WHF

WHF Environmental Consultants, Inc.

Post Office Box 6729
Modesto, CA 95355-6729
(209) 579-8138

26 March 1991

CALIFORNIA REGIONAL WATER
MAR 27 1991
QUALITY CONTROL BOARD

Pamela J. Evans
Alameda County Department of Environmental
Hazardous Materials
80 Swan Way, Room 200
Oakland, CA 94621

RE: 186 E. Lewelling Blvd., San Lorenzo

Dear Pamela:

I have enclosed a copy of the Work Plan for the Young property located at 186 E. Lewelling Boulevard. This plan is a Phase I Site Work Plan addressing the first major concern regarding this site.

Upon completing your review and approval of this plan, we will schedule with your office a project time table and schedule sub-contractors for this project.

If there are any questions regarding this site, please contact our office at (209) 579-8138.

Sincerely,

W. H. Fox, II, REA
WHF Environmental Consultants, Inc.

WHF/cdc
Enclosure

cc: Mr. Michael Abbott - Normoyle & Newman
Mr. Richard Hiett - RWCQB - Oakland

WHF

NEW PERFORMANCE AUTOMOTIVE

186 East Lewelling Blvd., San Lorenzo, California

Site Work Plan

Prepared By:

W. H. Fox, II, REA
WHF ENVIRONMENTAL CONSULTANTS, INC.

March 26, 1991

NEW PERFORMANCE AUTOMOTIVE

186 East Lewelling Boulevard
San Lorenzo, CA

Project #91-079

Site Work Plan

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NEW PERFORMANCE AUTOMOTIVE
Project #91-079
186 East Lewelling Boulevard
San Lorenzo, California

1.0 PROJECT IDENTIFICATION

This project has been developed to explore a small parcel of property known as New Performance Automotive. This work plan will explore the vertical migration of fuel released to the subsurface environment, as well as a soil gas vapor survey to define the possible lateral extent of the release.

1.1 Site Description and History

On September 5, 1990, three (3) underground storage tanks were removed from the site now known as New Performance Automotive ("Tennant") located at 186 E. Lewelling Boulevard in San Lorenzo, California. the three (3) underground tanks removed from this site were two (2) 4,000 gallon gasoline tanks and one (1) 350 gallon waste oil tank (Figure 1).

These three (3) tanks once served as the fuel tanks for the abandoned service station located at this site. Area residents state that this site had not been selling fuel in many years (Figure 2).

Five (5) soil samples were collected from this site. Four (4) samples were collected from beneath the two (2) 4,000 gallon tanks and a single sample from beneath the 350 gallon tank. These samples were then sent to Superior Analytical Laboratories, Inc., of San Francisco.

The analytical results indicated both 4,000 gallon gasoline tank location had elevated levels of gasoline and BTX&E compounds, which require further investigation under the Luft criteria for the State of California (Table 1). The waste oil site locaiton indicated no level of concern, at this time, based on the current analytical data (Appendix B).

2.0 PROJECT OBJECTIVES

This project has been developed to study the impact of the unauthorized fuel release to the subsurface at this site and/or if any impact has been made to the underlying ground waters. The project has been developed in a "two step" approach to assess the problem and it will be executed almost concurrently.

3.0 SITE WORK PLAN

The two steps to this project consist of a single 2" ground water monitoring well located just outside the excavation to the east or west, inside the property fence line, depending on the soil vapor results. Since the excavation is still settling, this would not allow for firm placement of the drilling rig and substandard compaction for a good well seal (Figure 3).

The second step of this project will provide for a soil gas vapor survey to determine the lateral migration of the contaminatin (Appendix C). The soil gas vapor sampling layout will provide information on a 20 foot grid and allow for contouring of the contaminate to give a plan view of the lateral extent (Figure 3A).

3.1 Drilling

Permits will be obtained as necessary for all wells (including borings) before drilling begins. The soil boring will be accomplished using a mobile mounted drilling rig employing the use of a hollow stem flight auger no less than 3 1/4-inch i.d. and 8 7/8-inch o.d.

All drilling equipment will be thoroughly steam- cleaned before drilling begins to prevent the introduction of contamination from off site and between borings to prevent cross contamination.

The borings will be logged (Figure 4) under the direct supervision of a registered engineering geologist using the United Soil Classification System. The color, texture, moisture, plasticity (if applicable), consistency of the earth materials, blow counts, pertinent soil or bedrock characteristics, and any evidence of contamination will be noted. All water-bearing zones and the depths at which they were encountered will be noted on these logs.

All borings will be drilled in such a manner as to prevent cross contamination between strata. Exploratory soil borings within the unsaturated zone will be backfilled with a concrete slurry mixture. Borings into the saturated zone will be drilled to a maximum of 20 feet beneath the top of the aquifer being explored. Any perching layers encountered will be investigated to a maximum thickness of five feet and will be backfilled with concrete slurry, after a bentonite seal has been placed. If a deeper aquifer is to be investigated, conductor casing will first be grouted into place to seal off the upper aquifer(s), in series if necessary and drilling will proceed through the conductor casing after the grout has been allowed to set properly. If evidence of contamination is noted during the drilling, the drilling will be halted until the responsible professional determines the advisability of deeper drilling.

Upon termination, the boring into the saturated zone will be completed as monitoring wells and backfilled with concrete grout, after a bentonite seal has been placed. The boring for the monitoring well will be of a diameter at least 4-inches greater than the 2-inch diameter of the well casing to be used.

The cuttings from the drilling operation will be containerized on-site during drilling for proper disposition. The proper method of disposal will be dependent upon results of laboratory analysis. This disposal will be the responsibility of the client unless other arrangements have been made.

3.2 Well Construction

All materials used in well construction will be thoroughly cleaned prior to introduction into the boring. A bentonite or cement and bentonite grout will be placed at the bottom of the boring as necessary. After the seal has been allowed to set long enough to support the weight of the casing, a 2- inch diameter well casing (stainless steel or PVC) with end cap and factory perforations for placement in the saturated zone (taking into account seasonal variation) will be placed in the boring. The screen and filter pack sizes will be as noted in the well construction drawing. The casing and end caps will be threaded or joined by stainless steel screws, no PVC cement will be used. The filter pack will extend two feet above the perforated zone. A bentonite seal 2-to 3-feet thick will be placed in the annular space above the filter pack followed by a cement grout to the surface. Seal and filter pack elevations may change based on the underlying geology (Figure 5).

3.3 Well Development and Sampling

The well will be developed until the well water appears clear of sediment of until an appropriate number of well volumes (based upon the judgement of the responsible professional) have been evacuated. The water produced during well development will be containerized and left on-site in 55-gallon drums or other suitable containers for disposal as hazardous waste if deemed necessary upon receipt of laboratory results. Disposal will be the responsibility of the client unless other arrangements have been made.

All soil and ground water samples will be properly labeled with date collected project number, sample coordinator, and sample identification. All samples will be identified with job number-year-borehole- depth/monitoring well-hour. Field records will document the above information and other significant data such as names of on-site personnel, sampling methods, date and time of sampling, the number of well volumes removed before sampling, preservatives added (if any), and any filtration performed on samples.

The samples will be refrigerated immediately for delivery to the laboratory and will under no circumstances be opened by anyone other than laboratory personnel. Chain of Custody records will be maintained at all times (Figure 6).

3.4 Soil Sampling

All soil sampling equipment will be thoroughly steam- cleaned before and between sampling to prevent cross contamination. Relatively undisturbed soil samples will be taken at intervals of not more than 5 feet in order to evaluate the subsurface materials, however this sampling interval may be waived in saturated sands in which sample recovery is not possible.

The soil samples will be taken using a California Modified Split Spoon sampler with brass liners. The sampler will be driven by a 140 pound hammer repeatedly falling 30 inches. The blow counts necessary to drive the sampler will be recorded for each 6-inch interval to help evaluate the consistencies of the materials.

The laboratory samples will not have head space and will be immediately sealed in their liners using aluminum foil lined plastic caps that are taped in place. The remaining sample will be removed from its liner to be used as an aide to the on-site geologist in logging the material at that depth.

Soil samples collected for analysis will be analyzed using EPA method 8015 modified for total petroleum hydrocarbons as gasoline and EPA method 8020 for BTX compounds.

3.5 Ground Water Sampling

A laboratory provided travel blank will accompany the sample vials from the time they are picked up from the lab to the time they are delivered to the lab. This travel blank should be listed on the Chain of Custody but will be analyzed only if all samples contain the same contaminants.

All sampling equipment including the pump, bailer, and cables, used by sampling personnel, will be disassembled if appropriate and steam-cleaned prior to commencement of sampling. These procedures will also be followed between each well, sampling point, and at the end of the sampling day. De-ionized or organic- free water (also provided by the laboratory) will then be introduced into the pump or bailer as a final stage of cleaning. This water will then be pumped or gently poured into sample vials to be used as pump or bailer blanks. These blanks will be tested only if their corresponding samples are found to contain contaminants.

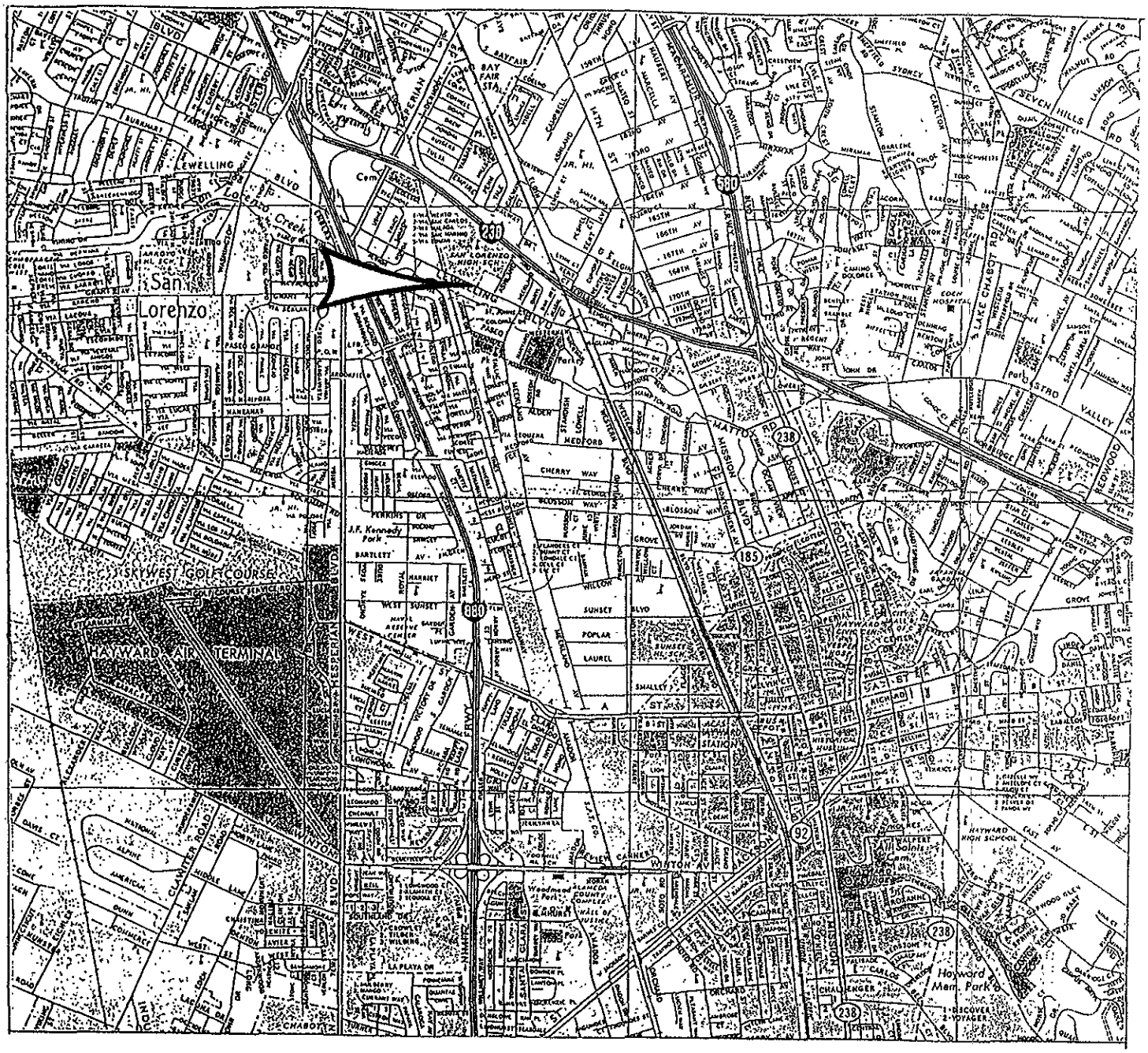
Immediately prior to sampling, water levels and well depth measurements will be taken in all wells at the site. Each well will be evacuated using a stainless steel bladder pump, which does not introduce air into the water column, or a teflon bailer. The pH, temperature, and electrical conductivity of the water will be monitored as the well is evacuated. These parameters will be noted on a field log. Instruments calibrated to known standards will be used to monitor these parameters. At least five well volumes will be evacuated from each well and more if necessary until the above parameters have stabilized. Wells that are de-watered before evacuation of five well volumes has been accomplished will be sampled upon 80 percent recovery of the initial water level. The wells or other sampling points will be sampled in order of the least to the most contaminated, as best known or estimated. The samples will be pumped from a

stainless steel bladder pump or carefully poured from a teflon bailer into clean glass vials with teflon-lined screw caps and half gallon plastic containers provided by the laboratory. Care will be taken to ensure that no air space exists in the vials by inverting to check for bubbles and re-sampling if necessary.

Samples will be analyzed or extracted within 14 days according to their EPA methods. Water samples collected for analysis will be analyzed by EPA method 602 for purgeable aromatics and halocarbons and total petroleum hydrocarbons, as gasoline by EPA Method 8015 modified.

W. H. Fox, II, REA
California Registered Environmental Assessor #00620
WHF Environmental Consultants, Inc.

FIGURES



New Performance Automotive
186 E. Lewelling Blvd
San Lorenzo, California

FIGURE 1
Vicinity Map

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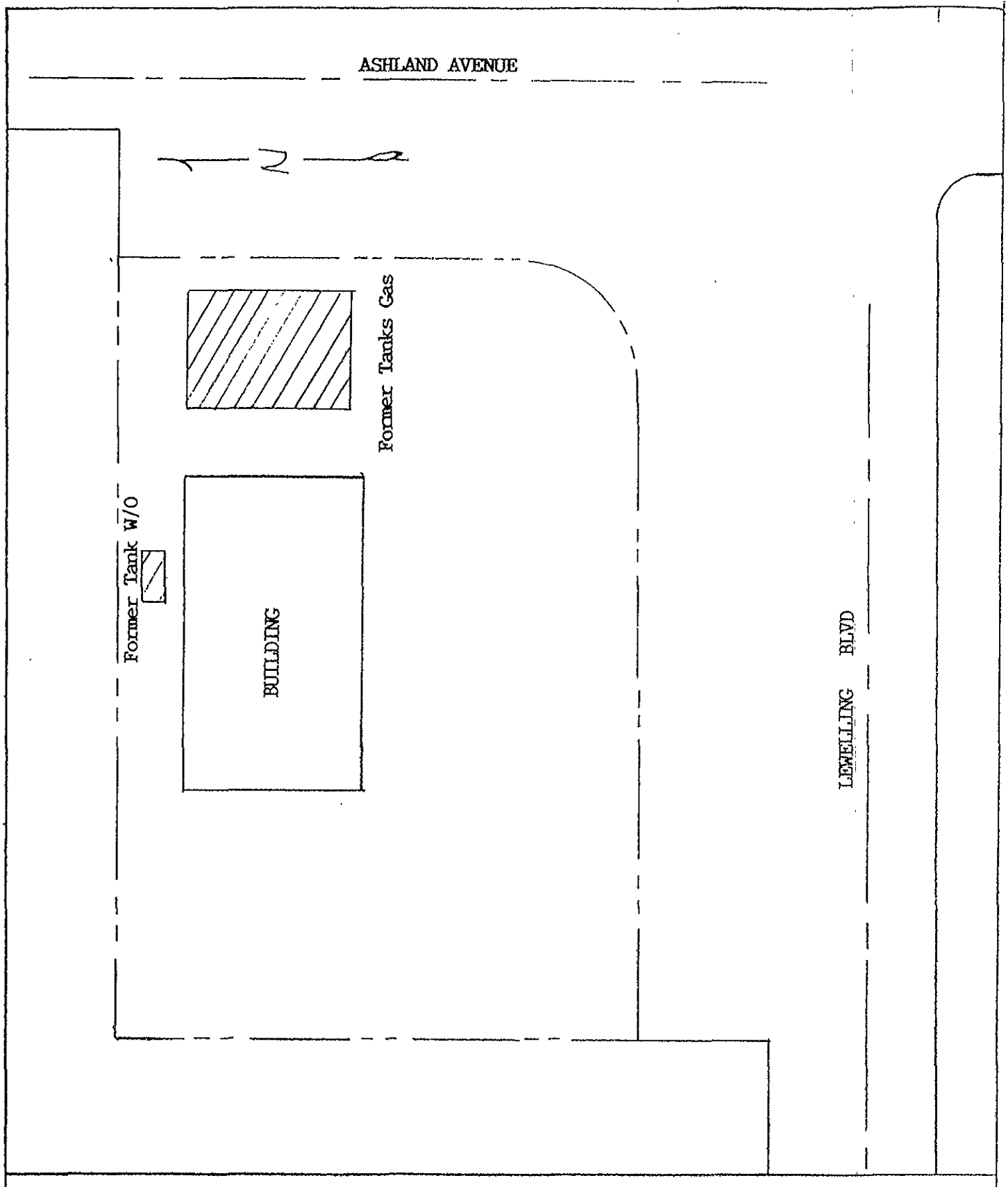

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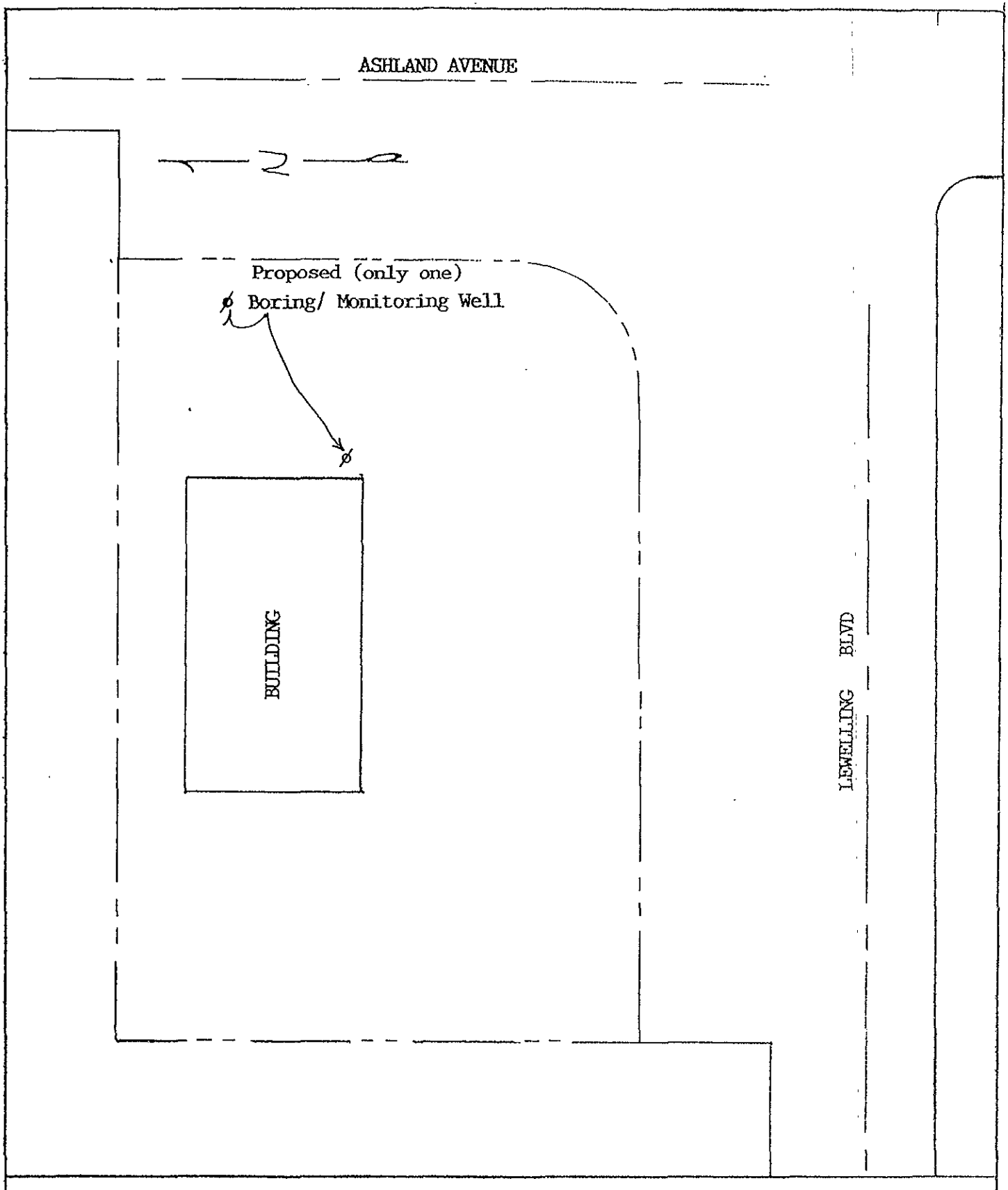
New Performance Automotive
186 E. Lewelling Blvd.
San Lorenzo, California

SCALE: 1"= 20'

FIGURE 2
Site Map

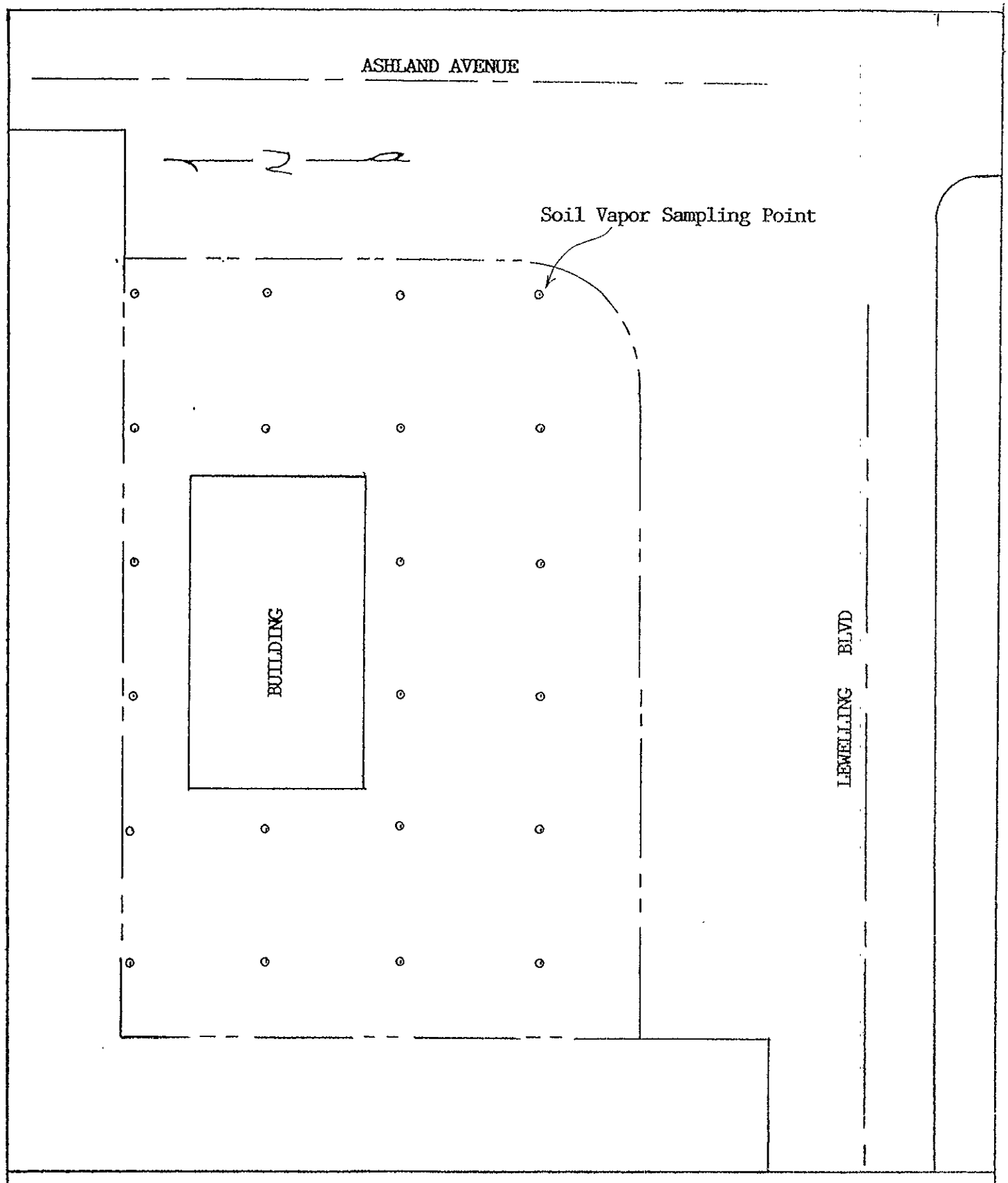


New Performance Automotive
186 E. Lewelling Blvd.
San Lorenzo, California

SCALE: 1"= 20'

FIGURE 3

Site Map
Monitoring Well Location



New Performance Automotive
186 E. Lewelling Blvd.
San Lorenzo, California

SCALE: 1"= 20'

FIGURE 3A

Site Map
Soil Vapor Grid

HENKLE AND ASSOCIATES

FIGURE 4 Boring Log (Typical)

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME [redacted] PROJECT NUMBER _____

FIELD ENG./GEO. CHYDE APPROX. ELEV. _____

COORDINATES _____ DRILLING METHODS 8" AUGER

PAGE 1 OF 1

BORING NO. B-1

DATE 11-5-87

MW-1 [redacted]

CASING INFORMATION SIZE	CASING INFORMATION DEPTH	GROUNDWATER LEVEL DATA ACTUAL TIME	GROUNDWATER LEVEL DATA DEPTH	GROUNDWATER LEVEL DATA ACTUAL TIME	GROUNDWATER LEVEL DATA DEPTH
		11/5/87	10.0		
		12/03/87	6.75		
		12/21/87	5.70		

DEPTH	SAMPLE #	BLOWS ON SAMPLER PER 15 CM.	SAMPLER RECOVERY	WELL GRAPHIC	SOIL PROFILE	U.S.C.S. SYMBOL	DESCRIPTION	REMARKS
0				G G		GW	0-1.5' SANDY GRAVEL	0-1.5' LOOSE
						CL/ML	1.5-4' DK. BRN SILTY CLAY	
5				B B		CL	4-19.5' LT. BRN CLAY M. PLASTICITY W/MINOR SILT CONT.	@10' HIT WATER (STATIC WATER TABLE) SOFT 4-19.5'
10	B-1 10	4/10/11	100%					
15	B-1 15	3/3/6	100%					
20	B-1 20	5/6/8	100%			ML/CL	19.5'-31.5', LT. BRN CLAYEY SILT, LOW PLASTICITY	STIFFER @ 19.5' (HARDER)
25	B-1 25	6/6/6	85%					0-31.5' NO HYDROCARBON ODOR
30	B-1 30	6/6/7	100%				B.O.W. 31.5'	
35								

REGISTERED GEOLOGIST
WILLIAM R. HENKLE, JR.
No. EG - 001233
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

NOTES: STARTED 10:00, COMPLETED (LESS GRAT) 14:30
2" WELL SCREEN 5'-25', BLANK 0-5'
140 LB. HAMMER
SAND FILL 8'-30' (#3 SAND)
BENTONITE SEAL 3'-8'
GROUT 0'-3'
SIERRA DRILLING CO.
AUGER STEAM CLEANED PRIOR TO DRILLING

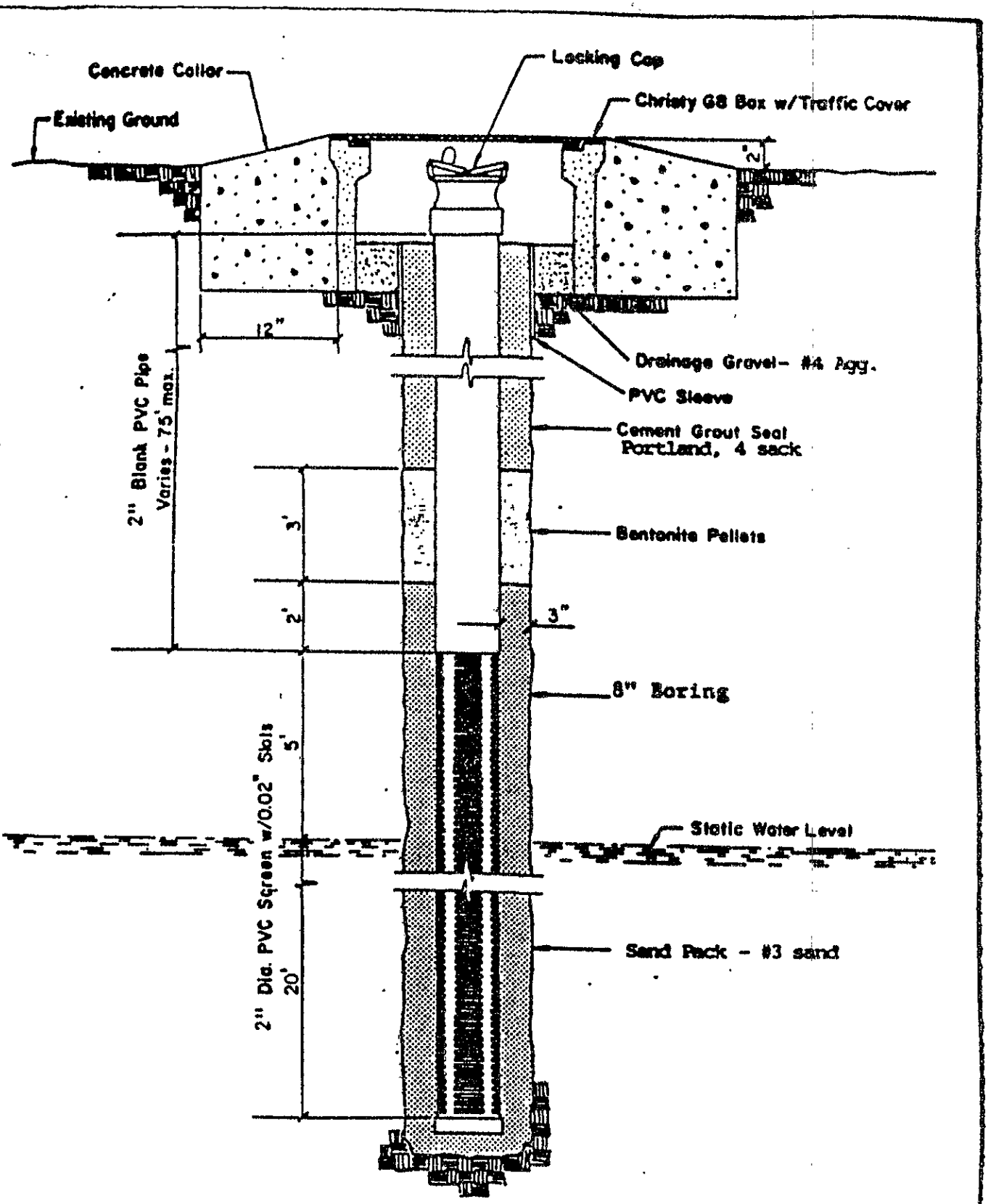


FIGURE 5

GROUND WATER MONITORING WELL

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Figure 6
CHAIN OF CUSTODY RECORD

PROJECT NAME:

SAMPLERS (signature) :

Station Number	Date	Time	Comp.	Grab	Station Location	Number of Containers	Analysis Required							REMARKS

Relinquished by(signature): Company or Agency:	Date / Time	Received by (signature): Company or Agency:	Relinquished by(signature): Company or Agency:	Date / Time	Received by (signature): Company or Agency:
Relinquished by(signature): Company or Agency:	Date / Time	Received by (signature): Company or Agency:	Relinquished by: Company or Agency:	Date / Time	Received by (signature): Company or Agency:
Relinquished by(signature): Company or Agency:	Date / Time	Received for Laboratory by: (signature)	Date / Time	Remarks/Shipping Information	

APPENDIX A

WHF Environmental Consultants, Inc.

Health and Safety Plan

WHF ENVIRONMENTAL CONSULTANTS, INC.
Health & Safety Plan

1.0 HEALTH AND SAFETY PLAN

WHF Environmental Consultants, Inc. has adopted the following health and safety procedures for working with organic vapors and liquid contaminants encountered during drilling and excavation of subsurface soil. The purpose of this program is to provide health and safety precautions for the initial and subsequent site visits until the nature and magnitude of the contaminants have been defined.

1.1 Personnel Responsibilities

All personnel assigned or involved with the remedial investigation or site clean-ups will have an assigned responsibility. The outlined responsibilities will establish standards for personnel protective wear, safety procedures and provide for emergency actions which could arise during project operations.

1.2 Project Manager (PM)

The Project Manager directs all project operations. Project Manager (PM), in cooperation with the Project Safety Officer (PSO), has the primary responsibility for ensuring that the safety plan is read, signed, and fully understood by all employees and outside persons allowed around or within designated working perimeters of the job site.

In cooperation with the PSO, he is responsible for ensuring that at all times during project operations, all employees adhere strictly to the Health and Safety Plan.

1.3 Project Safety Officer (PSO)

The PSO shall direct and ensure that all employees comply with the Health and Safety Plan. The PSO has the primary responsibility for:

1. Assuring that appropriate personnel protective equipment is available and properly utilized by all on-site personnel.

2. Assuring that personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and in planned procedures for dealing with emergencies.

3. Assuring that personnel are aware of the potential hazards associated with site operations.

4. Monitoring the safety performance of all personnel to ensure that the required work practices are employed.

5. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.

6. Preparing any accident/incident reports (see attached Accident Report Form).

1.4 Project Employee

Project Employees involved in on-site investigations are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.

2. Implementing Health and Safety Program and reporting to the PSO for any action deviating from the anticipated conditions described in the Health and Safety Plan.

1.5 Special Instructions

It is the responsibility of the Project Manager and the Health and Safety Manager to review the available site information to determine, to what degree the Health and Safety Plan will be implemented. Each site will be handled on a case by case basis. This site, because of the nature and known levels of con-

taminates, has been identified as a Level "D" entry. Based on U.S. EPA rating criteria for entry, this site requires a minimum of protection. This will include rubber boots, tyvek, gloves and hard hats.

Should for any reason, conditions change, the site will be elevated to an appropriate level of entry for safe working, based on the Project Safety Officer (PSO) and Project Manager (PM).

Should, at any time, the level of entry change, the remaining specific safety equipment and precautions can be implemented by the manager as required. This is fully defined in the following sections.

2.0 SAFETY IMPLEMENTATION

The provisions of the WHF Environmental Consultants, Inc. Health and Safety Plan are mandatory for all personnel associated with the site project and operations.

A complete background review and site visitation will be conducted in order to determine whether specific amendments are to be made to the Health and Safety Plan based on specific characteristics which may exist on the job site. Any suspected hazards associated with the on-site operation which exposure to, via inhalation or skin absorption, to such as suspected carcinogens or human sterilants, will be documented and specific guidance will be developed and added to this Health and Safety Plan as Appendices.

A defined project site layout is paramount to the safe completion of all remedial site investigations. The project site layout has built-in safety features. The site is divided into three zones. The following list defines the required personnel protective equipment.

2.1 Personnel Protective Equipment (PPE)

Personnel who will be working in or around the exclusion zone of the job site will use the following protective equipment and measures as warrant by the Project Manager:

- Coveralls as an undergarment
- Saranex outer garment
- Sample gloves (inner)
- PVC, Nitrile or Neoprene outer gloves
- Hard hat
- Steel toe boots
- Robars or Tingley boots
- Full face-piece respirator with R53HE cartridges (a combination of organic vapor, acid gas, pesticide, radionuclide, high efficiency filter). Note that cartridges should be changed daily.
- All joints to be taped
- Self-contained air will be utilized if project dictates

More stringent protective equipment requirements will be implemented if necessary. This determination will be made by the project supervisor after review of the materials to be handled, the ambient monitoring data, consultation with on-site technical personnel, the Safety Officer, and the proper management personnel. Upgrades in PPE, if necessary, will be implemented.

2.2 General Safety

The on-site Safety Officer will be responsible for the following daily safety implementations:

2.3 Daily Safety Meetings

Each day, prior to commencing work, a safety meeting shall be held to discuss safety considerations for the day's work to be done. A safety topic shall be addressed each day from the following list:

- Site Safety Plan (first day and once a week thereafter)
- Fire Fighting Techniques
- Defensive Driving
- Decontamination
- Levels of Protection

- Heat Stress
- Emergency Equipment on Site
- confined Space Entry Procedure - Respirator Maintenance
- Self-contained Breathing Apparatus Training (if necessary)

2.4 Safety Log

A safety log shall be kept for the project work site.

2.5 Eating, Drinking, Smoking

Eating, drinking, and smoking shall be allowed only in the designated areas in the support zone. No personnel may eat, drink, or smoke on-site in any other area except as permitted by the SSO.

2.6 Safety Plan Acknowledgment Sheet

All personnel visiting or working at the site shall read and certify to reading this SSP by appropriately completing the Safety Plan Acknowledgment Sheet (Figure 9) attached to this plan.

3.0 EMERGENCY CONTINGENCY PLAN

Should any situation or unplanned occurrence require outside or support services, the appropriate contacts from the following list should be made:

- Project Manager
- Client Project Coordinator
- Police/Sheriff's Department
- Ambulance
- Hospital

3.1 Emergency Conditions

In the event an emergency develops on-site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the project are is involved in an accident or experiences any adverse effects of symptoms of exposure while on site.
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

3.2 Emergency Procedures

In the even of an emergency, the following emergency procedures should be followed. Personnel on-site should use the "buddy" system (pairs). Buddies should prearrange hand signals or other mean of communication. In emergencies the following hand signals are suggested:

- Hand gripping throat: out of air, can't breathe.
- Grip partner's wrist or place both hands around waist: leave area immediately, no debate!
- Hands on top of head: need assistance.
- Thumbs up: OK, I'm all right, I understand.
- Thumbs down: No, negative.

Site work areas entrance and exit routes will be planned and emergency escape routes delineated by the Project Manager. These routes will be shown to all on-site personnel by the SSO.

Visual contact will be maintained between "pairs" on- site with the team remaining in close proximity in order to assist each other in case of emergencies.

In the event that any member of the field crew experiences any adverse effects or symptom of exposure while on-site, the entire field crew should immediately halt work and act according to the instructions provided by the PSO.

Wind indicators visible to all on-site personnel will be provided by the Project Manager to indicate possible routes for upwind escape.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, should result in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.

In the event that an accident occurs, the PSO is to complete an Accident Report Form (Figure 10) for submittal to the Project Manager, Client Project Coordinator, and WHF Environmental Consultant's office.

3.3 General First Aide Treatment

Eye	Irrigate Immediately
Skin	Soap was promptly
Inhalation	Move to fresh air
Ingestion	Get medical attention

4.0 DECONTAMINATION PROCEDURES

Hazardous substances are acutely or chronically toxic or otherwise hazardous to man, animals, and plants. Contamination avoidance is the first and best method for preventing spread of contamination from a hazardous site. Every effort is made to prevent direct contact with contaminants. Simple common sense rules of contamination avoidance include not sitting down, not leaning against drums or debris, and not putting equipment on the ground.

The personnel decontamination station provides a controlled decontamination and undressing system designed to avoid the transfer of chemical contamination from protective clothing or equipment to the individual. It is established before any personnel enters the contaminated area so that they can immediately and safely cope with an emergency. Personnel are briefed on decontamination procedures prior to entering the contamination area. When leaving the area, extreme care is taken to ensure that proper decontamination is performed on both person and equipment.

4.1 Personnel Decontamination

When leaving the contaminated are, all personnel will decontaminate at the decontamination station. Decontamination will consist of the following basic steps moving from the contaminated are to the support area:

Step 1	Wash and rinse boots in a two stage wash, remove and stack to dry.
Step 2	Wash, rinse, and remove outer gloves, stack to dry.
Step 3	Remove hard hat, wash, rinse, stack to dry.
Step 4	If wearing PVC suit, wash, rinse, hang to dry.
Step 5	Remove Tyveck or Saranex suit, discard in waste container.
Step 6	Remove respirator, wash, rinse, stack to dry in on break.
Step 7	Proceed to decontamination trailer to wash hands, face, and neck if on break or shower at the end of the shift.
Step 8	At end of shift, wash respirator thoroughly in wash solution, germicidal rinse, clean rinse, and hang to dry.

4.2 Equipment Decontamination

All equipment must be thoroughly washed, rinsed, and certified decontaminated before leaving the site. A decontamination station consisting of a vinyl catch basin and waste collection system shall be established in the contamination reduction zone. All visible contamination dust and residue shall be removed from all equipment.

4.3 Personnel Decontamination Station Closure

All disposable clothing and plastic sheeting used during the operation will be double bagged and either containerized on-site if determined non-hazardous or removed to an approved disposal facility if hazardous. Reusable rubber clothing will be dried and prepared for future use (if gross contamination has occurred, additional decontamination may be required). Cloth items will be bagged and removed from the site for final cleaning. All wash tubs, pail containers, etc., will be thoroughly washed, rinsed, and dried prior to removal from the site.

WHF Environmental Consultants, Inc.

Health and Safety Plan
Acceptance Sheet

This form is to be completed by each person to work on the subject site. Complete and return to the project's Health and Safety Officer.

Job Number _____

Client Project _____

Date _____

I have read and understand the contents of the above indicated Health and Safety Plan and agree to perform my work in accordance with it.

_____
Signed

_____
Print Name

_____
Company/Office

_____
Date

APPENDIX B

Analytical Data

ANALYTICAL SUMMARY TABLE

Tank Excavation Data

	ug/kg Benzene	ug/kg Toulene	ug/kg Ethyl Benzene	ug/kg Xylene	mg/kg Gasoline
1KES	7	ND	1	ND	2.0
1KWS	170	250	5,700	9,500	610.2
1 KWN	21	ND	130	29	5.0
1KEN	1,300	11,000	19,000	350,000	4,000
350 W/O	ND	3	ND	5	-

PPB

Sampling Date: September 5, 1990

TANK AREA

SAMPLE # 6
5-4K E N @ 15'

SAMPLE # 2
2-4K E S @ 15'

4000 GASOLINE

SAMPLE #4
4-4K W N @ 15'

SAMPLE #3
3-4K W S @ 15'

[illegible]

SAMPLE # 1
1-350 W/O @ 8'

350 W/O

SEMCO

166 LEWELLING
SAN LORENZO

N

RECEIVED 9-13-90

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 52447
CLIENT: SEMCO
CLIENT JOB NO.: WONG YOUNG

DATE RECEIVED: 09/05/90
DATE REPORTED: 09/12/90

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/Kg) Benzene	Toluene	Ethyl Benzene	Xylenes
2	#2-1KES	7	ND<3	4	ND<3
3	#3-1KWS	170	250	5700	9500
1	#1-1KWN	21	ND<3	130	29
5	#5-1KEN	1300	11000	49000	350000

mg/kg - parts per million (ppm)

Minimum Detection Limit in Soil: 3.0ug/kg

QAQC Summary:
Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 97 % : Duplicate RPD = <3.4 %

Richard Spma, Ph.D.
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I · SAN FRANCISCO, CA 94124 · PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 52447
CLIENT: SEMCO
CLIENT JOB NO.: WONG YOUNG

DATE RECEIVED: 09/05/90
DATE REPORTED: 09/12/90

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/Kg) Benzene	Toluene	Ethyl Benzene	Xylenes
1	#1-350 W/O	ND<3	3	ND<3	6

ug/kg - parts per billion (ppb)

Minimum Detection Limit in Soil: 3.0ug/kg

QA/QC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 97%: Duplicate RPD = <3.3 %

Comments:

Richard Srna, Ph.D.
Laboratory Director

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by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/Kg) Benzene	Toluene	Ethyl Benzene	Xylenes
1	#1-350 W/O	ND<3	3	ND<3	6

ug/kg - parts per billion (ppb)

Minimum Detection Limit in Soil: 3.0ug/kg

QAQC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 97%: Duplicate RPD = <3.3 %

Comments:

Richard Srna, Ph.D.
Laboratory Director

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LABORATORY NO.: 52447
CLIENT: SEMCO
CLIENT JOB NO.: WONG YOUNG

DATE RECEIVED: 09/05/90
DATE REPORTED: 09/12/90

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 8015

LAB #	Sample Identification	Concentration (mg/Kg) Diesel Range
1	#1-350 W/O	ND<10

ug/kg - parts per billion (ppb)

Minimum Detection Limit for Diesel in Soil: 10mg/kg

QAQC Summary:

Daily Standard run at 200mg/L:
MS/MSD Average Recovery = 111%; Duplicate RPD = 2 %

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CERTIFICATE OF ANALYSIS

LABORATORY NO.: 52447
CLIENT: SEMCO
CLIENT JOB NO.: WONG YOUNG

DATE RECEIVED: 09/05/90
DATE REPORTED: 09/12/90

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (mg/Kg) Gasoline Range
2	#2-4KES	2
3	#3-4KWS	610
4	#4-4KWN	5
5	#5-4KEN	4000

mg/kg - parts per million (ppm)
Minimum Detection Limit for Gasoline in Soil: 1mg/kg

QAQC Summary:
Daily Standard run at 2mg/L: RPD Gasoline = 8 %
MS/MSD Average Recovery = 82%; Duplicate RPD = 4.03 %

Richard Spma, Ph.D.
Laboratory Director

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CERTIFICATE OF ANALYSIS

LABORATORY NO.: 52117
CLIENT: SEMCO
CLIENT JOB NO.: WONG YOUNG

DATE RECEIVED: 09/05/90
DATE REPORTED: 09/12/90

ANALYSIS FOR TOTAL PETROLEUM OIL AND GREASE
by EPA Method 503E

LAB #	Sample Identification	Concentration (mg/Kg) Total oil & grease
1	#1-350 W/O	38

mg/kg - parts per million (ppm)

Minimum Detection Limit for oil & grease in Soil: 20mg/kg

QAQC Summary:
Duplicate RPD =13 %

Richard Sma, Ph.D.
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
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CERTIFICATE OF ANALYSIS

LABORATORY NO.: 52447
CLIENT: SEMCO
CLIENT JOB NO.: WONG YOUNG

DATE RECEIVED: 09/05/90
DATE REPORTED: 09/12/90

ANALYSIS FOR TOTAL LEAD
by EPA Method 7420

LAB #	Sample Identification	Concentration (mg/kg) Lead
1	#1-350 W/O	20

mg/kg - parts per million (ppm)

Minimum Detection Limit for Lead in Soil: 10 mg/kg

QAQC Summary:
Spike Recovery = 97%
Duplicate RPD = 1

Richard Srna, Ph.D.
Laboratory Director

OUTSTANDING QUALITY AND SERVICE

TOTAL P.10

(209) 533-9293
FAX (209) 524-0503

CHAIN OF CUSTODY RECORD

PROJECT NAME: Wang Young

SAMPLERS (signature): Chuck Kim

Station Number	Date	Time	Comp.	Grab	Station Location	Number of Containers	Analysis Required: TPH	BTXE	10	Total Lead	REMARKS
#1-350wp	9/5/90	10:30		✓	#1-350wp - 8'	1	✓	✓	✓	✓	TPH-BTXE-AS-Diesel
#2-4KES	9/5/90	10:05		✓	#2-4KES -15'	1	✓	✓			Gasoline
#3-4KWS	9/5/90	10:30		✓	#3-4KWS-15'	1	✓	✓			" "
#4-4KWN	9/5/90	10:50		✓	#4-4KWN-15'	1	✓	✓			" "
#5-4KEN	9/5/90	11:05		✓	#5-4KEN-15'	1	✓	✓			" "
											#2 thru #5 on hot

Relinquished by(signature): Chuck Kim	Date / Time 9/5/90 3:20	Received by (signature):	Relinquished by(signature):	Date / Time	Received by (signature):
Company or Agency:		Company or Agency:	Company or Agency:		Company or Agency:
Relinquished by(signature):	Date / Time	Received by (signature):	Relinquished by:	Date / Time	Received by (signature):
Company or Agency:		Company or Agency:	Company or Agency:		Company or Agency:
Relinquished by(signature):	Date / Time	Received for Laboratory by: (signature)	Date / Time	Remarks/Shipping Information	
Company or Agency:					
		A. Gallardo	9/5/90 15:25	Normal Turn	

APPENDIX C

Barringer Laboratory's Soil Gas Vapor Study

BARRINGER LABORATORIES INC.

15000 W. 6TH AVE., SUITE 300
GOLDEN, COLORADO 80401
PHONE. (303) 277 1687

1455 DEMING WAY, SUITE 15
SPARKS, NEVADA 89431
PHONE. (702) 358 1158

Absorption of Pollutant Gases

The objective of this discussion is to present data on an improved method for the absorption of gases within soils and other sites of possible pollution.

A new method, developed by Barringer, is designed to supercede a technique that was originally developed for surface exploration for hydrocarbons but has recently been described as being applicable to the mapping of plumes of sub-surface contamination. This earlier technique involves the burial, for periods of one week or longer, of wires that are coated with activated charcoal. The absorbers are then returned to the laboratory. The wires are placed in a chamber and, after evacuation, they are rapidly heated to the Curie point using radio-frequency inductive heating. All of the gases that have been desorbed from the charcoal are then passed into a mass spectrometer without further speciation.

Barringer Laboratories Inc. have developed a system that offers a number of improvements over this technique. These improvements are the result of the use of an absorbent that is superior to charcoal in both its adsorption/desorption efficiency and its ability to maintain the integrity of the gases that have been absorbed. The analytical system offers better quantification and improved absorbate indentification, speciation and sensitivity using gas chromatography.

The absorbent is placed in small vials that are fitted with a semi-permeable membrane to both retain the absorbent and to restrict the entry of extraneous soil particles or other debris. The absorber is mobilized to and from the field in a sealed jar to prevent the accidental absorption of environmental contaminants. The absorber is buried in the soil for a period of between two and seven days. After retrieval the absorber is returned to the laboratory for analysis. The semi-permeable membrane is replaced by a septum and the adsorbed gases are released by a closely controlled heating step. Aliquots of the desorbed gases are then injected into gas chromatographs that are fitted with detectors selected to provide maximum sensitivity for the pollutants being sought.

As a part of the development program, absorbers containing different absorbents were exposed to atmospheres containing known concentrations of a variety of potentials pollutants. The results are given below:

Figures 1-3 are the chromatograms from charcoal and another absorbent that are successively exposed to an atmosphere containing 40ng/cc (40ppb w/v) trichloroethylene (TCE). Figure 1 is a chromatogram of the atmosphere of the absorption chamber at the beginning of the exposure period. In addition to trichloroethylene, a trace of methylene chloride ($MeCl_2$) was also present. Figure 2 is the chromatogram of the gases that were desorbed from an absorber containing activated charcoal. It is apparent that the trichloroethylene has dissociated to form vinyl chloride, and only a trace of the original compound remains. Nonetheless, the ability of this type of absorber to concentrate pollutants is shown by the methylene chloride peak, which shows a 13.6-fold increase over the response from the original chamber. This represents an 82% recovery of the original $MeCl_2$. When the phenomena of breakdown of trichloroethylene was first observed, steps were taken to reduce the surface activity of the charcoal. These steps included acid-washing, washing with methylene chloride and sylanization. However, it appears probable that the breakdown is the result of a catalytic process and, although the tendency to cause breakdown was reduced, it was never eliminated.

The chromatogram in Figure 3 is the result of the use of a second absorbent (Absorbent B). This showed a much reduced tendency to cause breakdown and the majority of the trichlorethylene was unaffected.

Testing then progressed to experiments using 21 regulated volatile organic compounds (VOC's). Charcoal was not used for these experiments. The exposure level was 80ng/cc (80ppb w/v) of VOC's. Figure 4 is the chromatogram of the exposure chamber at the start of the exposure and Figure 5 was the atmosphere of the chamber at the end of the experiment after 48 hrs. This shows that 89.5% of the VOC's had been removed by absorption. Figure 6 is the chromatogram from absorbent B. The chromatogram shows that most of the VOC's could be absorbed and desorbed with little breakdown. However, there was no enhancement of the concentrations of the VOC's from the original chamber.

Figure 7 is the chromatogram that resulted from the exposure of a third absorbent (Absorbent C). This substance had a similar performance to absorbent B, with respect to breakdown, but can be seen to give a marked concentrating effect on the VOC's. The concentration was increased by about six-fold over the original chamber.

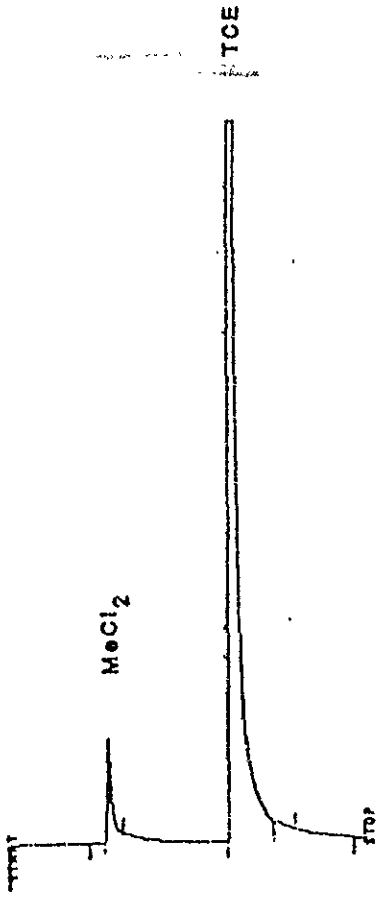

Figure 1

Exposure chamber, TCE

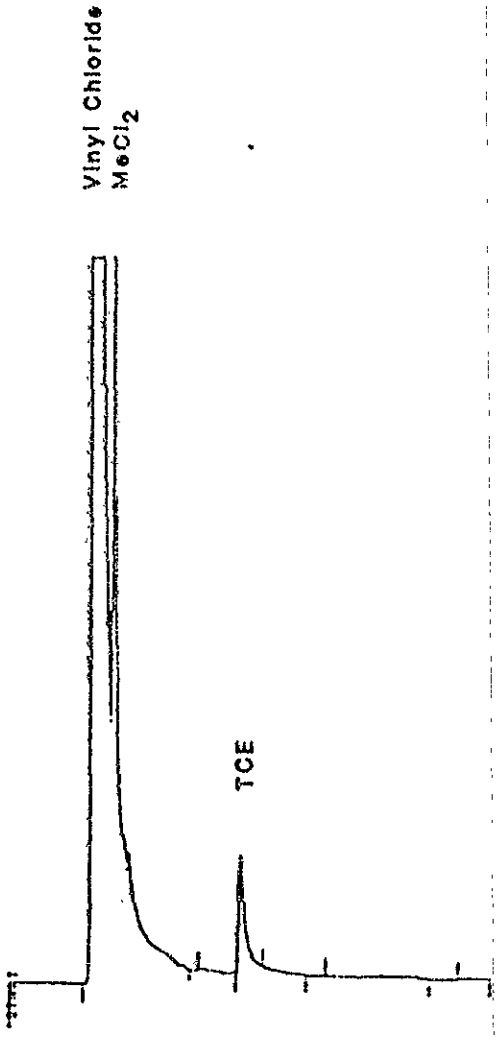

Figure 2

Activated charcoal, recovery of TCE

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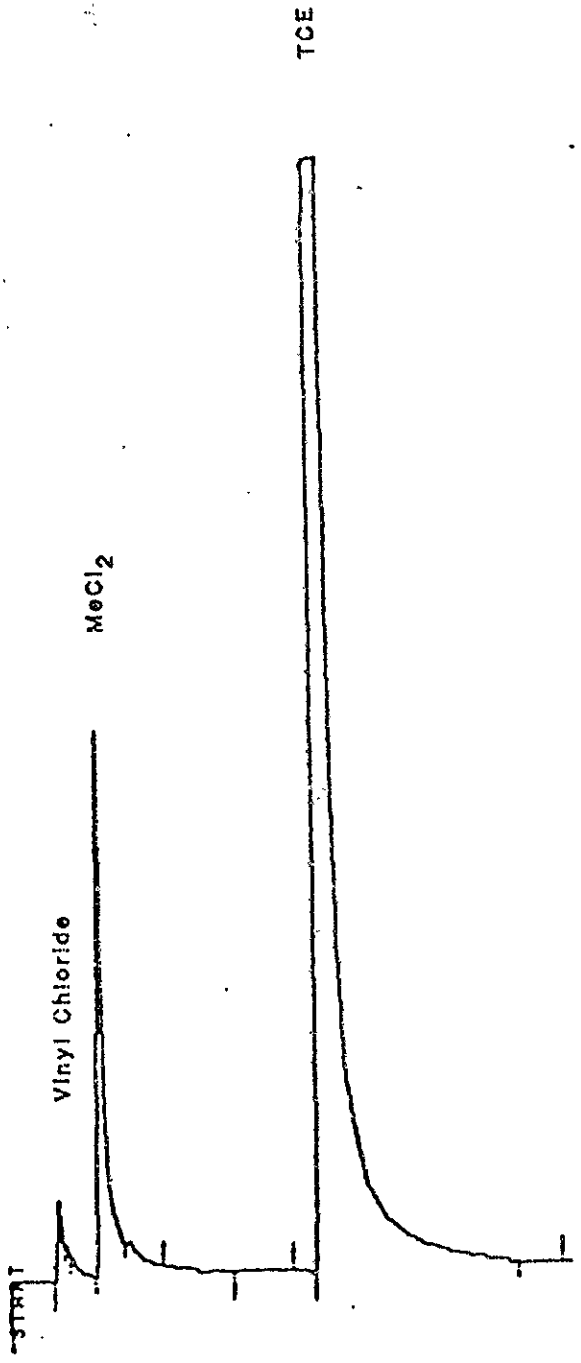
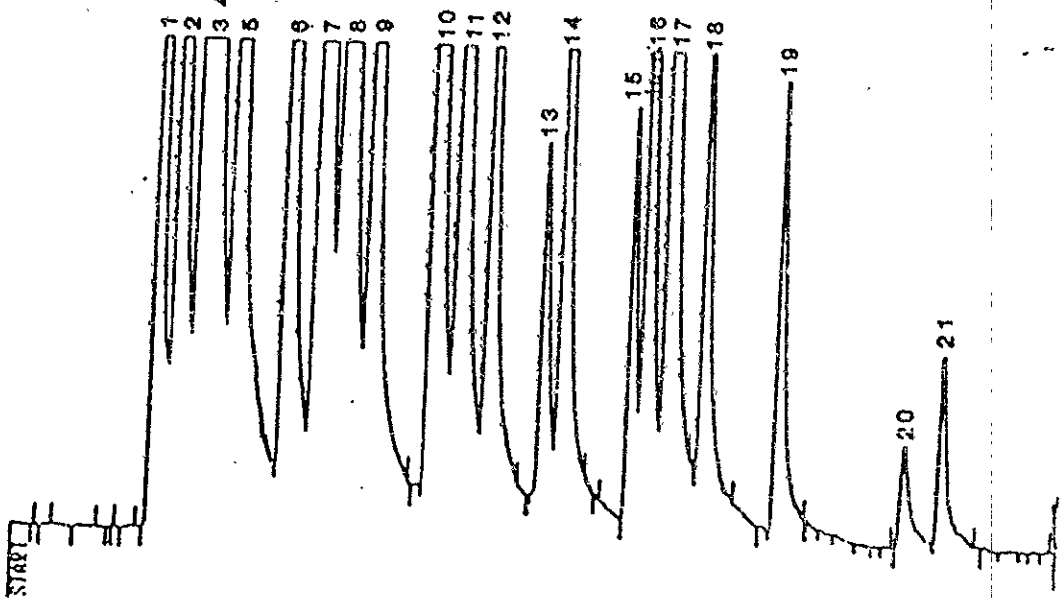


Absorbent B, recovery of TCE

BARRINGER RESOURCES

Figure 3



1. CCl_3F
2. 1,1DCE
3. $MeCl_2$
4. 1,2 DCE
5. 1,1 DCA
6. $CHCl_3$
7. 1,1,1 TCE
8. CCl_4
9. 1,2 DCA
10. TCE
11. 1,2 DCP
12. $BrCl_2CH$
13. Chloroethylvinyl ether
14. Trans 1,3 DCPE
15. Cis 1,3 DCPE
16. 1,1,2 TCA
17. Tetra CE
18. Br_2ClCH
19. Chlorobenzene
20. $CHBr_3$
21. 1,1,2,2 Tetra CA

Figure 4
Exposure chamber, VOC's

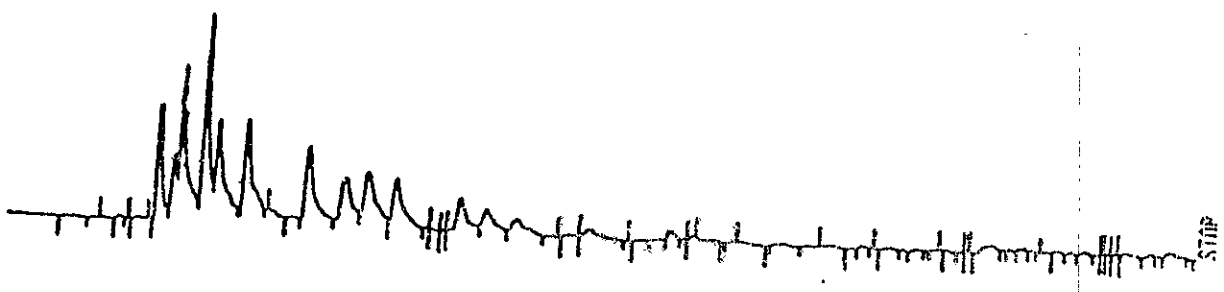


Figure 5
Exposure chamber, VOC's after 48 hours

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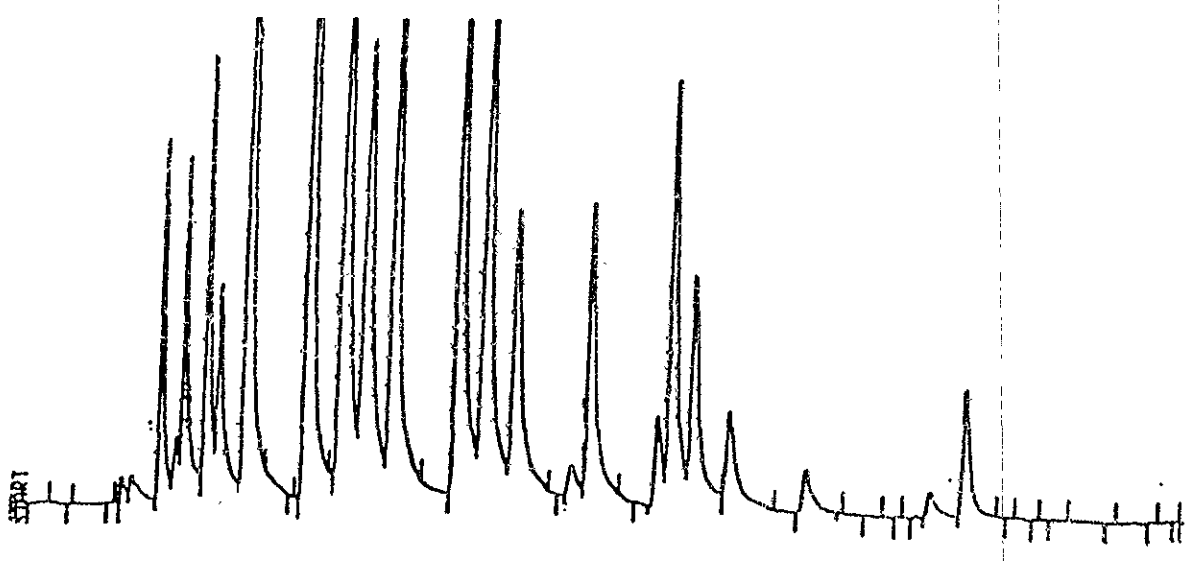

Figure 6
Absorbent B, VOC's

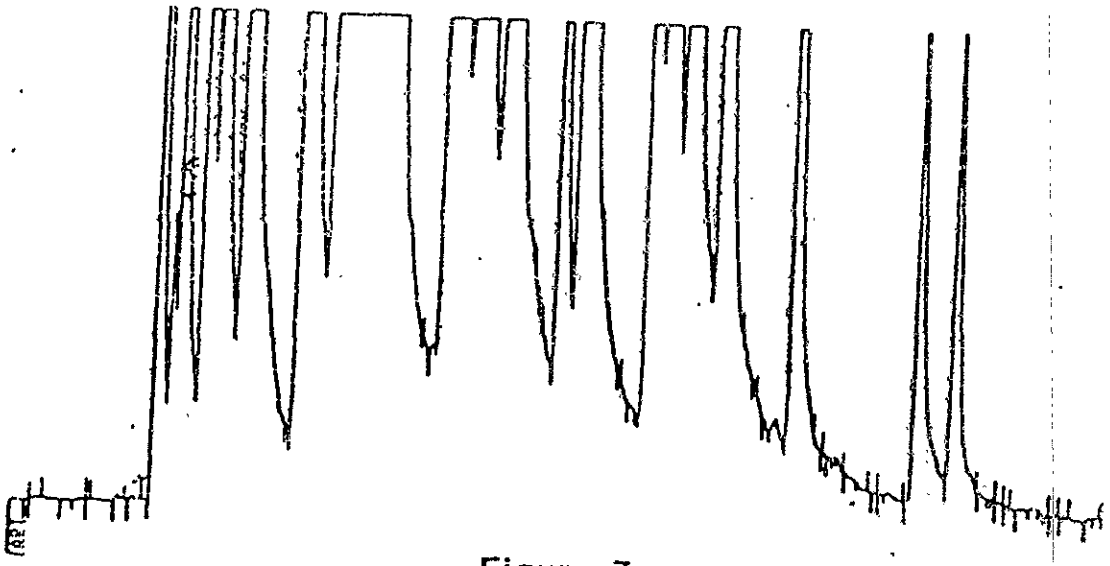

Figure 7
Absorbent C, VOC's

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In order to compare the usefulness of these absorbents for other compounds activated charcoal and absorbent C were competitively (i.e. simultaneously) exposed to an atmosphere containing 1ppm benzene, toluene, ethylbenzene and xylene (BTEX). Figure 8 is the chromatogram of the original chamber. Figure 9 shows the results from charcoal and Figure 10, those from Absorbent C. The recovery from charcoal was only 1.9% that of Absorbent C, which showed a concentration effect of approximately ten-fold over the original chamber.

All three absorbents were exposed competitively to an atmosphere of 68ppb gasoline in a sealed container. Figure 11 shows the original container, Figure 12 was from the charcoal, Figure 13 Absorbent B and Figure 14 Absorbent C. Charcoal and absorbent B gave only 4% and 74% respectively, of the recovery of absorbent C, which showed a concentration effect approximately ten-fold over the original chamber.

In order to produce conditions that were a closer approximation to the water-vapor saturated soil atmosphere, an absorber using Absorbent C was exposed in a chamber containing the VOC's and a container of warm water. Surprisingly, the absorber appeared to be approximately twice as effective as under dry conditions. This, perhaps, was the result of the most active and retentive adsorption sited on the absorbent having been blocked-off by strongly-bound water molecules. The VOC's were then desorbed with greater efficiency.

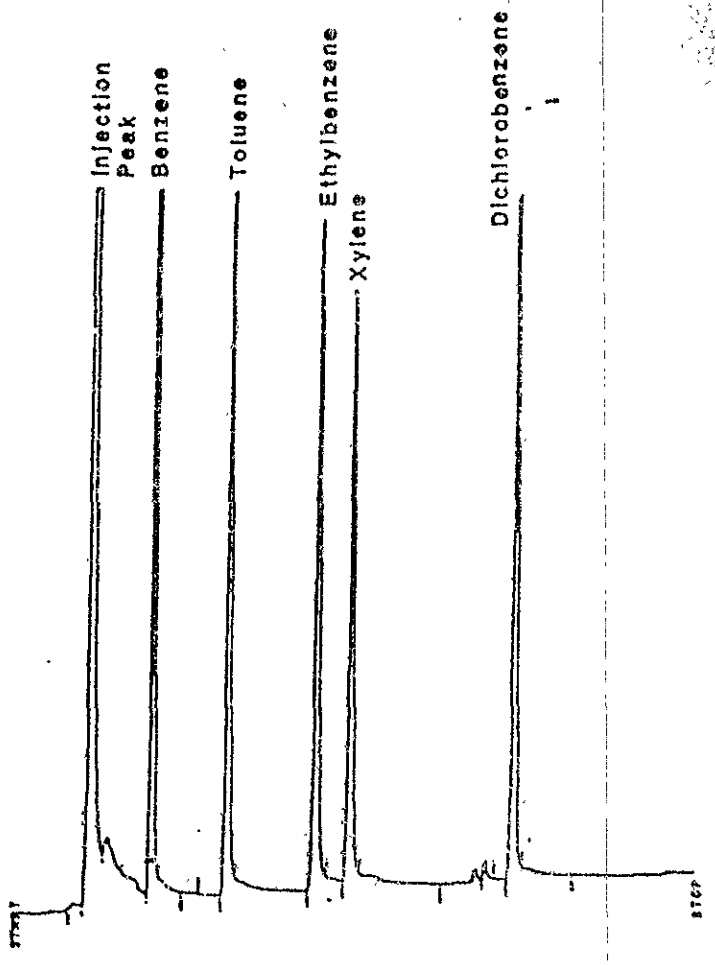

Figure 8
Exposure chamber, BTEX

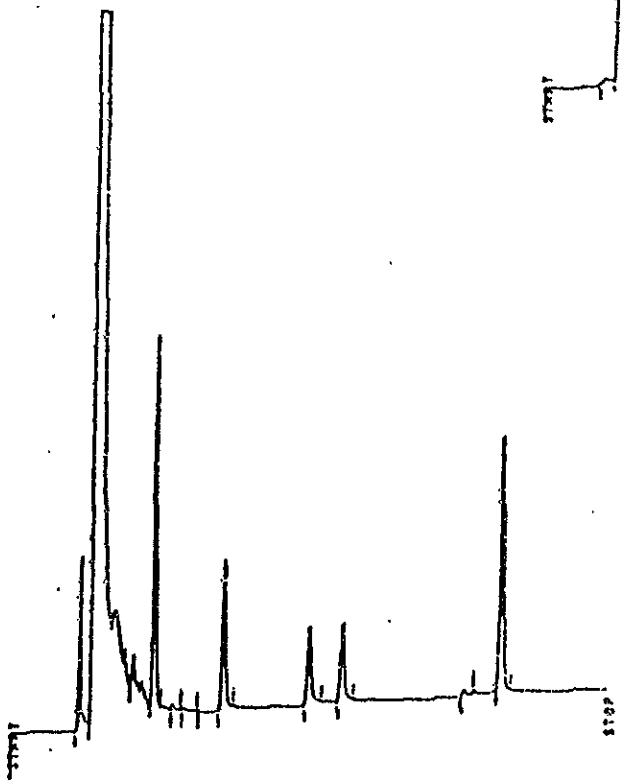

Figure 9
Activated charcoal, BTEX

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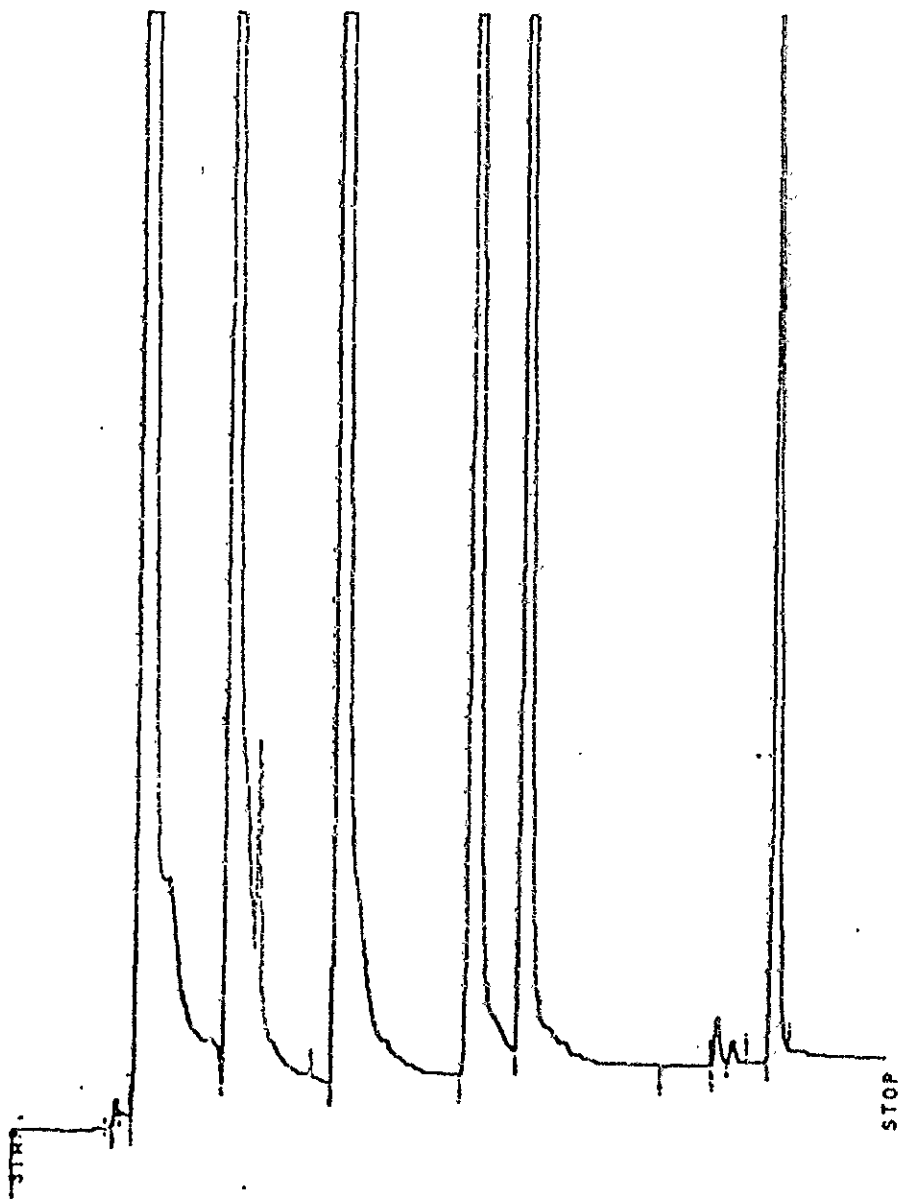

Recovery absorbent C, BTEX

BARRINGER RESOURCES

Figure 10

Figure 11

Exposure chamber, gasoline

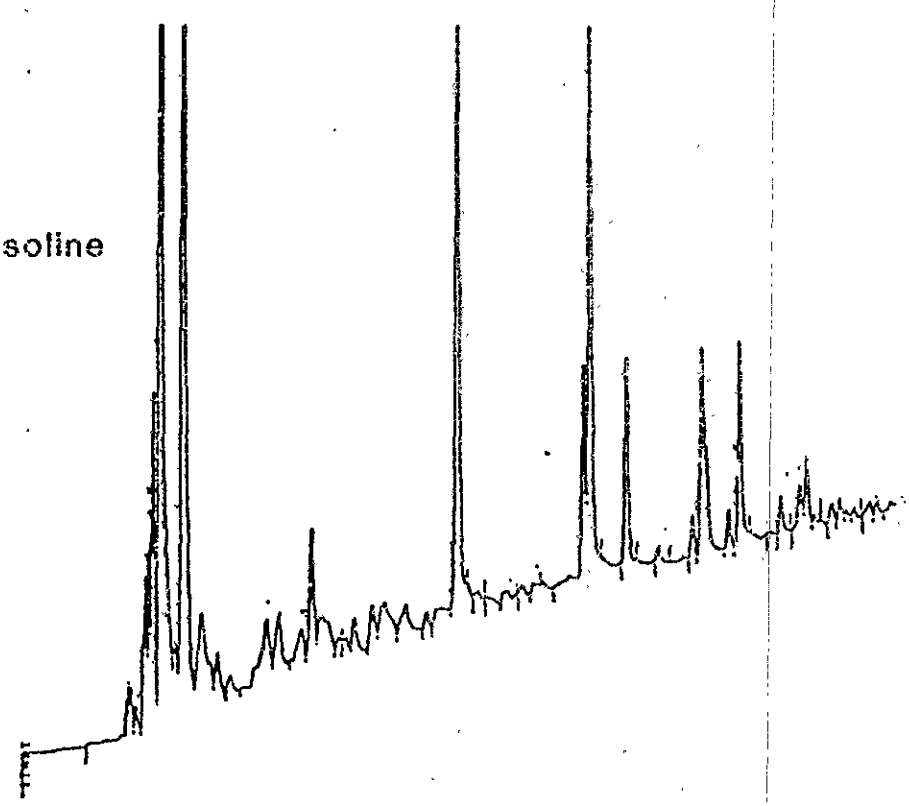

Figure 12

Recovery of gasoline, activated charcoal

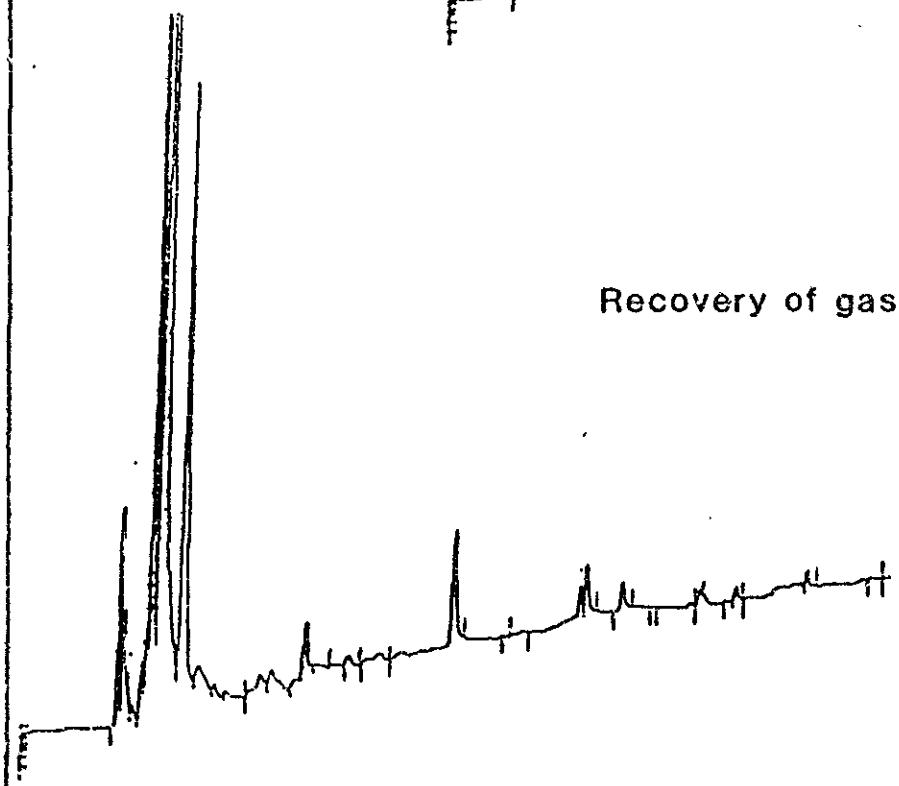

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Figure 13

Recovery of gasoline, absorbent B

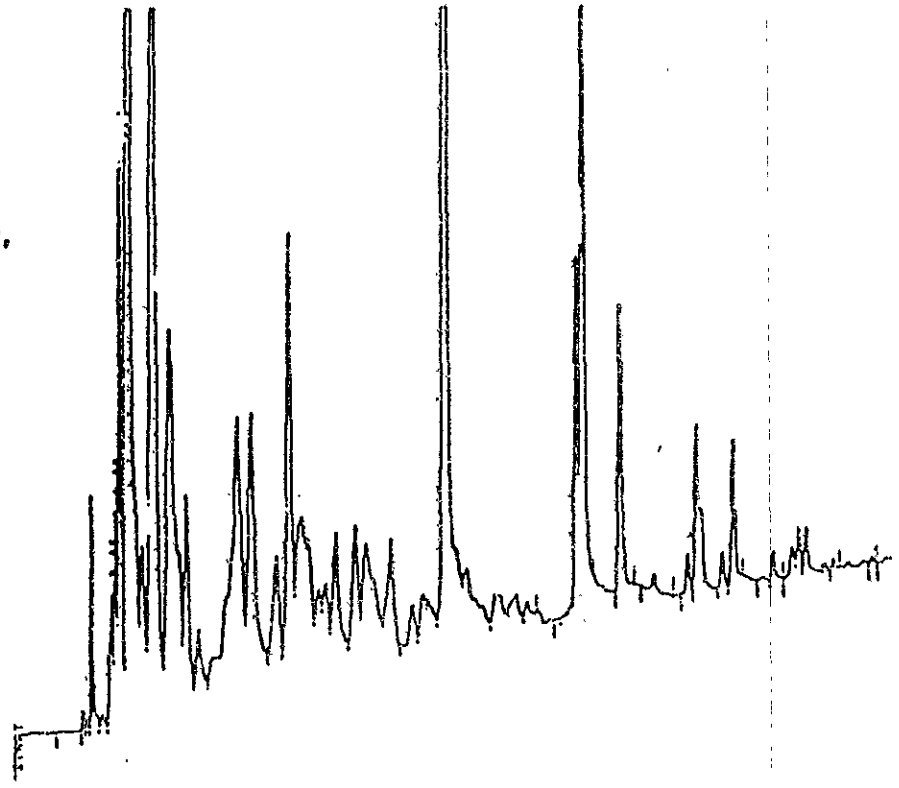
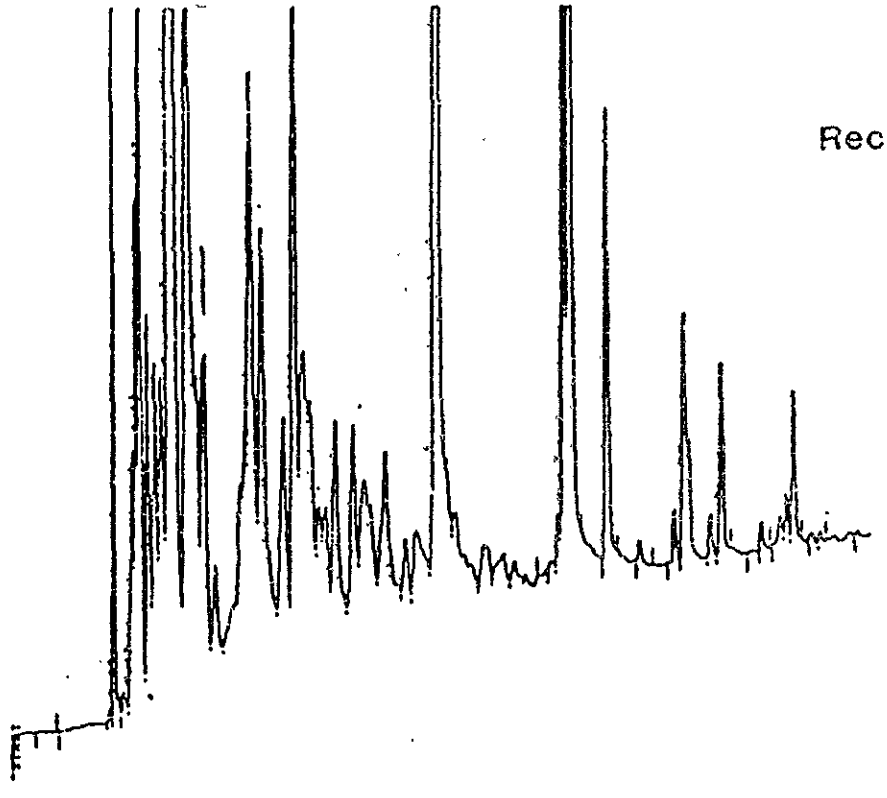


Figure 14

Recovery of gasoline, absorbent C



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