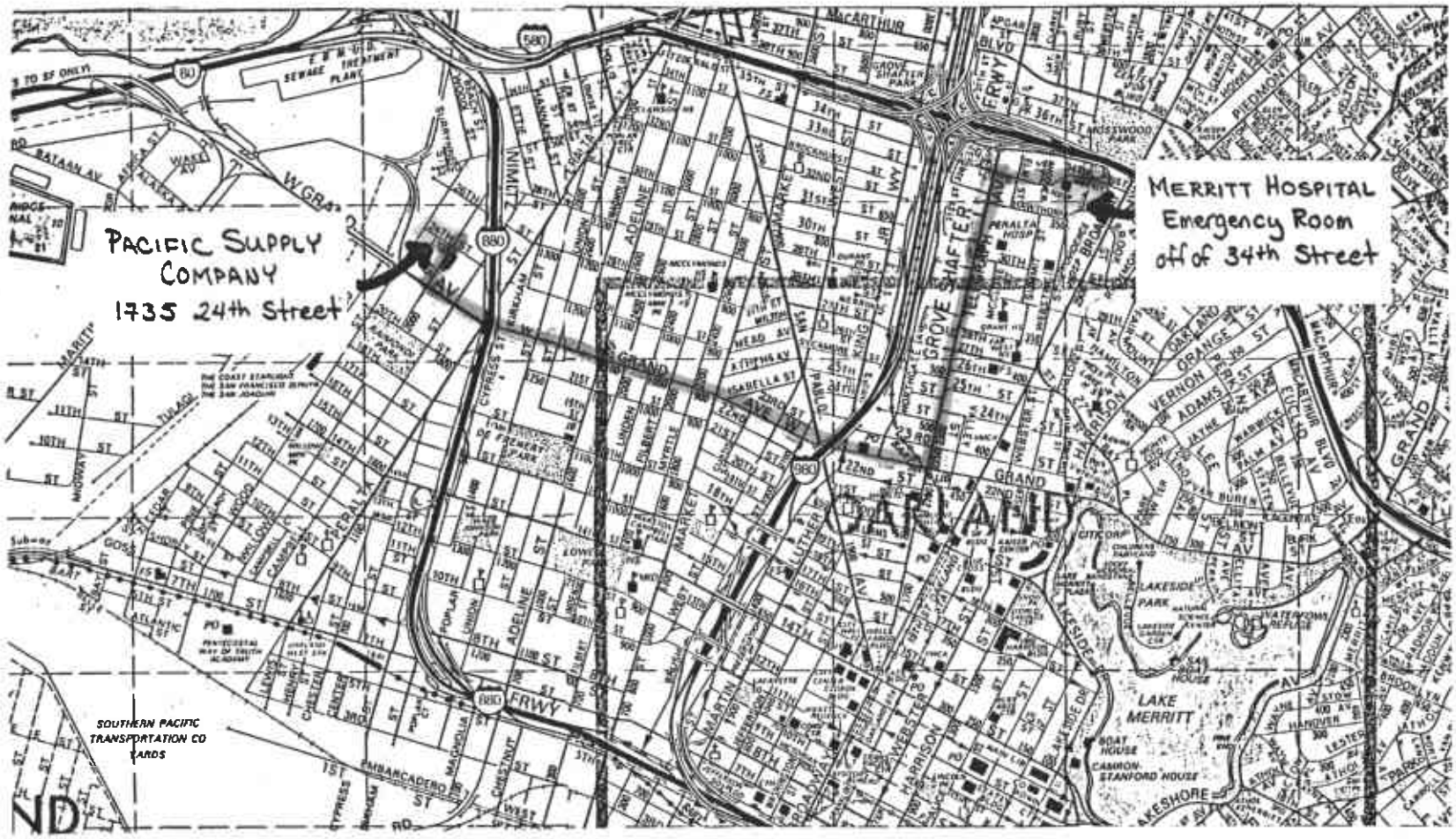
The attached map entitled, "Route to Hospital for the Health and Safety Plan", depicts an area map showing a direct route from the site to Oakland's Merritt Hospital emergency room, which is open 24 hours. The emergency room access road is along 34th Street. The Merritt Hospital street address is 350 Howthorne and the nearest major cross street is Telegraph Avenue. The general information phone number is (510) 451-4900.

Contact Persons:

Consultant -	Michael Velzy	(415) 637-0170
Client -	Normita Callison	(916) 645-3341

6.0 HEALTH AND SAFETY MEETING

A safety orientation meeting will be held at the site before field work commences. The purpose of this meeting is to review the Health and Safety Protocol with all field personnel.



SCALE OF SINGLE MAP PAGES
1 INCH TO 2200 FEET

NORTH

REFERENCE: Thomas Guide, Alameda County, 1989 Updated Revision

PROJECT NUMBER: 29.6 PACIFIC SUPPLY COMPANY OAKLAND, CALIFORNIA		
DRAWING NUMBER: 29.6 H&S Plan		
DRAWN BY:	WFC	12/24/91
APPROVED BY:	MEV	
SCALE: As Indicated		

BRUNSING ASSOCIATES, INC.

ROUTE TO HOSPITAL
FOR THE
HEALTH AND SAFETY
PLAN

APPENDIX B

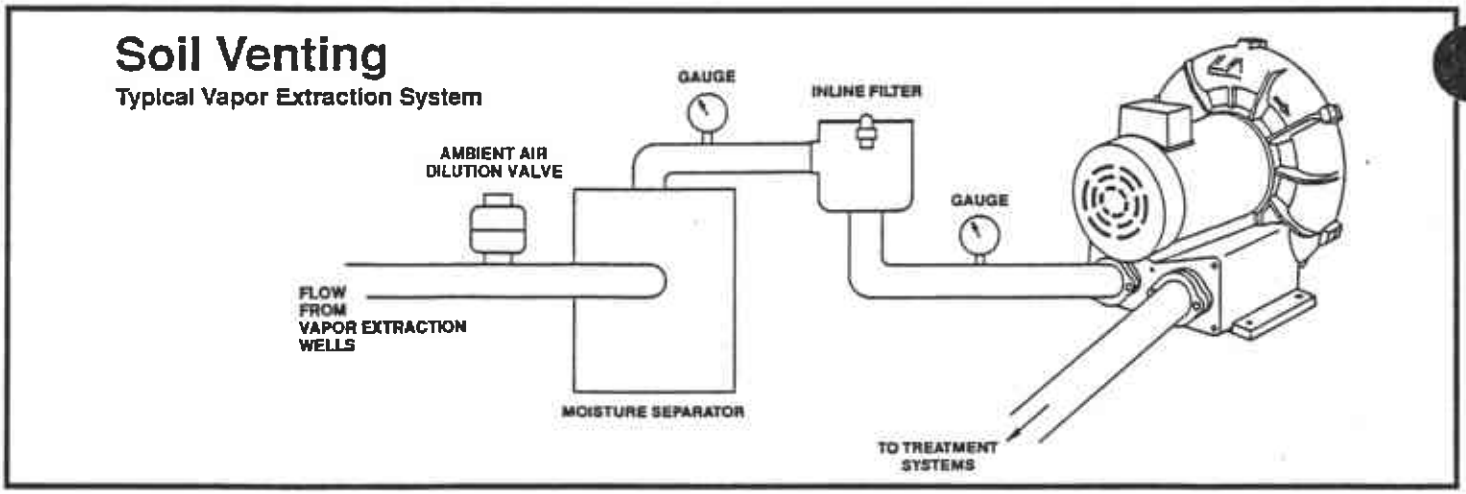
ENVIRONMENTAL INSTRUMENTS

CALL TOLL FREE
1-800-648-9355

Environmental Instruments Vapor Extraction Systems are designed for in-situ removal of vapor phase contaminants from soil. Vapor extraction is an increasingly popular and cost-effective method of mitigating a source of groundwater contamination.

EI offers both compact regenerative blower systems, using regenerative blowers, and custom blower packages built around the rotary positive displacement blowers. With our selection of explosion-proof vapor extraction blower systems, we can provide a system ideally suited in flow and vacuum for your site conditions. And our blowers provide more than enough pressure to push the contaminated air stream through any of our treatment process.

ENVIRONMENTAL INSTRUMENTS
REGENERATIVE VAPOR EXTRACTION SYSTEMS



FEATURES

1) EI's Regenerative Vapor Extraction Systems are quiet, compact and low maintenance.

2) Simple installation; with most systems, just hook up your extraction piping and plug in the electrical cord.

3) Explosion-proof motors and starters are standard.

4) An ambient air control valve is provided to maintain the volatile levels below hazardous LEL levels in the discharge air stream.

5) Vacuum and pressure gauges are provided in line to aid in monitoring the extraction system.

6) EI's regenerative systems are adaptable to changing conditions. If soil impedence increases, the blower pulls more vacuum. If impedence decreases, it pulls more flow.

7) Compact skid mounted system is easily transportable.

8) Trailer mounted systems available.

9) Blowers are also sold separately.

ENVIRONMENTAL INSTRUMENTS

CALL TOLL FREE
1-800-648-9355

ENVIRONMENTAL INSTRUMENTS REGENERATIVE VAPOR EXTRACTION SYSTEMS SPECIFICATIONS

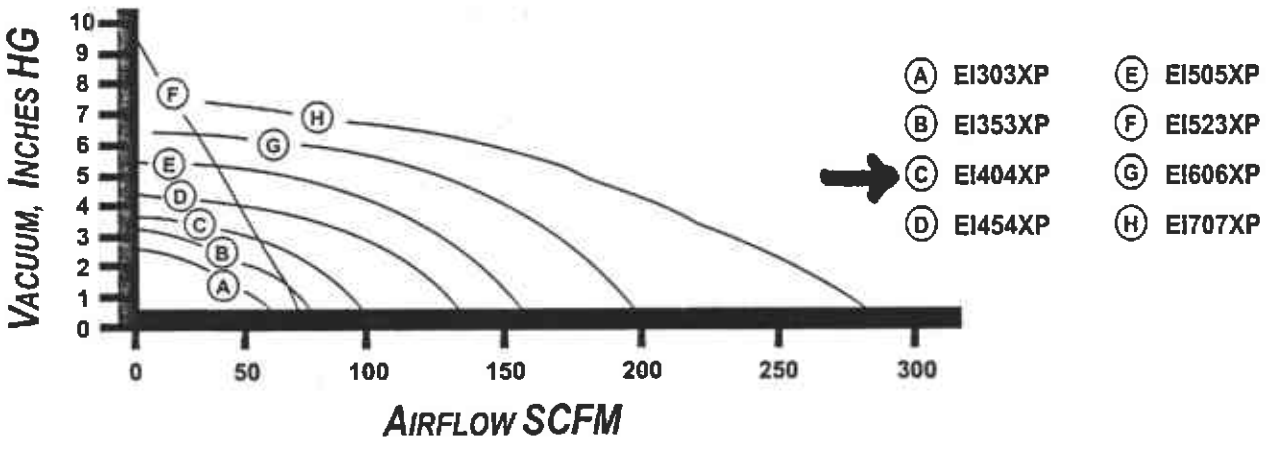
Proposed Model

MODEL	EI303XP	EI353XP	EI404XP	EI454XP
Maximum Flow, SCFM	63	84	98	127
Max. Vacuum, Inches Hg	3.0	3.3	3.6	4.3
Max. Pressure, Inches water	40	50	56	65
Intake/Exhaust Dia.	2"FNPT	2"FNPT	2"FNPT	2"FNPT
Motor HP	0.5	0.75	1.0	1.5
Voltage	115/230	115/230	115/230	115/230
Phase	1*	1*	1*	1*
Frequency	60	60	60	60
Amps	6.5/3.5	8/4	12/6	18/9

MODEL	EI505XP	EI523XP	EI606XP	EI707XP
Maximum Flow, SCFM	160	84	200	280
Max. Vacuum, Inches Hg	5.2	9.7	6.1	6.8
Max. Pressure, Inches water	62	158	80	100
Intake/Exhaust Dia.	2"FNPT	2"FNPT	2"FNPT	2"FNPT
Motor HP	2.0	3.0	3.0	5.0
Voltage**	115/230	230/460	230/460	230/460
Phase	1	3	3	3
Frequency	60	60	60	60
Amps	21/10.5	9/4.5	8/4	14/7

*3 phase motors available

BLOWER PERFORMANCE AT SEA LEVEL



ENVIRONMENTAL INSTRUMENTS ACTIVATED CARBON

For vapor phase treatment of toxic air streams from soil venting, air stripping, tank or separator vents, drumming stations and more, look to Environmental Instruments to provide a vapor control system for you.

We feature a wide range of granular, pelletized and powered activated carbon. We also carry impregnated carbon for specialty applications, such as H_2S, ammonia and mercury vapor removal. Carbon is available in bulk bags, drums, bulk trucks, or air purification filters. We can size an activated carbon system to meet your treatment requirements.

VAPOR PHASE CONTROL

GAS PHASE ACTIVATED CARBON CANISTER TO ABSORB VOC'S

- *to 3500 CFM*
- *140 to 8000 pounds carbon*
- *can be manifolded for greater flows*

PARTIAL LIST OF VAPORS TREATED WITH ACTIVATED CARBON:

Acrylates	Benzene	Perchloroethylene
Alcohols	Ethanol	Propyl Amine
Aldehydes	Heptane	Tetrahydrofuran
Hydrocarbons	Hexane	Hydrogen Sulfide
Mercaptans	Halogens	Methyl Acrylate
Isoprene	Toluene	Trichloroethylene
Butanol	Xylene	Sulpher Dioxide

REGENERATION SERVICE

We can provide a thermal regeneration of activated carbon which restores the adsorptive properties of the carbon to near-virgin quality. This process costs pound-for-pound 25-50% of virgin carbon resulting in substantial money savings. And regeneration eliminates disposal costs and associated problems.