AEGIS ENVIRONMENTAL CONSULTANTS
801 Riverside Avenue, Suite C Roseville, CA 95678 916 • 782-2110 969-2110

March 8, 1990

Mr. Lowell Miller
Alameda County Health Care Services
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

RE: Work Plan and tank closure report, Shell Service Station, 318 South Livermore Avenue, Livermore, California

Dear Mr. Miller:

Enclosed you will find the above referenced report. If you have questions call me at (916)782-2110.

Yours truly,

Pat Wright

Pat Wright, Registered Geologist #529

TANK CLOSURE REPORT

HYDROGEOLOGICAL INVESTIGATION WORK PLAN

Shell Oil Company
318 South Livermore Avenue
Livermore, California

Aegis Project No. 89-041

February 18, 1990

Prepared By:
AEGIS ENVIRONMENTAL CONSULTANTS, INC.
801 Riverside Avenue, Suite C
Roseville, California 95678

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1.0 INTRODUCTION

This work plan describes the proposed additional site assessment for Shell's service station located at 318 South Livermore Avenue, Livermore, California. A previous investigation conducted by Woodward-Clyde Consultants has partially defined the soil and hydrogeologic conditions below the site. A copy of the Woodward-Clyde Consultants report will accompany this work plan.

1.1 Purpose

The purpose of this work plan is to:

- Complete the characterization of the soil and hydrogeologic conditions below the site.
- Assess the presence of petroleum hydrocarbons in the soil and groundwater beneath the site.
- Evaluate remediation/mitigation options for hydrocarbon contaminates in soil and/or groundwater beneath the site, or request cessation of mitigation activities.

1.2 Scope of Work Plan

- Install three ground water monitoring wells to an estimated depth of 25 feet below grade or 10 feet below the water table at the locations identified on Figure 3.
- Recover from the borings representative soil samples at five foot intervals.
- Classify the recovered soil samples according to the Unified Soil Classification System.
- Screen the recovered soil samples for the presence of organic vapors with a photoionization detector according to methods described in Section 4.0.
- Based on the results of classification and screening submit one or more soil samples from the soil borings to a California State-Certified Laboratory to be analyzed for petroleum constituents as described in Section 4.0.
- Develop the monitoring wells, collect and submit water samples to a California State-Certified Laboratory to be analyzed for petroleum constituents as described in Section 4.0.
- Survey the riser pipe elevation, obtain water levels and verify the direction of ground water flow and hydraulic gradient.

- Prepare a report presenting assessment results for the Phase II investigation including recommendations regarding the need for further action.

2.0 BACKGROUND INFORMATION

The work plan for the initial phase of the hydrogeologic investigation at the site was presented in the report issued by Woodward-Clyde Consultants, dated March 8, 1989.

2.1 Site Description

The site is located at 318 South Livermore Avenue, Livermore, California. The site is bounded on the west by South Livermore Avenue, on the north by 3rd Street, on the east by residential and on the south by a pizza restaurant. The site is located on the Livermore topographic 7.5 minute series quadrangle. Elevation at the site is approximately 490 feet above mean sea level (MSL). The topographic map reveals a gentle slope to the west. The site is currently utilized as a retail gasoline service station consisting of a metal building, a dispenser island with a canopy, three 10,000 gallon double wall fiberglass underground storage tanks (new), and asphalt covered parking and driveway areas. The topographic features are presented on Figure 1.

2.2 Summary of Results From Phase I Investigation

On February 27, 1989, Gettler-Ryan had Woodward-Clyde Consultants drilled four soil borings around the tank location. Soil borings were drilled to a total depth of 16.5 feet, and the laboratory analysis for the four samples taken at the depth of 15.0'-16.5' feet were analyzed for total petroleum hydrocarbons as gasoline (TPH-G), benzene, toluene, ethyl benzene and xylenes (BTEX). The TPH-G and BTE and X analyses revealed non-detectable concentrations of petroleum products.

Sample	TPH-G	BTE&X
SA-3-4	ND	ND
SB-3-4	ND	ND
SC-3-4	ND	ND
SD-3-4	ND	ND

On March 14, 1989, Gettler-Ryan collected a grap soil sample from the backfill material around the fill pipe of the regular leaded gasoline tank. The soil sample was analyzed by International Technology Corporation in San Jose, California, for low boiling hydrocarbons as gasoline, toluene, ethyl benzene, xylenes, and total lead. Since total lead analysis was greater than 50 mg/kg and less than 1000 mg/kg the soil sample was analyzed for soluble lead and organic lead. The lab analyses are as follows:

where is this report?

TPH-G	37000 mg/kg	Detection Limit	6000 mg/kg
Total Lead	550 mg/kg	Detection Limit	3.0 mg/kg
W.E.T. Lead	42 mg/kg	Detection Limit	0.06 mg/kg

? soil from landfill

(Gettler-Ryan report enclosed)

On November 29, 1989, the four underground fuel tanks were uncovered to tank tops by R.W. Johnson and Sons Construction Company. On November 30, 1989, Aegis Environmental Consultants sampled the stockpiled soil. The soil samples were analyzed for total petroleum hydrocarbons as gasoline, benzene, toluene, ethyl benzene, xylenes and total lead. W.E.T. lead analyses were performed for disposal purposes for a Livermore landfill profile sheet. Laboratory results are presented on Tables I and II. A map showing sample locations is presented on Site Map #1.

The four gasoline storage tanks were removed ~~from~~ the ground on December 5, 1989. Soil samples were taken at a minimum of two feet below tank bottoms. One soil sample was taken ~~from~~ each end of the four tanks (eight samples total). Laboratory analyses of the soil samples revealed action level contaminates in sample 1-A, soil sample 1-A was taken from the fill-pipe end of the regular (leaded) gasoline tank.

Table #1
Soil Sample Analytical Results
Results Reported in Parts Per Million
Sample Date: November 30, 1989

Sample ID	T.P.H. G	T.P.H. D	T.P.H. MO	B T E X Benzene	Ethylbenzene	Toluene	Xylenes
(Composite) A-1, A-2, A-3	ND			ND	ND	ND	ND
(Composite) B-1, B-2, B-3	ND			ND	ND	ND	ND
(Composite) C-1, C-2, C-3	ND			ND	ND	ND	ND
(Composite) D-1, D-2, D-3	ND			ND	ND	ND	ND
(Composite) E-1, E-2, E-3	ND			ND	ND	ND	ND
(Composite) F-1, F-2, F-3	ND			ND	ND	ND	ND
(Composite) G-1, G-2, G-3	190			0.38	1.4	3.0	11.
(Composite) H-1, H-2, H-3, H-4	100			0.3	1.6	3.2	14
1 - A	870			ND	~~ND~~ 87	~~ND~~ .17	~~ND~~ 16
2 - A	3.8			ND	ND	ND	~~16~~
3 - A	1.6			ND	ND	ND	ND

Continue Table I Soils

Sample ID	T.P.H. G	T.P.H. D	T.P.H. MO	B T E X Benzene	Ethylbenzene	Toluene	Xylenes
4 - A	ND			ND	ND	ND	ND
1 - B	ND			ND	ND	ND	ND
2 - B	1.6			ND	ND	ND	ND
3 - B	ND			ND	ND	ND	ND
4 - B	1.3			ND	ND	ND	ND
RR - 1 - A	180			ND	ND	ND	0.35
R - 2 - A	ND			ND	ND	ND	ND
R - 3 - A	ND			ND	ND	ND	ND
(Composite) I-1, I-2, I-3, I-4	12			ND	ND	ND	ND
(Composite) J-1, J-2, J-3, J-4	70			ND	ND	ND	0.72
(Composite) K-1, K-2, K-3, K-4	530			0.32	4.2	0.84	24
A	12			0.090	ND	ND	0.41
B	13			0.11	ND	ND	0.13

Continue Table I Soils

Sample ID	T.P.H. G	T.P.H. D	T.P.H. MO	B T E X Benzene	Ethylbenzene	Toluene	Xylenes
#2 Bin, #3 Bin, Composite	160			60	550	920	4800
1 - B - Bin	ND			ND	ND	3.1	4.6
1 - D - Piping	4.7			2.6	3.7	6.6	39
1 - C	ND			ND	ND	ND	6.4
1 - A	ND			ND	ND	ND	3.7
#2 Piping	16			71	730	1300	3000
Ventline	ND			ND	ND	5.7	17

Table II (Lead)
Soil Reported in Parts Per Million - E.P.A. Method 6010
Sampling Date: November 30, 1989

Sample ID	Parameter	Detection Limit	Detected	WET Results Detection Limit	Milligrams /Liter Detected
(Composite) A-1, A-2, A-3	Lead	1.5	25.	0.06	0.98
(Composite) B-1, B-2, B-3	Lead	1.5	9.3	0.06	0.22
(Composite) C-1, C-2, C-3	Lead	1.5	9.9	0.06	0.11
(Composite) D-1, D-2, D-3	Lead	1.5	8.2	0.06	0.13
(Composite) F-1, F-2, F-3	Lead	1.5	11.	0.06	0.69
(Composite) G-1, G-2, G-3, G-4	Lead	1.5	21.	0.06	0.49
(Composite) H-1, H-2, H-3, H-4	Lead	1.5	11	0.06	0.35
1 - A	Lead	0.25	4.8		
2 - A	Lead	0.25	31.	0.05	0.061
3 - A	Lead	0.25	5.4		
4 - A	Lead	0.25	3.0		

Continue Table II (Lead)

Sample ID	Parameter	Detection Limit	Detected	WET Results Detection Limit	Milligrams /Liter Detected
1 - B	Lead	0.25	3.4		
2 - B	Lead	0.25	6.6		
3 - B	Lead	0.25	2.6		
4 - B	Lead	0.25	2.2		
R - 1 - A	Lead			0.05	3.9
RR - 1 - A	Lead	0.05	8.1		
R - 2- A	Lead	0.05	8.1		
R - 3 -A	Lead	0.05	8.1		
(Composite) I-1, I-2, I-3, I-4	Lead	0.05	13.		
(Composite) J-1, J-2, J-3, J-4	Lead	0.05	7.2		
(Composite) K-1, K-2, K-3, K-4	Lead	0.05	14.		
A		0.05	11.		
B		0.05	12		

On December 12, 1989, Aegis resampled the tank excavation in the areas that revealed high laboratory analyses in the original samples. Laboratory results on the (resampling) samples revealed TPH-G as non-detectable. Laboratory analyses are presented on Figures 1 and 2. A map showing sample location is presented on site maps 2, 3, 4 and 5.

3.0 PROPOSED WORK PLAN

A total of three (3) borings will be drilled according to Alameda County guidelines. The location of the proposed soil borings are shown on Figure 2. The soil borings will be advanced to an estimated total depth of 25 feet below grade or to a depth ten (10) feet below the first groundwater. The borings will be advanced using a ten (10) inch diameter hollow-stem auger. The monitoring wells will be constructed using four (4) inch diameter blank PVC well casing and four (4) inch diameter PVC well screens with 0.020 inch perforations. Proposed well construction diagrams are presented in Appendix B.

Soil samples will be collected at a maximum vertical spacing of 5 feet and will be screened in the field with a portable photoionization detector (PID) or an organic vapor analyzer (OVA) to determine organic vapor content. Selected soil samples will be sent to a State certified laboratory for analyses. The methods used in the analyses of samples are described in Section 4.0.

The total volume of cutting removed from the soil borings will be placed on and covered by visquene. Once composite sample of drill cuttings will be obtained and submitted to a State Certified Laboratory once analyzed according to the methods outlined in section 4.0. Disposal of the cutting's will be accomplished according to existing regulations after analytical results are received.

All work described herein will be completed according to the health and safety procedures outlined in the site health and safety plan included in Appendix A. A copy of the health and safety plan will be available on site during all field operations.

4.0 METHODS

4.1 Soil Sampling

Soil borings will be drilled and soil samples collected under the direction of a State of California registered professional geologist. The soil borings will be advanced to a depth of approximately five feet below grade by using a hand auger. The soil borings will be advanced, below five feet to final depth, using a truck-mounted hollow-stem auger drilling rig.
To reduce the possibility of cross-contamination between boreholes,

all downhole drilling equipment will be steamed cleaned between each boring. To reduce cross-contamination between samples, the split-barrel sampler will be washed in a tri-sodium phosphate solution and double-rinsed between each sampling event.

Soil sampling will be conducted in accordance with ASTM 1586-84. Using this procedure, a two-inch O.D. split-barrel sampler or a two-inch I.D. California-type sampler is driven into the soil by a 140-pound weight falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler an additional 12 inches is known as penetration resistance, or the "N" value. The N value is used as an empirical measure of the relative density of cohesionless soils and the consistency of cohesive soils.

Upon recovery, a portion of the soil sample will be placed into a glass jar and sealed for later screening with a PID/OVA. Another portion of the soil sample will be used for classification and description. That part of the soil sample collected in a brass tube within the California-type sampler will be stored at approximately 4° C for transport to the laboratory.

4.2 Soil Classification

As the samples are obtained in the field, they are classified in accordance with the Unified Soil Classification System (USCS). Representative portions of the samples are then returned to the laboratory for further examination and for verification of the field classification. Logs of the borings indicating the depth and identification of the various soil types, the N value, and pertinent information regarding the method of maintaining and advancing the borehole are also made.

4.3 Soil Sample Screening: Portable Photoionization Detector Method

After soil sample jars have been brought to ambient temperature, the head space of the soil sample jars will be screened with a portable photoionization detector or organic vapor analyzer equipped with a 10.2 eV lamp calibrated to benzene for direct reading in ppm. The sample jar lid will be opened and the detector probe immediately placed within the head space of the jar. The highest observed reading will be recorded.

4.4 Analytical Procedures

All soil samples submitted to the laboratory will be analyzed for BTEX, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene by EPA method 8020, TPH by EPA method 8015 (GC/710). Soil cuttings will also be analyzed for total lead (TTLC) by EPA method 7421, and inorganic lead (STLC) by EPA method 6010 and organo lead by DHS method, as necessary to classify the material.

4.5 Quality Assurance Plan

4.5.1 General Sample Collection and Handling Procedures

Proper collection and handling are essential to ensure the quality of a sample. Each sample will be collected in a suitable container, preserved correctly for the intended analyses, and stored prior to analysis for no longer than the maximum allowable holding time. Details on the procedure for collection and handling of soil samples to be used on this project can be found in Section 4.1.

4.5.2 Sample Identification and Chain-of-Custody Procedures

Sample identification and chain-of-custody procedures ensure sample integrity and document sample possession from the time of collection to its ultimate disposal. Each sample container submitted for analysis will have a label affixed to identify the job number, date, and time of sample collection, and a sample number unique to that sample. This information, in addition to a description of the sample, field measurements made, sampling methodology, names of on-site personnel, and any other pertinent field observations will be recorded on the borehole log in the field records. All samples will be analyzed by a state-certified laboratory.
A chain-of-custody form will be used to record possession of the sample from time of collection to its arrival at the laboratory. When the samples are shipped, the person in custody of them will relinquish the samples by signing the chain-of-custody form and noting the time. The sample-control officer at the laboratory will verify sample integrity and confirm that it was collected in the proper container, preserved correctly, and there is an adequate volume for analysis.

If these conditions are met, the sample will be assigned a unique log number for identification throughout analysis and reporting. The log number will be recorded on the chain-of-custody form and in the legally-required log book maintained by the laboratory in the laboratory. The sample description, date received, client's name and any other relevant information will also be recorded.

4.5.3 Analytical Quality Assurance

In addition to routine calibration of the analytical instruments with standards and blanks, the analyst is required to run duplicates and spikes on 10 percent of the analyses to insure an added measure of precision and accuracy. Accuracy is also verified through the following:

1. U.S. Environmental Protection Agency (EPA) and State certification programs.

2. Participation in an interlaboratory or "round-robin" quality assurance program.

3. Verification of results with an alternative method. For example, calcium may be determined by atomic absorption, ion chromatography, or titrimetric methods. Volatile organics may be determined through either purge and trap or liquid-liquid extraction methods.

4.5.4 Miscellaneous Checks of Accuracy

Where trace analysis is involved, purity of the solvents, reagents and gases employed is of great concern. The laboratory maintains a service contract on all major instrumentation; gas chromatograph, atomic absorption, ion chromatography, and total organic carbon analyzers are all serviced and maintained regularly.

The above program is more than sufficient for most needs. Additional quality assurance such as spikes and duplicates on all analyses, will be provided if requested.

5.0 SCHEDULE

Aegis will proceed with the work outlined in this plan when approval is obtained. A drilling crew will be mobilized to drill the proposed borings within two weeks of approval of this plan. Laboratory analysis of soil samples will require one week. Forty eight hours notice will be given Alameda County Health District prior to starting field work. A summary report of the assessment results including information on subsurface soils, hydrologic conditions, conclusions, and recommendations will be prepared within a month after laboratory results are received.

6.0 REMARKS/SIGNATURES

The interpretations and conclusions contained in this work plan represent our professional opinions. These opinions are based on currently available information and were developed in accordance with currently accepted engineering practices at this time and for this specific site. Other than this, no warranty is implied or intended.

AEGIS ENVIRONMENTAL CONSULTANTS

This report was reviewed by:

Clarke H. Owen

Clarke H. Owen
Senior Geologist

Date: 3-8-90

This report was prepared by:

The work described herein will be performed under the direct Supervision of a State of California registered professional geologist:

Pat Wright

Pat Wright
Registered Geologist #529

Date: 3-7-90

APPENDIX A

Site Safety Plan

MUST BE ON-SITE DURING ALL FIELD OPERATIONS

FIELD INVESTIGATION TEAM
SITE HEALTH AND SAFETY PLAN

A. GENERAL INFORMATION

Client: Shell Oil Co. Aegis Project Number: 89-041

Site Name: _____

Street Address: 318 S. Livermore Avenue
Livermore, California

Plan Prepared by: Pat Wright Date: 2-10-90

Approved by: Clarke Owen Date: 2-10-90

Revised by: Date:

Revision Approved by: Date:

Objectives:

Phase I - Determine extent of petroleum hydrocarbons in soil and Ground water

Phase II -

Phase III -

Proposed Date of Investigation: 4-15-90

Hazard Summary/Level of Protection

A:_____ B:_____ C:_____ D:___XX___(with modifications)

B. SITE/WASTE CHARACTERISTICS

Waste/Contaminant Type(s):_____ Liquid_XX__Soil_____Solid____ Sludge

____ Gas

Characteristic(s):____ Corrosive__XX_Ignitable_____Radioactive
__XX Volatile __XX_Toxic _____Reactive
____ Unknown _____Other (Name):

Contaminant Source: Underground fuel storage tank

Surrounding Features: Commercial area.

Status (active,inactive,unknown): Motor fuel service station

History (worker or non-worker injury; complaints from public; previous agency action):

Tank closure revealed contaminated soil

C. HAZARD EVALUATION

Have all contaminants been identified that may be present on site?

Yes____ No_X____ Unknown_____

List all chemicals below that have been identified or are suspected on site and their maximum concentrations in soil/water. Information on hazardous properties are listed in section G. For chemicals not shown in section G, enter the hazardous property information in the spaces provided.

Chemical Name	Maximum Concentration : In Soil	In Water
Gasoline Constituents	870 PPM	UNKNOWN
Diesel	None	UNKNOWN
Waste Oil Constituents	None PPM	UNKNOWN

(ppm) = parts per million - yes
(ppb) = parts per billion
NA = Not Applicable

Free product present? _____ Yes ____ No _XX__ Unknown

Type of product present: _XX__Leaded _XX_Unleaded ___ Diesel

D. SITE SAFETY WORK PLAN

PERSONNEL

Team Member(list)	Responsibility
Pat Wright	Site Coordinator
Pat Wright	Project
Brian Garber	Site Safety Officer

Perimeter Establishment:

Map/Sketch Attached? Yes_xx_ No___ Site Secured? Yes__ No_XX_ Perimeter Identified? Yes_XX__No___ Zero line defined? Yes___ No_XX Free Product? Yes___ No___ Dissolved Product? Yes___ No___

INVESTIGATION-DERIVED MATERIAL DISPOSAL:

Soil removed from the borings will be placed. Two composite samples will be obtained from each boring. One sample will be analyzed for TPH & BTEX, and total lead, inorganic lead, and organo lead. The remaining sample will be frozen and retained by the laboratory for further testing, if required to classify soil. Any material disposed off-site will be disposed of in accordance with existing regulations and guidelines.

D1. PERSONAL SAFETY

SITE ENTRY PROCEDURES: vacant site

PERSONNEL PROTECTION:

Level of protection: A_____ B_____ C_____ D__XX_ (Modified)

Modifications:

1. All personnel must wear hard hat, safety shoes.
2. Neoprene gloves and tyvek/saranax suit should be worn if contact with contaminated water or soil is likely.
3. Hearing protection must be worn if noise levels prevent normal conversation at a distance of three feet. No smoking, eating, or drinking is allowed within 15 feet of the drill rig.
4. Respiratory protection is dependent on conditions listed in next section.
5. No personnel are to enter or approach any excavation area where there is a danger of wall collapse or confined space entry.

Surveillance Equipment and Materials:

Instrumentation	Action Level	Action
photoionization	5 units or 5 times background (breathing zone)	use half-mask respirator with organic vapor cartridges
	1000 ppm	eliminate all ignition sources, leave site until levels are reduced
oxygen meter	<19.5 % oxygen	do not enter area or confined space until levels are reduced
explosimeter	>10% LEL	eliminate all ignition sources
	>20% LEL	reduce levels immediately
or		leave site

First Aid Equipment: Standard first aid kit, portable eye wash

First Aid Procedures:

Ingestion: DO NOT induce vomiting, summon medical help.
Inhalation: Move victim to fresh air, seek medical attention if needed.
Dermal Exposure: Remove contaminated clothing, flush with water.

DECONTAMINATION PROCEDURE:

Personnel: Flush exposed skin with soap and water.

WORK LIMITATIONS (time of day, weather, heat/cold stress):

In high ambient temperatures, follow heat-stress precautions. Provide plenty of cool water and electrolytes (e.g., Gatorade), remove protective clothing during breaks, check resting pulse and increase number of breaks if pulse does not return to normal during work break.
In cold ambient temperatures (<35°F.), follow hypothermia precautions. Work may only progress during daylight hours or under conditions of adequate lighting.

ELECTRICAL HAZARDS:

Will be located by U.S.A. before drilling.
Maintain at least 10 feet clearance from overhead power lines. If unavoidably close to overhead or buried power lines, turn power off and lockout circuit breaker. Avoid standing in water when operating electrical equipment.

CONFINED SPACES

Monitor organic vapors and oxygen before entering. If following value
exceeded, do not enter:

Oxygen <20.0%

Total hydrocarbons > 5 ppm above background, if all air contaminants have not been identified.

Concentrations of specific air contaminants exceeding action levels in Section D, if all air contaminants have been identified.

If entering a confined space, monitor oxygen and organic vapors con-
tinuously.

Agencies contacted in underground utility search:
Shell Oil Company, Underground Service Alert (USA)

E. EMERGENCY INFORMATION

LOCAL TELEPHONE NUMBERS (provide area codes):

Ambulance	911
Hospital Emergency Room	
Poison Control Center	(916) 453-3692
Fire Department	911
Explosives Unit	911

SITE RESOURCES:

Water supply available on site:	Yes X	No__
Telephone available on site:	Yes X	No__
Bathrooms available on site:	Yes X	No__
Other resources available on site:	Yes X	No__

If yes, identify: Electricity

If you answered "no" to any of the above questions, identify the closest available facility, and provide directions.

EMERGENCY CONTACTS		PHONE NO.
1.Project Manager:	Pat Wright	(916)782-2110
2.Health and Safety Officer:	Brian Garber	(916)782-2110
4.Site Contact:		
5.Regulatory Contact:	Lowell Miller	(415)271-4320

F. EMERGENCY ROUTES

(Give name address, telephone number, directions, distance and time estimate.)

HOSPITAL:

Valley Memorial Hospital
1111 Stanely Street
Livermore, CA 94550
Telephone (415) 447-7000

From site proceed northwest on Livermore Street to Stanely Street, turn left on Stanely Street and proceed to hospital.

G. HAZARD EVALUATION

PARAMETER	TLV (ppm)	OT (ppm)	IDLH (ppm)	VOLA-TILITY	SKIN HAZARD	EXPLO-SIVITY
Benzene	0.1	4	2,000	H	L	H
Ethylbenzene	100	NS	2,000	M	L	H
Toluene	100	2	2,000	M	L	H
Xylene	100	<1	10,000	H	M	H
Gasoline	300	NS	NS	H	L	H

KEY:

TLV = Threshold Limit Value (Worker - 8 Hours)
OT = Odor Threshold
DLH = Immediately Dangerous to Life and Health
NS = None Specified
NR = Not Reported

H = High
M = Medium
L = Low
U = Unknown

G. HAZARDOUS PROPERTY INFORMATION
Explanations and footnotes

Water solubility is expressed in different terms in different references. Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline. However, most of these materials are water soluble at the part per millon or part per billion level. Gasoline for example, is insoluble in the gross sense, and will be found as a discreet layer on top of the ground water. But certain gasoline constituents, such as benzene, toluene, and xylene will also be found in solution in the ground water at the part per millon or part per billion level.

A. Water solubility expressed as 0.2g means 0.2 grams per 100 grams water at 20°C.

B. Solubility of metals depends on the compound in which they are present.

C. Several chlorinated hydrocarbons exhibit no flash point in conventional sense, but will burn in presence of high energy ignition source or will form explosive mixtures at temperatures above 200°F.

D. Practically non-flammable under standard conditions.

E. Expressed as mm Hg under standard conditions

F. Explosive concentrations of airborne dust can occur in confined areas.

G. Values for Threshold Limit Value - Time Weighted Average (TLV-TWA) are OSHA Permissible Exposure Limits (PEL) except where noted in H. and I.

H. ~~TLV - TWA adopted by the American Conference of Government~~ Industrial Hygienists (ACGIH) which is lower than the OSHA PEL.

I. TLV - TWA recommended by the National Institute for Occupational Safety and Health (NIOSH). A TLV or PEL has not been adopted by the ACGIH or OSHA.

J. A. - Corrosive
B. - Flammable
C. - Toxic
D. - Volatile
E. - Reactive
F. - Radioactive
G. - Carcinogen
H. - Infectious
K. Dermal Toxicity data is summarized in the following three categories:

Skin penetration

A - negligible penetration (solid-polar)
B - slight penetration (solid-nonpolar)
C - moderate penetration(liquid-nonpolar)
D - high penetration (gas/liquid-nonpolar)

Systemic Potency

E - slight hazard - LD_{50} = 500-15,000 mg/kg
lethal dose for 70 kg man = 1 pint-1 quart
F - moderate hazard - LD_{50} = 50-500 mg/kg
lethal dose for 70 kg man = 1 ounce-1 pint
G - extreme hazard - LD_{50} = 10-50 mg/kg
lethal dose for 70 kg man = drops to 20 ml

Local Potency

H - slight - reddening of skin
I - moderate - irritation/inflammation of skin
J - extreme - tissue destruction/necrosis

1. Acute Exposure Symptoms

A - abdominal pain
B - central nervous system depression
C - comatose
D - convulsions
E - confusion
F - dizziness
G - diarrhea
H - drowsiness
I - eye irritation
J - fever
K - headache
L - nausea
M - respiratory system irritation
N - skin irritation
O - tremors
P - unconsciousness
Q - vomiting
R - weakness

G. HAZARDOUS PROPERTY INFORMATION - FUELS

Material	Water Solubility[A]	Specific Gravity	Vapor Density	Flash Point °F	Vapor Pressure[E]	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Acute[L] Exposure Symptoms
Diesel Fuel	insoluble	0.81-0.90	—	130	—	0.6-1.3 6.0-7.5		none established	NE	0.008 ppm	BD	CI	BCEFHIKL MNP
Gasoline	insoluble	0.72-0.76	3-4	-45	variable	1.4% 7.6%		300 ppm	NE	< 1 ppm	BDG	CI	BCEFHIKL MNP
Kerosene	insoluble	0.83-1.0	—	100-165	5	0.7% 5.0%		none established	NE	0.008 ppm	BD	CI	BCEFHIKL MNP

G. HAZARDOUS PROPERTY INFORMATION - VOLATILE ORGANIC PRIORITY POLLUTANTS

Material	Water Solubility[A]	Specific Gravity	Vapor Density	Flash Point °F	Vapor Pressure[E]	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard Property[J]	Dermal Toxicity[K]	Acute[L] Exposure Symptoms
Acrolein	22%	0.8410	1.9	-15	214 mm	2.8% 31.0%	46	0.1 ppm	5 ppm	0.1-16.6 (0.21-0.5)	BCD	EJ	ABDGHIK DMNOPQR
Acrylonitrile	7.1%	0.8060	1.8	30	83 mm	3.0% 17.0%	82	2.0 ppm	4,000 ppm	19-100	BCGD	DG	FGIKMNQ R
Benzene	820 ppm	0.8765	2.8	12	75 mm	0.39% 7.1%	3800	10.0 ppm	2,000 ppm	4.68	BCD	CG	BDFHKL MNOQR
Bromoethane	0.1 g	1.732	3.3	none	1.88 atm	13.5% 14.5%		5.0 ppm	2,000 ppm	no odor	CD		BDEIKL MNOQR
Bromodichloromethane	insoluble	1.980	—	none	n/a	non-flam.	916	none	none established		CGD specified		BMN
Bromoform	0.01 g	2.887	—	none	5 mm	non-flam.	1147	0.5 ppm	n/a	530	CD flam.		BDMN
Carbon Tetrachloride	0.08%	1.5967	5.3	none	91 mm	non-flam.	2800	5.0 ppm	300 ppm	21.4-200	CD	JGH	ABDGHN Q
Chlorobenzene	0.01 g	1.1058	3.9	84	8.8 mm	1.3% 9.6%	2910	75.0 ppm	2,400 ppm	0.21-60	BD	CF	BCFIKMN OPQR
Chloroethane	0.6 g	0.8978	2.2	-58	1.36 atm	3.8%		1000.0 ppm	20,000 ppm		BD 15.4%		BHIKNP
2-Chloroethylvinyl Ether	insoluble	1.0475	3.7	80	30 mm	—	250	none	none established		BD specified		HIM
Chloroform	0.8 g	1.4832	4.12	none	160 mm	non-flam.	800	10.0 ppm	1,000 ppm	50-307 fatigue	CD (>4096)		BCEIKM N
Chloromethane	0.74%	0.9159	1.8	32	50 atm	7.6% 19.0%		50.0 ppm	10,000 ppm	10-100 no odor (500-1000)	BD	DF	ABDEFGI JKLOQR

G. HAZARDOUS PROPERTY INFORMATION - VOLATILE ORGANIC PRIORITY POLLUTANTS (CONTINUED)

Material	Water Solubility[A]	Specific Gravity	Vapor Density	Flash Point °F	Vapor Pressure[E]	IEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Acute[L] Exposure Symptoms
1,1-Dichloroethane (DCA)	0.1 g	1.1757	8.4	22	182 mm	6.0% 16.0%	725	100.0 ppm	4,000 ppm	5 ppm	BD		ABHMO
1,2-Dichloroethane	0.8%	1.2554	3.4	55	87 mm	6.2% 16.0%	670	10.0 ppm[H]	1,000 ppm	6 ppm	BDG		BCFGMQ
1,1-Dichloroethylene (DCE)	2250 mg/l	— @ 77°F	3.4	3	591 mm	7.3% 16.0%	200	5.0 ppm[H]	none		BD		BMN specified
Trans-1,2-Dichloroethylene	slightly soluble	1.2565	—	36	400 mm	9.7% 12.8%		none	none	.0043 mg/l	BD established		AEFLQQ specified
1,2 Dichloropropane	0.26%	1.1583	3.9	60	40 mm	3.4% 14.5%	1900	75.0 ppm	2,000 ppm	50	BD		ABGHKMN Q
Cis-1,3-Dichloropropene	insoluble	1.2	3.8	83	28 mm	5.0% 14.5%	250	1.0 ppm[H]	none specified		BD		ABGHIKM NP
Trans-1,3-Dichloropropene	insoluble	1.2	3.8	83	28 mm	5.0% 14.5%		1.0 ppm[H]	none specified		BD		ABGHIKM NP
Ethylbenzene	0.015 g	0.867	3.7	59	7.1 mm	1.0% 6.7%	3500	100.0 ppm	2,000 ppm	0.25-200 (200)	BD	CIF	AEHIKM NPQR
Methylene Chloride	slightly soluble	1.335	2.9	none	350 mm	12.0%[C] unavailable	167	100.0 ppm[H]	5,000 ppm	25-320 (5000)	CED	CIF	BCKMNP R
1,1,2,2-Tetrachloroethane	0.19%	1.5953	5.8	none	5 mm	non-flam.		1.0 ppm[H]	150 ppm	3-5	CD		ABCHIKL MNQQ
Tetrachloroethylene	0.15 g/ml	1.6227	5.8	none	15.8 mm	non-flam.	8850	50.0 ppm[H]	500 ppm	4.68-50 (160-690)	CD		ACHIKM NP
1,1,1-Trichloroethane (TCA)	0.07 g	1.3390	4.6	none	100 mm	8.0%[C] 10.5%	10300	350.0 ppm	1,000 ppm	20-400 (500-1000)	BCED		AEEHIKL NOP
1,1,2-Trichloroethane	0.45	1.4397	4.6	none	19 mm	6.0%[C]	1140	10.0 ppm	500 ppm	0	C		EHGHIKL

G. HAZARDOUS PROPERTY INFORMATION - VOLATILE ORGANIC PRIORITY POLLUTANTS (CONTINUED)

Material	Water Solubility[A]	Specific Gravity	Vapor Density	Flash Point °F	Vapor Pressure[E]	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Acute[L] Exposure Symptoms
Trichloroethylene (TCE)	0.1%	1.4642	4.5	90	58 mm	12.5% 90.0%	4920	50.0 ppm[H]	1,000 ppm	21.4-400	BC		BEKNOPQ
Trichlorofluoromethane	0.11 g	1.494	—	none	0.91 atm	non-flam.		1000.0 ppm	10,000 ppm	135-209	CD		BEHKQ
Toluene	0.05 g	0.866	3.2	40	22 mm	1.3% 7.1%	5000	100.0 ppm	2,000 ppm	0.17-40 fatigue (300-400)	BC	BE	BEFHKM NOPQ
Vinyl Chloride	negligible	0.9100	2.24	-108	3.31 atm	3.6% 33.0%	500	1.0 ppm	none specified	260	BEG	DG	AEFHKN R

G. HAZARDOUS PROPERTY INFORMATION - HEAVY METALS

Material	Water Solubility[A]	Specific Gravity	Vapor Density	Flash Point °F	Vapor Pressure[E]	LEL UEL	ID_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard Property[J]	Dermal Toxicity[K]	Acute Exposure Symptoms[L]
Arsenic	B	5.727	n/a	none	n/a	F		10.0 ug/m^3	none specified		C,G	C,G	A,D,G,I,M,O,Q,R
Beryllium	B	1.85	n/a	none	n/a	F		2.0 ug/m^3	none		C		I,M,R specified
Cadmium	B	8.642	n/a	none	n/a	F	225	0.5 mg/m^3	4) mg^3		C		A,B,G,I,K,M,N,Q,R
Chromium	B	7.20	n/a	none	n/a	F		0.5 mg/m^3 [H]	500 mg^3	F			F,M,Q
Copper	B	8.92	n/a	none	n/a	F		0.1 mg/m^3	none specified		C		F,G,I,M,Q,R
Lead	B	11.3437	n/a	none	n/a	F		50.0 ug/m^3	none		C		A,D,F,G,Q,R specified
Mercury	B	13.5939	7.0	none	0.0012 mm	F		50.0 ug/m^3 [H]	28 mg/m^3		C		A,G,I,M,Q
Nickel	B	8.9	n/a	none	n/a	F		1.0 mg/m^3	none		C		D,G,I,M,Q specified
Silver	B	10.5	n/a	none	n/a	F		0.01 mg/m^3	none		C		I,N specified
Thallium	B	11.85	n/a	none	n/a	F		0.1 mg/m^3	20 mg/m^3		C	B,G	A,G,I,M,Q
Zinc	B	7.14	n/a	none	n/a	F		none	none		C established		D,F specified

G. HAZARDOUS PROPERTY INFORMATION - MISCELLANEOUS

Material	Water Solubility[A]	Specific Gravity	Vapor Density	Flash Point °F	Vapor Pressure[F]	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard Property[J]	Dermal Toxicity[K]	Acute Exposure Symptoms[L]
Acetone	soluble	0.8	2.0	-4	400 mm	2.5% 12.8%	9750	750 ppm	10,000 ppm	100	BD	DI	N
Asbestos	insoluble	2.5	n/a	none	n/a	non-flam.		0.2-2 fibers/cc	none		CG		MN specified
Chromic Acid	soluble	1.67-2.82	n/a	none	n/a	non-flam.		none	none		ACEG established		GIN specified
Cyanides	58-72%		n/a .	none	n/a	non-flam.		5 mg/m³	50 mg/m³		CE		EHKNPQ
PCB (Generic)	slightly soluble	—	n/a	none	n/a	non-flam.		1.0 ug/m³	none		CG		CHIPQ specified
Phenol	8.4%	1.0576	3.2	175	0.36 mm	1.8% 8.6%	414	5 ppm	100 ppm	0.047-5 (48)	C		ABCDEHM NOQ
Xylene	0.0003%	0.8642	3.7	84	9.0 mm	1.1% 7.0%	5000	100 ppm	10,000 ppm	0.5-200 (200)	BD		AEHIKM NPQ

APPENDIX B

Analytical Results

Figure 1

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Aegis Environmental Consultants
801 Riverside Avenue, Suite C
Roseville, CA 95678
ATTN: Tracy Schilling

Date: December 7, 1989

Work Order Number: S9-11-370

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	Aegis #89-041, Shell, 318 S. Livermore Avenue/3rd Street, Livermore, CA
Date Received by Lab:	11/30/89
Number of Samples:	26
Sample Type:	Soil

The methods of analysis for metals and general chemistry are taken from E.P.A. protocol, using methods from SW-846, 3rd Edition or Methods for Chemical Analysis of Water and Wastes, 600/4-79-020. The method used is listed adjacent to the parameter in the table.

The samples were prepared by extracting with 0.2M sodium citrate for 48 hours. The resulting values are the soluble threshold limit limit concentrations for the requested parameters.

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/an
16 Pages Following - Tables of Results

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: A-1, A-2, A-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-01, S9-11-370-02, S9-11-370-03 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/1/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: B-1, B-2, B-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-04, S9-11-370-05, S9-11-370-06 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/1/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: C-1, C-2, C-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-07, S9-11-370-08, S9-11-370-09 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/1/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: D-1, D-2, D-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-10, S9-11-370-11, S9-11-370-12 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/4/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: E-1, E-2, E-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-13, S9-11-370-14, S9-11-370-15 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/1/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: F-1, F-2, F-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-16, S9-11-370-17, S9-11-370-18 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/5/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None

FIGURE 1

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: A-1, A-2, A-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-01, S9-11-370-02, S9-11-370-03 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	25.

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.98

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: B-1, B-2, B-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-04, S9-11-370-05, S9-11-370-06 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	9.3

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.22

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: C-1, C-2, C-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-07, S9-11-370-08, S9-11-370-09 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	9.9

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.11

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: D-1, D-2, D-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-10, S9-11-370-11, S9-11-370-12 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	8.2

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.13

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: E-1, E-2, E-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-13, S9-11-370-14, S9-11-370-15 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	15.

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.28

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: F-1, F-2, F-3 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-16, S9-11-370-17, S9-11-370-18 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	11.

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.69

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: G-1, G-2, G-3, G-4 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-19, S9-11-370-20, S9-11-370-21, S9-11-370-22 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/5/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	34.	190.
Benzene	0.025	0.38
Toluene	0.025	3.0
Ethyl Benzene	0.025	1.4
Xylenes (total)	0.05	11.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: G-1, G-2, G-3, G-4 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-19, S9-11-370-20, S9-11-370-21
S9-11-370-22 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	21.

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.49

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: H-1, H-2, H-3, H-4 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-23, S9-11-370-24, S9-11-370-25, S9-11-370-26 [composite]
Receipt Condition: Cool
Extraction Date: 12/1/89
Analysis Date: 12/5/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	16.	100.
Benzene	0.2	0.3
Toluene	0.2	3.2
Ethyl Benzene	0.2	1.6
Xylenes (total)	0.3	14.

Date: December 7, 1989
Client Project ID: Aegis #89-041, Shell,
318 S. Livermore Ave./3rd St., Livermore, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-370

Client Sample ID: H-1, H-2, H-3, H-4 [composite]

Sample Date: 11/30/89
Lab Sample ID: S9-11-370-23, S9-11-370-24, S9-11-370-25
S9-11-370-26 [composite]
Receipt Condition: Cool

Results - Milligrams per Kilogram

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	1.5	11.

Wet Results - Milligrams per Liter

Parameter	E.P.A. Method	Detection Limit	Detected
Lead	6010	0.06	0.35

Fund 1

RECEIVED 12-9-89

INTERNATIONAL TECHNOLOGY CORPORATION

December 02, 1989

AEGIS Enviromental Cons.
801 Riverside Avae. Suite C
Roseville, CA. 95678

RE:Project #: 204-4380-0303 986683 5441 M60
8904)
ATTENTION: Tracy Schilling

On November 30, 1989, the following samples were received at the ITAS San Jose Laboratory:
Your Sample ID's :

A-1	G-4
A-2	H-1
A-3	H-2
B-1	H-3
B-2	H-4
B-3	
C-1	
C-2	
C-3	
D-1	
D-2	
D-3	
E-1	
E-2	
E-3	
F-1	
F-2	
F-3	
G-1	
G-2	
G-3	

The samples were checked into our sample tracking system as order number S9-11-370 and assigned testing for the following parameters:

Waste Extraction Test Soil
EPA 6010
Modified 8015/8020

When the above analyses are completed, your report will be issued to the address or addresses stated on the request for analysis form. If you need to arrange for other reporting, please contact me.

Sincerely,
Josephine DeCarli
Josephine Decarli

AEGIS

59-11-370

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. _____

C/C Control No. A 80836

PROJECT NAME/NUMBER Livermore Shell; 89-041

LAB DESTINATION IT 2055 Junction Ave, San Jose

SAMPLE TEAM MEMBERS Tracy Schilling, Pat Wright

CARRIER/WAYBILL NO. _____

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
A1,2,3	Gravel & Soil	11/30/89 10:45 AM	Soil	Brass Tube	Cool/ok	
B1,2,3						
C1,2,3						
D1,2,3						
E1,2,3						
F1,2,3					WIC ZOA 4380 0303	
G1,2,3,4					AFE 98166 83	
H1,2,3,4	318 So Livermore Ave ("Sandy") Livermore, CA	12:15			Exp Code 5441 Cross Street → 3rd St.	
			Stan Roller		Shell Eng.	

Special Instructions: 24 hr turn around; Modified 8015 EPA Methods (TPH G w/ BTX&E series)

Possible Sample Hazards: Call if any questions (916) 782-2110.

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Tracy Schilling 11/30/89 (12:30pm)
   Received By: [signature] 11/30/89 16:50
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received by: _____
4. Relinquished By: _____
   Received By: _____

WHITE - To accompany samples
YELLOW - Field copy

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
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RECEIVED 12-12

Figure 2

Aegis Environmental Consultants
801 Riverside Ave., Suite C
Roseville, CA 95678
Attention: Tracy Schilling

Project: #89-041, Shell, Livermore

Enclosed are the results from 8 soil samples received at Sequoia Analytical on December 6,1989. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9120384	Soil, 1A	12/5/89	EPA 5030/8015/8020 Lead
9120385	Soil, 2A	12/5/89	EPA 5030/8015/8020 Lead
9120386	Soil, 3A	12/5/89	EPA 5030/8015/8020 Lead
9120387	Soil, 4A	12/5/89	EPA 5030/8015/8020 Lead
9120388	Soil, 1B	12/5/89	EPA 5030/8015/8020 Lead
9120389	Soil, 2B	12/5/89	EPA 5030/8015/8020 Lead
9120390	Soil, 3B	12/5/89	EPA 5030/8015/8020 Lead
9120391	Soil, 4B	12/5/89	EPA 5030/8015/8020 Lead

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

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Figure 2

Aegis Environmental Consultants	Client Project ID:	#89-041, Shell, Livermore	Sampled:	Dec 5, 1989
801 Riverside Ave., Suite C	Matrix Descript:	Soil	Received:	Dec 6, 1989
Roseville, CA 95678	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 7, 1989
Attention: Tracy Schilling	First Sample #:	912-0384	Reported:	Dec 8, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
912-0384	1A	870	N.D.	0.17	0.87	16
912-0385	2A	3.8	N.D.	N.D.	N.D.	N.D.
912-0386	3A	1.6	N.D.	N.D.	N.D.	N.D.
912-0387	4A	N.D.	N.D.	N.D.	N.D.	N.D.
912-0388	1B	N.D.	N.D.	N.D.	N.D.	N.D.
912-0389	2B	1.6	N.D.	N.D.	N.D.	N.D.
912-0390	3B	N.D.	N.D.	N.D.	N.D.	N.D.
912-0391	4B	1.3	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

9120384.AAA <2>

SEQUOIA ANALYTICAL

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Aegis Environmental Consultants	Client Project ID:	#89-041, Shell, Livermore	Sampled:	Dec 5, 1989
801 Riverside Ave., Suite C	Sample Descript:	Soil	Received:	Dec 6, 1989
Roseville, CA 95678	Analysis for:	Lead	Extracted:	Dec 7, 1989
Attention: Tracy Schilling	First Sample #:	912-0384	Analyzed:	Dec 7, 1989
			Reported:	Dec 8, 1989

LABORATORY ANALYSIS FOR: Lead

Sample Number	Sample Description	Detection Limit mg/kg	Sample Result mg/kg
912-0384	1A	0.25	4.8
912-0385	2A	0.25	31
912-0386	3A	0.25	5.4
912-0387	4A	0.25	3.0
912-0388	1B	0.25	3.4
912-0389	2B	0.25	6.6
912-0390	3B	0.25	2.6
912-0391	4B	0.25	2.2

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

[redacted] CORPORATION [redacted] CHAIN-OF-CUSTODY [redacted] CO [redacted] Livermore [redacted] P/A Control No. [redacted]

C/C Control No. A 808

PROJECT NAME/NUMBER ~~Livermore Shell~~ 89-041

LAB DESTINATION Lt 2055 Junction Ave, San...

SAMPLE TEAM MEMBERS Tracy Schilling

CARRIER/WAYBILL NO. _____

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
1A	Below Tank Bottom	12/5/89 2:30 pm	Soil	Brass		
2A	Soil -					
3A						
4A						
1B						
2B						
3B						
4B		3:30 pm				
	Shell Eng: ~~Stan Roller~~		Diane Lundquist			

Special Instructions: 24 hr Turn around Mod EPA 8015 (TPH G w/ BTX & E in series) & Total Pb EPA 7420

Possible Sample Hazards: Freeze for further Analysis

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Tracy Schilling 12/5/89 3:45 pm

Received By: Brenden Aegis Environmental Consultants 12/6 11:00 am

2. Relinquished By: _____

Received By: _____

3. Relinquished By: _____

Received by: _____

4. Relinquished By: _____

Received By: _____

WHITE - To accompany samples
YELLOW - Field copy

[redacted] OTHER REGULATIONS. SEE REVERSE SIDE

SEQUOIA ANALYTICAL

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RECEIVED
12-19-89

Aegis Environmental Consultants
801 Riserside Ave., Suite C
Roseville, CA 95678
Attention: Pat Wright

Project: #89-041, Shell Livermore

Enclosed are the results from 1 soil sample received at Sequoia Analytical on Relogged 12/13. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9120385	Soil, 2A	12/5/89	California LUFT Manual, 12/87

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

VMTague

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Figure 2

Aegis Environmental Consultants	Client Project ID:	#89-041, Shell, Livermore	Sampled: Dec 5, 1989
801 Riserside Ave., Suite C	Sample Descript:	Soil	Received: Relogged 12/13
Roseville, CA 95678	Analysis Method:	California LUFT Manual, 12/87	
Attention: Pat Wright	First Sample #:	912-0385	Analyzed: Dec 13, 1989
			Reported: Dec 14, 1989

ORGANIC LEAD

Sample Number	Sample Description	Sample Results mg/kg (ppm)
912-0385	2A	0.061

Detection Limits:	0.05

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:
318 So. Livermore Ave., Livermore

INTERNATIONAL TECHNOLOGY CORPORATION

Shell Eng. Stan Rotter

REQUEST FOR ANALYSIS

Segoia Redwood City

R/A Control No.

C/C Control No.

PROJECT NAME: SHELL LIVERMORE

PROJECT NUMBER: 89-041

PROJECT MANAGER: PAT WRIGHT

BILL TO: SHELL

DATE SAMPLES SHIPPED: 12/5/89

LAB DESTINATION: [illegible]

LABORATORY CONTACT: [illegible]

SEND LAB REPORT TO: AEGIS ENVIRONMENTAL
801 RIVERSIDE AVE
ROSEVILLE, AVE 95678

PURCHASE ORDER NO.

DATE REPORT REQUIRED: 12/7/89

PROJECT CONTACT: PAT WRIGHT

PROJECT CONTACT PHONE NO.: (916) 782-2110

Address: 318 So. Livermore Ave / Cross St.: 3rd
Livermore, CA

WIC 204.4380 0303 AFE 986683 Exp Code 5441

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
1A	Soil	Brass Cyl.	N/A	Mod 8015 (TPH G w/ BTX&E) + Total Pb	24 hr Turn Around
2A				EPA 7420	Mod 8015 (TPH G w/ BTX+E in series
3A					
4A					
1B					
2B					Total Pb
3B					
4B				all samples	
	Add organic leach for 2A per Tracy				

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)

Normal _____ Rush * (Subject to rush surcharge)

* PLEASE FREEZE FOR FURTHER ANALYSIS.

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

Nonhazard _____ Flammable _____ Skin Irritant _____ Highly Toxic _____ Other _____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)

Return to Client _____ Disposal by Lab *

ANY QUESTIONS PLEASE CALL.

FOR LAB USE ONLY

Received By _____ Date/Time _____

WHITE - Original, to accompany samples
YELLOW - Field copy

SEQUOIA ANALYTICAL

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RECEIVED 12-18-89

Aegis Environmental Consultants
801 Riverside Ave., Suite C
Roseville, CA 95678
Attention: Pat Wright

Project: #89-041, Livermore Shell

Figure 3

Enclosed are the results from 1 soil sample received at Sequoia Analytical on December 12,1989. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9121333 A	Soil, R1A	12/11/89	EPA 7421

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

VM Tague

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Figure 3

Aegis Environmental Consultants	Client Project ID:	#89-041, Shell, Livermore	Sampled:	Dec 11, 1989
801 Riverside Ave., Suite C	Sample Descript:	Soil, R1A	Received:	Dec 12, 1989
Roseville, CA 95678			Extracted:	Dec 13, 1989
Attention: Pat Wright	Lab Number:	912-1333 A	Analyzed:	Dec 13, 1989
			Reported:	Dec 14, 1989

LABORATORY ANALYSIS

Analyte	Detection Limit mg/kg	Sample Results mg/kg
Total Lead	0.05	3.9

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:
318 So. Livermore Ave., Livermore

SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

RECEIVED 12-19-89

Aegis Environmental Consultants
801 Riverside Ave., Suite C
Roseville, CA 95678
Attention: Pat Wright

Figure 3

Project: #89-041, Livermore Shell

Enclosed are the results from 1 soil sample received at Sequoia Analytical on December 12,1989. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
9121333 A-B	Soil	12/11/89	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

VM Tague

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

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Figure 3

Aegis Environmental Consultants	Client Project ID:	#89-041, Livermore Shell	Sampled:	Dec 11, 1989
801 Riverside Ave., Suite C	Sample Descript.:	Soil	Received:	Dec 12, 1989
Roseville, CA 95678	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 12, 1989
Attention: Pat Wright	Lab Number:	912-1333 A-B	Reported:	Dec 14, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS WITH BTEX DISTINCTION (EPA 8015/8020)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Low to Medium Boiling Point Hydrocarbons	1.0	N.D.
Benzene	0.05	N.D.
Toluene	0.1	N.D.
Ethyl Benzene	0.1	N.D.
Xylenes	0.1	N.D.

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

VM Tague

Vickie Tague
Project Manager

Please Note:
318 S. Livermore Ave., Livermore

SEQUOIA ANALYTICAL

Chain of Custody Report

Page 3

Company: Aegis Environmental Consult.
Address: 801 Riverside Ave Suite C
Roseville CA 95678

Attention to: Pat Wright
Telephone: 916/782-2110

Project Name: Shell
Project Location: Livermore

Special Instructions:
WIC: 204 4380 0303
AFE: 986683

318 S. Livermore Ave
Cross Street: 3rd St.
Livermore, CA
Exp Code 5441
Shell Eng:
Stan Roller

I. Sample Tracking

Sample Collection:
Date 12/11/89 Time 11:45 a.m. p.m
Collected by: Tracy Schilling

Laboratory Delivery:
Date 12-12-89 Time 2:30 a.m. p.m.
Delivered by:
Received in Laboratory by:

II. Turnaround Status

912133 3

_8 hr X 1 Work Day _2 Work Days _3 Work Days _5 Work Days _10 Work Days _15 Work Days

Sample Description	Number/Type of Containers	Analyses Requested
Soil (R1A)	2/Brass Cyl.	TPH G w/BTXE in Series Mod 8015

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(415) 364-9600 • FAX (415) 364-9233

FIGURE 3

Chain of Custody

Client: Shell Oil Co.
Project Number: 89-041
Project Name: Livermore Shell
Attention to: Pat Wright
Telephone: 916/782-2110

Date Sampled: 12/11/89
Sampled By: Tracy Schilling

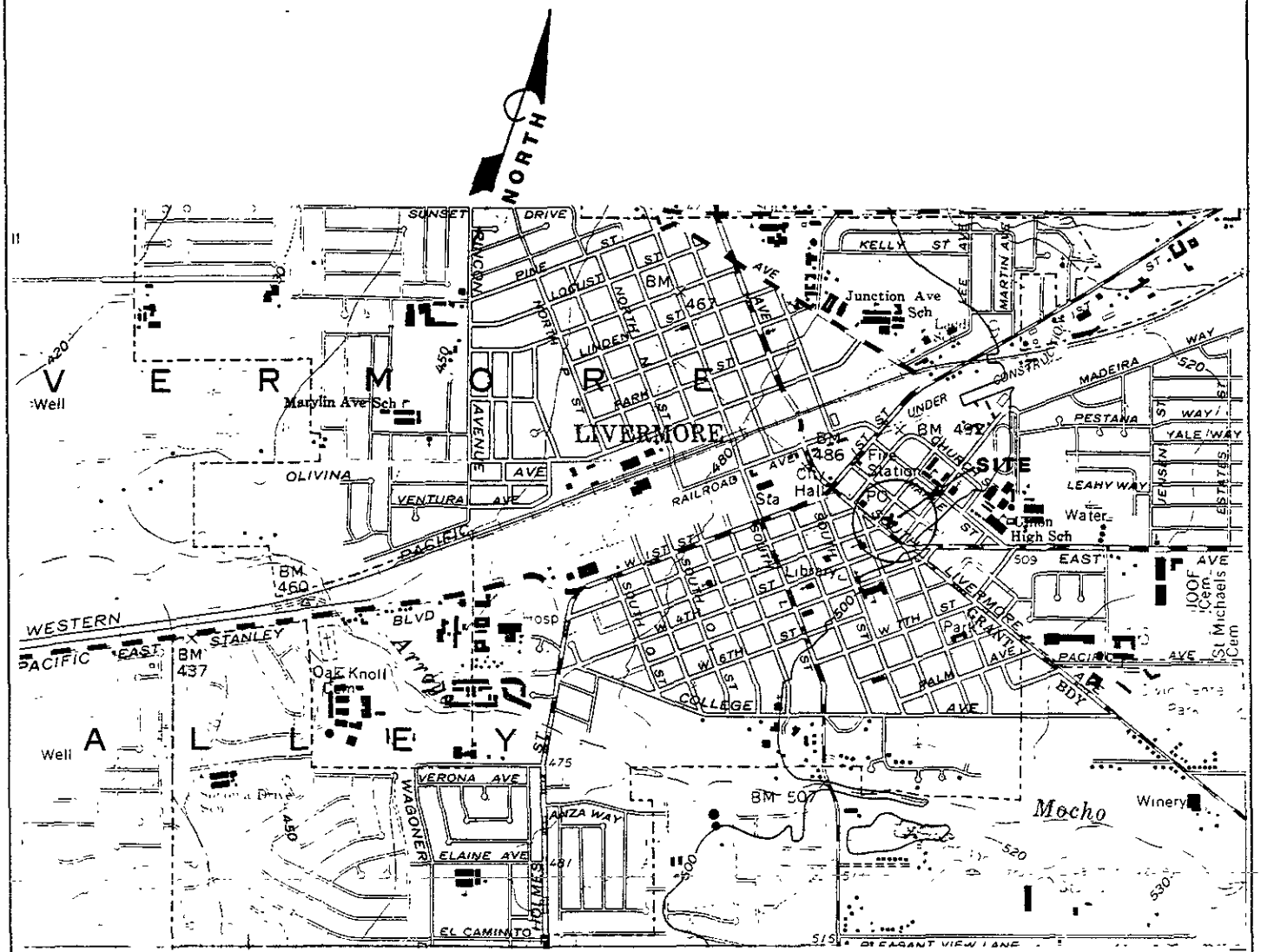
Turnaround Status:
___ 8 hr
_x_ 1 Work Day
___ 2 Work Days
___ 3 Work Days
___ 5 Work Days
___ 10 Work Days
___ 15 Work Days

Sample ID	Number/Type Of Containers	TPH 8 +	BTXE (Mod. 8015)						
R1A	2/Brass	X	X						
	Add total lead per Clarke 12/12/89 4:45 pm								

Relinquished by: Tracy Schilling Date: 12/11/89 Received by: 12-12- 2:3

APPENDIX C

Figures



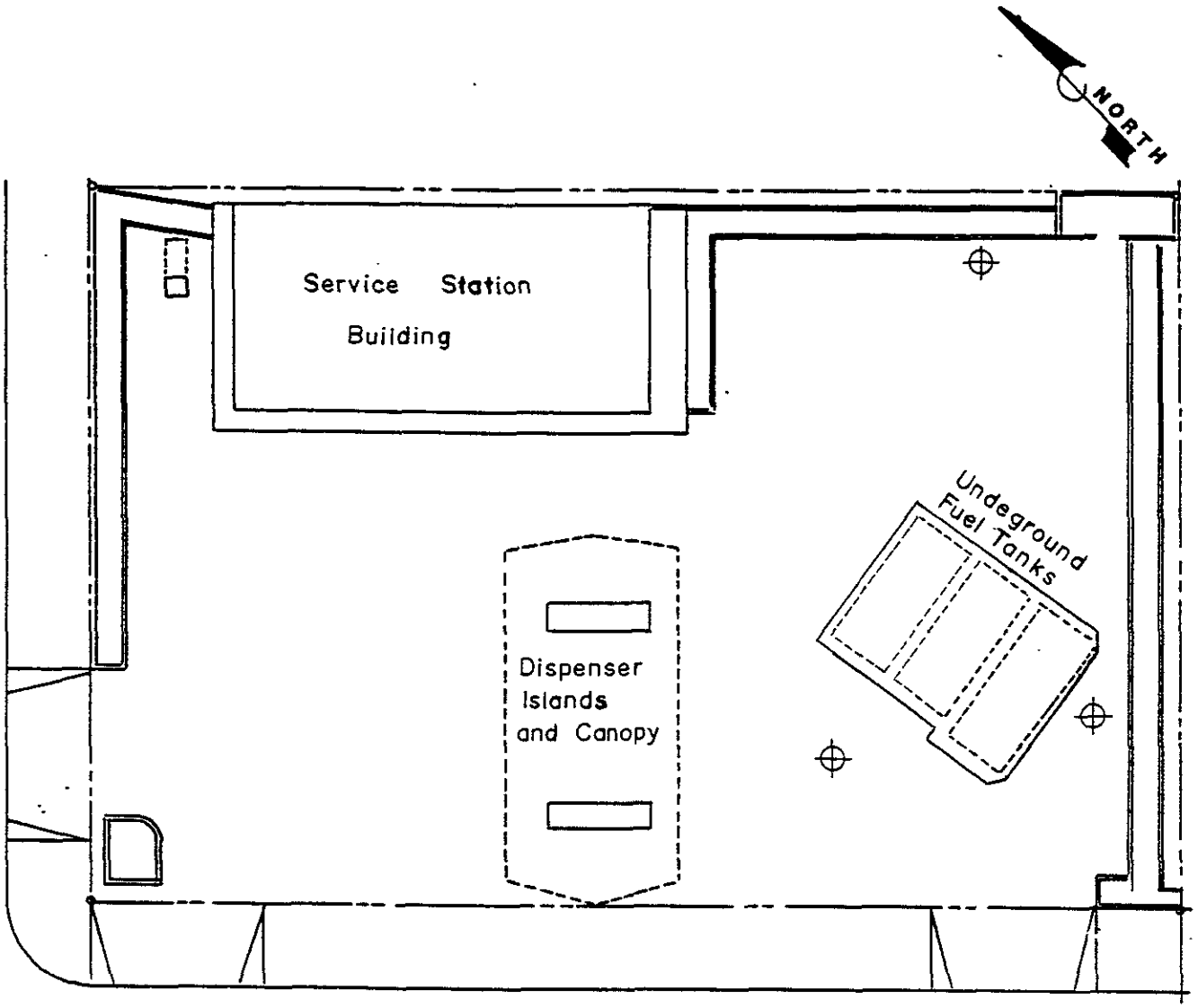
GENERAL NOTES:

BASE MAP FROM LIVERMORE 7.5 MINUTE TOPOGRAPHIC

FIGURE 1
SITE LOCATION MAP
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY: Ed Bernard DATE: Dec.11,1989
REVIEWED BY: DATE:



Legend

⊕ Proposed Monitoring Wells

Approximate Scale

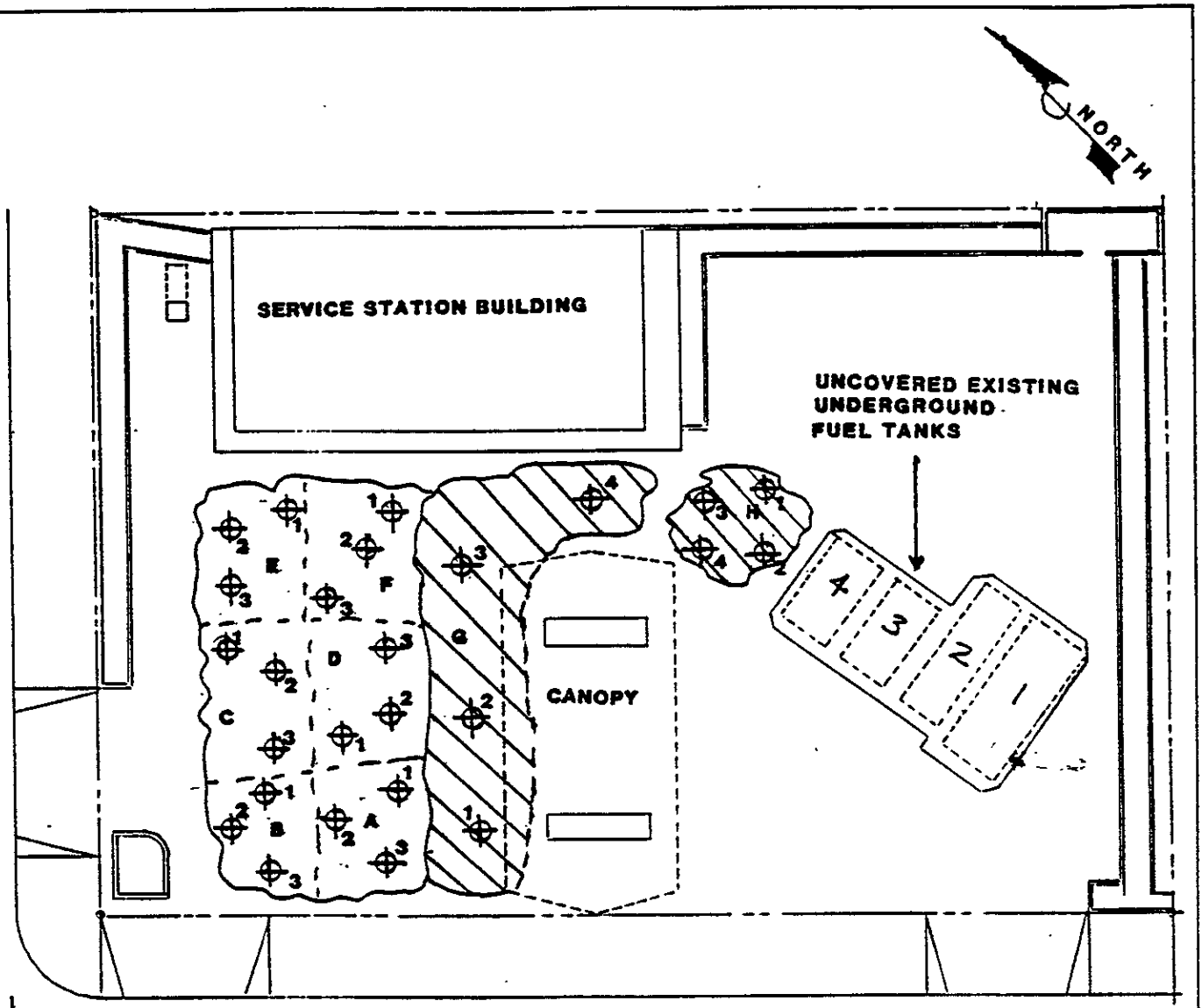
1" = 23'

0 23

FIGURE 2
SITE MAP
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY: Ed Bernard DATE: Jan. 5, 1990
REVIEWED BY: DATE:



— EXCAVATED SOILS
SOIL SAMPLE LOCATIONS

SAMPLE DATE
NOVEMBER 30, 1989

—TYPICAL NON—DETECTED SOILS

— TYPICAL DETECTED SOILS

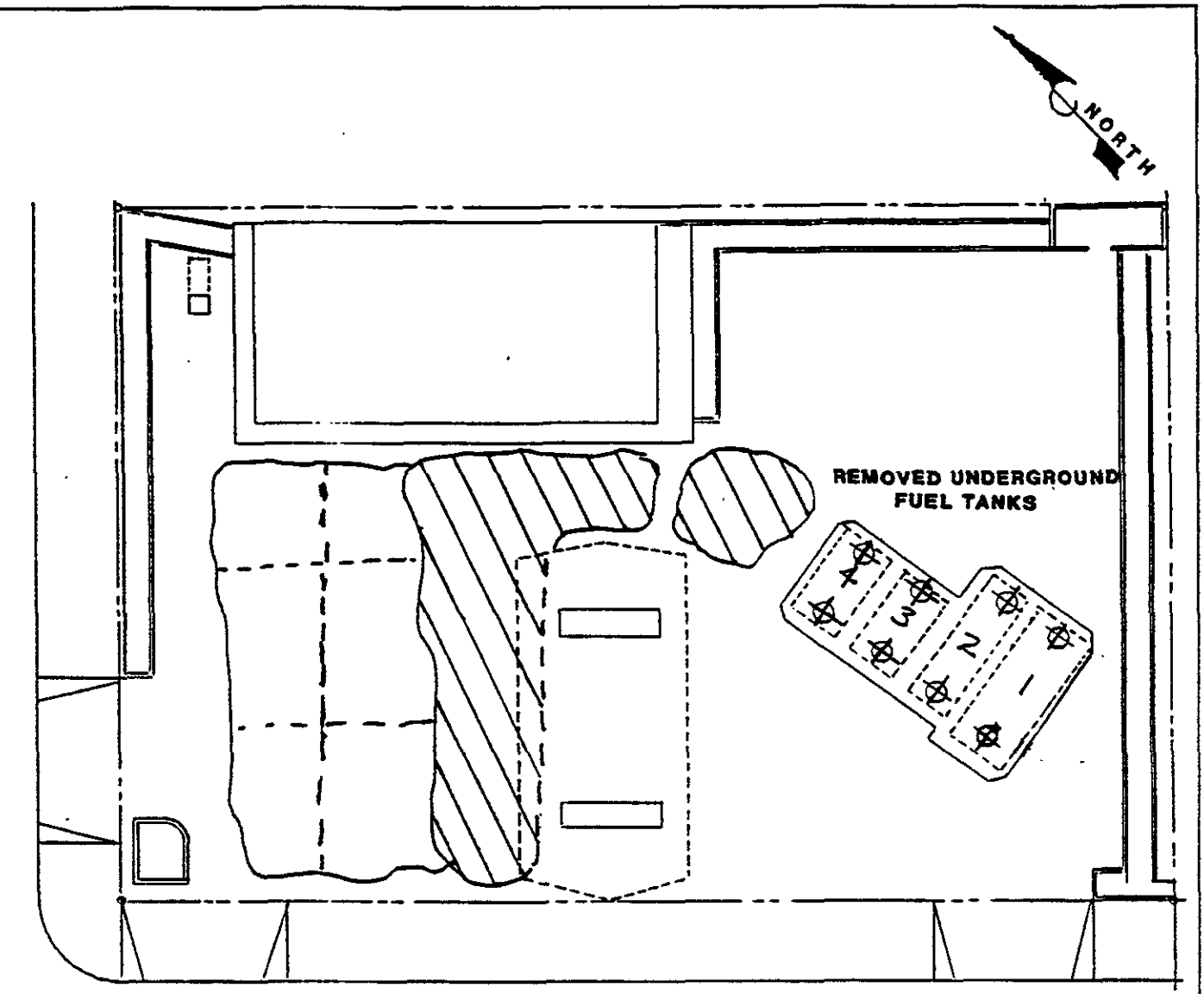
SCALE
1"=23'

0 23

SITE MAP #1
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY: Ed Bernard DATE: Dec. 18, 1989
REVIEWED BY: DATE:



SOIL SAMPLE LOCATIONS

SAMPLE DATE
DECEMBER 5, 1989

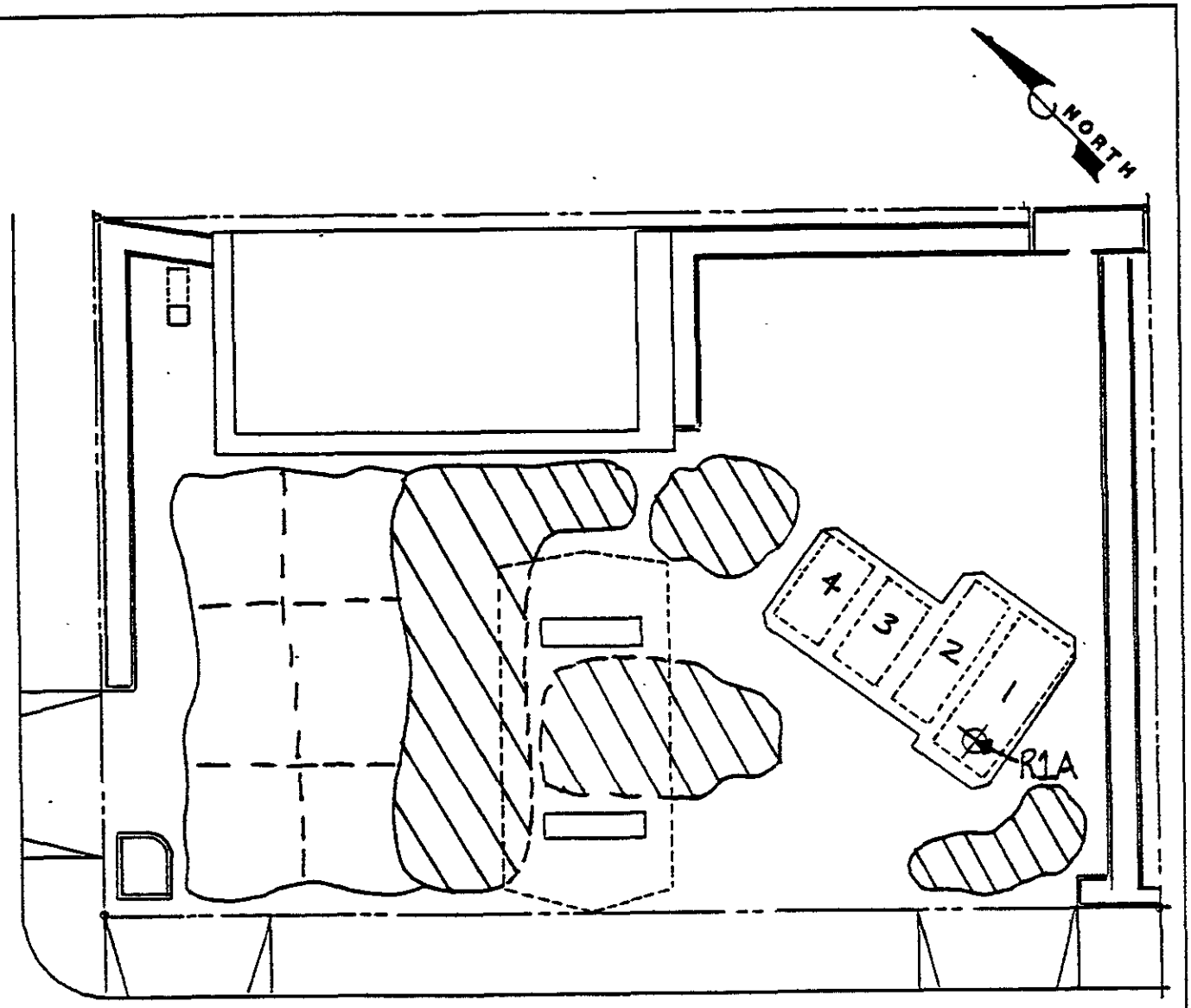
SCALE
1" = 23'

0 23

SITE MAP#2
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY:Ed Bernard DATE:Dec.18,1989
REVIEWED BY: DATE:



⊕ — SOIL SAMPLE LOCATION

SAMPLE DATE
DECEMBER 11, 1989

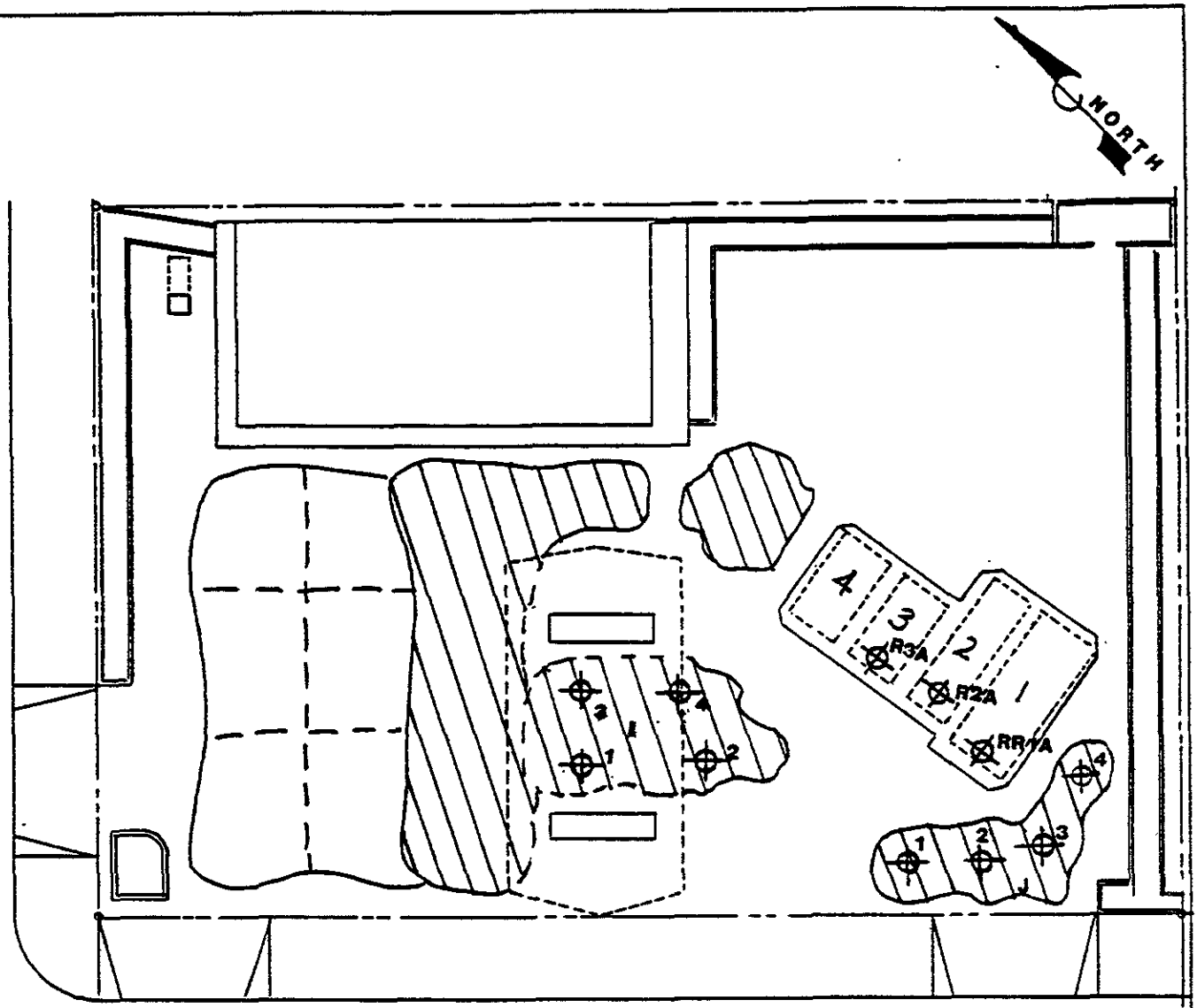
SCALE
1" = 23'

0 23

SITE MAP# 3
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY: Ed Bernard DATE: Dec.18,1989
REVIEWED BY: DATE:



⊕ —SOIL SAMPLE LOCATIONS

SAMPLE DATE
DECEMBER 12, 1989

SCALE
1" = 23'

0 23

SITE MAP #4
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY: Ed Bernard DATE: Dec. 18, 1989
REVIEWED BY: DATE:

SEQUOIA ANALYTICAL
680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

PAGE 4

FACSIMILE TRANSMISSION

TO

Name: PAT WRIGHT
Company: AEGIS
Fax #: 916/786-7830

FROM

VICKIE TAGUE
SEQUOIA ANALYTICAL LABORATORY
Fax (415) 364-9233

Date: 12/18
Number of Pages (including this page): 3

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Aegis Environmental Consultants	Client Project ID:	#89-041, Shell, Livermore, 318 So. Livermore	Sampled: Dec 12, 1989
801 Riverside Ave., Suite C	Matrix Descript:	Soil	Received: Dec 13, 1989
Roseville, CA 95678	Analysis Method:	EPA 5030/8015/8020	Analyzed: Dec 13, 1989
Attention: Pat Wright	First Sample #:	912-1487	Reported: Dec 18, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
912-1487	RR1A	180	N.D.	N.D.	N.D.	0.35
912-1488	R2A	N.D.	N.D.	N.D.	N.D.	N.D.
912-1489	R3A	N.D.	N.D.	N.D.	N.D.	N.D.
9121490 A-D	I1,2,3,4, Composite	12	N.D.	N.D.	N.D.	N.D.
9121491 A-D	J1,2,3,4, Composite	70	N.D.	N.D.	0.11	0.72
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Figure #1

Aegis Environmental Consultants	Client Project ID:	#89-041, Shell, Livermore, 318 So. Livermore	Sampled:	Dec 12, 1989
801 Riverside Ave., Suite C	Sample Descript:	Soil	Received:	Dec 13, 1989
Roseville, CA 95678	Analysis for:	Lead	Extracted:	Dec 14, 1989
Attention: Pat Wright	First Sample #:	912-1487	Analyzed:	Dec 14, 1989
			Reported:	Dec 18, 1989

LABORATORY ANALYSIS FOR: Lead

Sample Number	Sample Description	Detection Limit mg/kg	Sample Result mg/kg
912-1487	RR1A	0.05	8.1
912-1488	R2A	0.05	8.1
912-1489	R3A	0.05	8.1
9121490 A-D	I1,2,3,4, Composite	0.05	13
9121491 A-D	J1,2,3,4, Composite	0.05	7.2

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL
680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Figure 5

FACSIMILE TRANSMISSION

TO

Name: CLARKE OWEN
Company: AEGIS
Fax #: 916/786-7830

FROM

VICKIE TAGUE

SEQUOIA ANALYTICAL LABORATORY

Fax (415) 364-9233

Date: 12/19

Number of Pages (including this page): 3

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Figure 5

Aegis Environmental Consultants 801 Riverside Ave., Suite C Roseville, CA 95678 Attention: Clarke Owen	Client Project ID: #89-041, Livermore, Shell Sample Descript: Soil Analysis for: Lead First Sample #: 912-2284 A-D		Sampled: Dec 15, 1989 Received: Dec 18, 1989 Extracted: Dec 18, 1989 Analyzed: Dec 18, 1989 Reported: Dec 19, 1989

LABORATORY ANALYSIS FOR: Lead

Sample Number	Sample Description	Detection Limit mg/kg	Sample Result mg/kg
9122284 A-D	K1,2,3,4, Composite	0.05	14
912-2285	A	0.05	11
912-2286	B	0.05	12

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

VMTague

Vickie Tague
Project Manager

Please Note:
318 So. Livermore, Livermore

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Figure 5

Aegis Environmental Consultants	Client Project ID:	#89-041, Livermore, Shell	Sampled:	Dec 15, 1989
801 Riverside Ave., Suite C	Matrix Descript:	Soil	Received:	Dec 18, 1989
Roseville, CA 95678	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 18, 1989
Attention: Clarke Owen	First Sample #:	912-2284 A-D	Reported:	Dec 19, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
9122284 A-D	K1,2,3,4, Composite	530	0.32	0.84	4.2	24
912-2285	A	12	0.090	N.D.	N.D.	0.41
912-2286	B	13	0.11	N.D.	N.D.	0.13
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:
318 So. Livermore, Livermore

NET Pacific, Inc

Client No: 18.1
Client Name: Aegis Environmental Cons.
NET Log No: 9363

Date: 01-24-90
Page: 2

Parameter	Reporting Limit	Descriptor, Lab No. and Results C1-4 comp 01-19-90 44168	#2 ben.isl disp. 01-19-90 44169	#3 ben.add-on disp. 01-19-90 44170	Units
Lead (EPA 7421)	0.2	50	3.3	3.3	mg/Kg
PETROLEUM HYDROCARBONS		--	--	--	
VOLATILE (SOIL)		--	--	--	
DILUTION FACTOR *		20	1	1	
DATE ANALYZED		01-23-90	01-23-90	01-22-90	
METHOD GC FID/5030		--	--	--	
as Gasoline	1	160	6.2	ND	mg/Kg
METHOD 8020		--	--	--	
Benzene	2.5	60	ND	ND	ug/Kg
Ethylbenzene	2.5	550	22	ND	ug/Kg
Toluene	2.5	920	21	3.9	ug/Kg
Xylenes, total	2.5	4,800	250	6.4	ug/Kg

Figure 5

NET Pacific, Inc.

Client No: 18.1
Client Name: Aegis Environmental Cons.
NET Log No: 9363

Date: 01-24-90
Page: 3

Parameter	Reporting Limit	Descriptor, Lab No. and Results #1B bin. isl.disp. 01-19-90 44171	 #1D piping tel 01-19-90 44172	 #1C 01-19-90 44173	Units
Lead (EPA 7421)	0.2	16	38	6.4	mg/Kg
PETROLEUM HYDROCARBONS		--	--	--	
VOLATILE (SOIL)		--	--	--	
DILUTION FACTOR *		1	1	1	
DATE ANALYZED		01-22-90	01-22-90	01-22-90	
METHOD GC FID/5030		--	--	--	
as Gasoline	1	ND	4.7	ND	mg/Kg
METHOD 8020		--	--	--	
Benzene	2.5	ND	2.6	ND	ug/Kg
Ethylbenzene	2.5	ND	3.7	ND	ug/Kg
Toluene	2.5	3.1	6.6	ND	ug/Kg
Xylenes, total	2.5	4.6	39	6.4	ug/Kg

Figure 5

NET Pacific, Inc.

Client No: 18.1
Client Name: Aegis Environmental Cons.
NET Log No: 9363

Date: 01-24-90
Page: 4

Parameter	Reporting Limit	Descriptor, Lab No. and Results #1A 01-19-90 44174	 #2 piping tel 01-19-90 44175	 ventline tel 01-19-90 44176	Units
Lead (EPA 7421)	0.2	1.7	28	90	mg/Kg
PETROLEUM HYDROCARBONS		--	--	--	
VOLATILE (SOIL)		--	--	--	
DILUTION FACTOR *		1	1	1	
DATE ANALYZED		01-22-90	01-22-90	01-22-90	
METHOD GC FID/5030		--	--	--	
as Gasoline	1	ND	16	ND	mg/Kg
METHOD 8020		--	--	--	
Benzene	2.5	ND	71	ND	ug/Kg
Ethylbenzene	2.5	ND	730	ND	ug/Kg
Toluene	2.5	ND	1,300	5.7	ug/Kg
Xylenes, total	2.5	3.7	3,000	17	ug/Kg

Figure 5

NET Pacific, Inc

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results colum indicates analyte not detected at the value following, which supercedes the listed reporting limit.
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

* Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated reporting limits by the dilution factor.

Figure 5

Phone (916) 782 2110
FAX (916) 786-7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

93603

Send results to:
Aegis Environmental
801 Riverside, Suite C
Roseville, CA 95678

Site Address: [illegible] Avenue

AEGIS Project #: [illegible]

Shipped By: Aegis Environmental Consultants, [illegible]

Shipped To: [illegible]

Project Manager [illegible]

For Shell Projects Only

WIC: [illegible]

AFE: [illegible]

CT/DL: [illegible]

Shell Engineer: [illegible]

Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
[illegible]	[illegible]	[illegible]	1/18/90	Soil	1	TPH Gas BTEX MTBE
"	"	2	"	"	"	"
"	"	3	"	"	"	"
"	"	[illegible]	"	"	"	"
"	"	[illegible]	"	"	"	"
"	"	[illegible]	"	"	"	"
"	"	[illegible]	"	"	"	"
"	"	[illegible]	"	"	"	"

Sampler(s) (signature) [illegible]

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
[illegible]	[illegible]		[illegible]	[illegible]	
[illegible]	[illegible]	Temple	1/19/90	2300	(via NCS) Samples received on ice by 1/19
					[illegible]

Sealed for shipment by: (signature) [illegible] Date/Time: 1/19/90 Shipment Method: [illegible]

Received for Lab by: (signature) [illegible] Date/Time: [illegible] Comments: [illegible]

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

INTERNATIONAL TECHNOLOGY CORPORATION

Sequoia Analytical / Redwood City

REQUEST FOR ANALYSIS

R/A Control No. B 85584

C/C Control No. _____

PROJECT NAME	LIVERMORE SHELL	DATE SAMPLES SHIPPED	12/12/89
PROJECT NUMBER	89-041	LAB DESTINATION	Sequoia Analytical
PROJECT MANAGER	Pat WRIGHT	LABORATORY CONTACT	Vicki Tague
BILL TO	SHELL	SEND LAB REPORT TO	AEGIS ENVIRN. Consultants 801 Riverside Ave Suite C Roseville, CA 95678
		Shell Eng:	Mr. Stan Roller
PURCHASE ORDER NO.		DATE REPORT REQUIRED	
WIC: 204-4380-0303 AFE: 986683 Exp Code: 5441	318 So. Livermore Ave Cross St.: 3rd St. Livermore, CA	PROJECT CONTACT	Tracy Schilling
		PROJECT CONTACT PHONE NO.	916/782-2110 (call if any questions)

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
KR1A	Soil	2*6" Brass	N/A	Mod 8015 w/ BTXE	
R2A	↓	↓	↓	in series	
R3A				& 7421 (Total Pb)	
I1,2,3,4				↓	Composite
I1,2,3,4					Composite

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.) 24 hour turnaround

Normal _____ Rush X (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

Nonhazard _____ Flammable _____ Skin Irritant _____ Highly Toxic _____ Other _____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)

Return to Client _____ Disposal by Lab X

FOR LAB USE ONLY

Received By _____ Date/Time _____

WHITE - Original, to accompany samples
YELLOW - Field copy

INTERNATIONAL TECHNOLOGY CORPORATION

Sequoia Analytical
Redwood City

CHAIN-OF-CUSTODY RECORD

R/A Control No. _____

C/C Control No. A 80841

PROJECT NAME/NUMBER Livermore Shell/89-041

LAB DESTINATION Sequoia Analytical

SAMPLE TEAM MEMBERS Tracy Schilling

CARRIER/WAYBILL NO. _____

any questions → call 415/782-2116

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
KK1A	Livermore Shell; Soil ex	12/12/89 1:00 pm	Soil	Liner tyl		
K2A	ex					
K3A	ex					
I1,2,3,4	SP					
J,1,2,34	SP					

Figure 2

Special Instructions: 24 hour turnaround Mod 8015 TPH-G w/ BTXE, EPA 7421 Total Pb.

Possible Sample Hazards: _____

ex - excavation
sp - stockpile

SIGNATURES: (Name, Company, Date and Time)

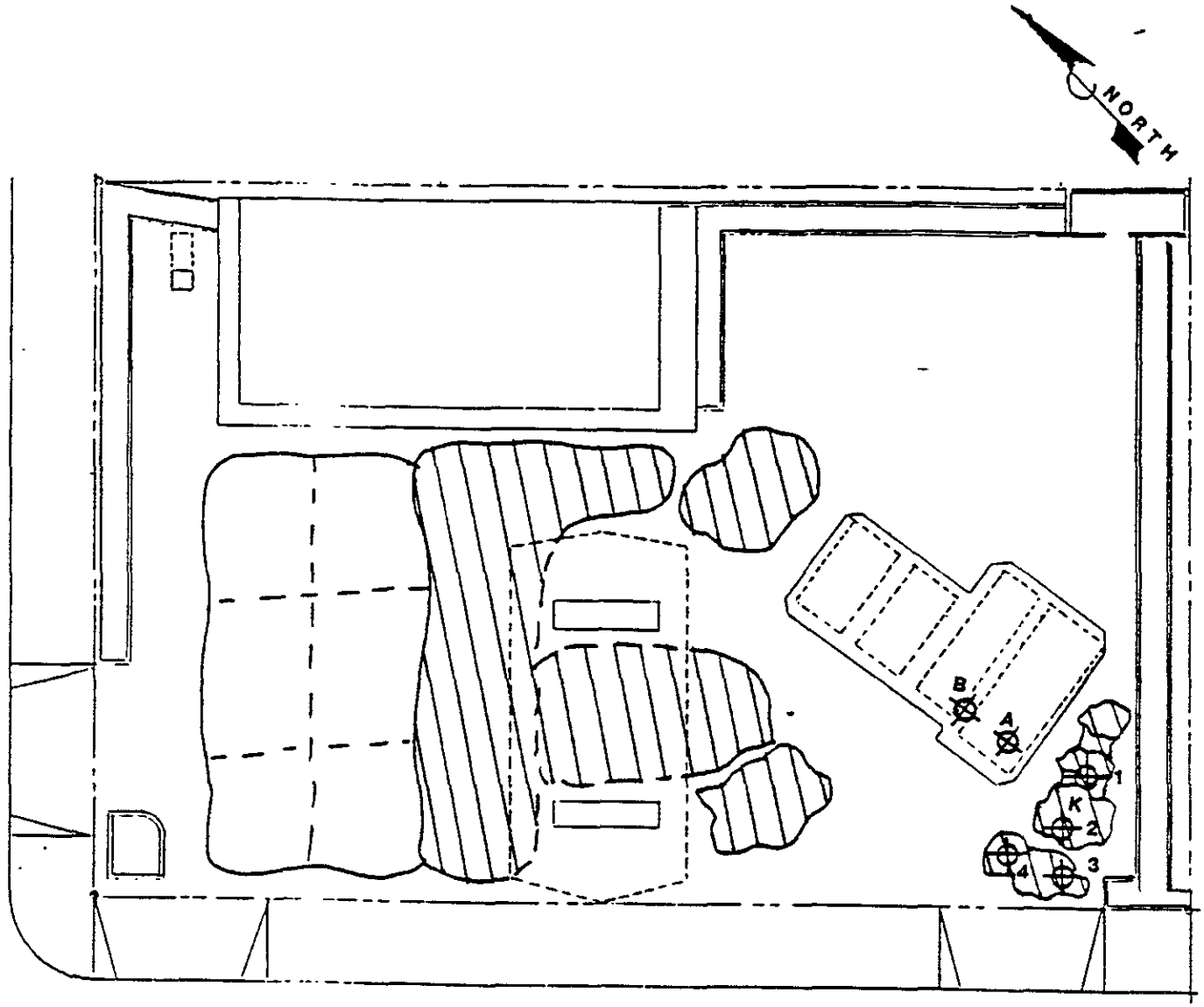
1. Relinquished By: Tracy Schilling/Argus/12/12/89/3:00pm
   Received By: _____
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received by: _____
4. Relinquished By: _____
   Received By: _____

WIC: 204-4380-0303
AFE: 986683
Exp Code: 5441

318 So. Livermore Ave
Cross Street: 3rd Street
Livermore, CA

Shell Eng:
Mr. Stan Boller

WHITE - To accompany samples
YELLOW - Field copy



⊕ – SOIL SAMPLE LOCATIONS

SAMPLE DATE
DECEMBER 15, 1989

SCALE
1" = 23'

0 23

SITE MAP#5
Shell Service Station
318 South Livermore Ave.
Livermore, Ca.

AEGIS JOB NO. 89-041

DRAWN BY:Ed Bernard DATE:Dec.18,1989
REVIEWED BY: DATE: