Harding Lawson Associates

October 13, 1989

Alameda County Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

Attention: Mr. Rafat Shahid

Gentlemen:

Quarterly Technical Reports
Shell Service Station
5755 Broadway Street
Oakland, California 94618

On behalf of Shell Oil Company, we enclose the quarterly technical report for the following Shell service station for which Harding Lawson Associates is providing remedial investigations:

- 5755 Broadway, Oakland

This quarterly technical report has been reviewed and approved by Shell Oil Company.

If you have any questions, please call.

Very truly yours,

HARDING LAWSON ASSOCIATES

Randolph Stone
Certified Engineering Geologist

Stephen J. Osborne
Geotechnical Engineer

RS/SJO/ly

cc: Ms. Diane Lundquist, Shell Oil Company

A Report Prepared for

Shell Oil Company
P.O. Box 4023
Concord, California 94520

~~WORK PLAN~~ FOR A SOIL AND GROUND-WATER INVESTIGATION
SHELL SERVICE STATION
5755 BROADWAY
OAKLAND, CALIFORNIA

HLA Job No. 4022,218.03

see p. 8 - no work is proposed (except monitoring)

by

Glenn S. Young
Project Geologist

Randolph Stone
Randolph Stone
Engineering Geologist

REGISTERED GEOLOGIST
RANDOLPH STONE
NO. 1214
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, California 94520
415/687-9660

October 13, 1989

INTRODUCTION

Scope of Work

This Work Plan outlines a proposed soil and ground-water investigation that will be conducted by Harding Lawson Associates (HLA) at the Shell Oil Company (Shell) service station, 5755 Broadway, Oakland, California (Plate 1). The purpose of our investigation is to evaluate whether an on-site source of petroleum hydrocarbons exists, to evaluate the need for remediation and to achieve regulatory closure for this site. Total petroleum hydrocarbons (TPH) as gasoline have been identified in ground-water samples from an existing on-site monitoring well (S-1).

SITE DESCRIPTION

Setting and Facilities

As shown on Plate 2, this site is a triangularly shaped parcel on the northwest corner of Broadway and Taft Avenues. It is bordered on the north and west by residential buildings.

Existing structures on the site include a service station building, four fuel pump islands with a large overhead canopy, and three underground storage tanks (USTs). The site and surrounding terrain slope gently toward the south. Tank capacities and contents are summarized in Table 1.

Table 1. Underground Storage Tank Inventory

Tank Number	Tank Size	Contents
1	10,000 gallons	Unleaded gasoline
2	10,000 gallons	Regular gasoline
3	10,000 gallons	Super unleaded gasoline

These tanks are currently being used to store fuel. Based upon review of regulatory agency files, HLA understands that these tanks apparently consist of unlined, single-walled steel.

Hydrogeologic Setting

The station site slopes gently to the southeast. The underlying soil is generally composed of brown-gray sandy lean clay as fill, overlying bedrock consisting of heavily fractured olive-brown shale and mudstone. This station appears to have been constructed by cutting into the hillside on the northern portion of the lot and filling in the southern portion. Depth to ground water is approximately 4 feet.

The ground-water gradient is toward the south. Recharge of the shallow ground water is apparently by surface infiltration of rainfall and domestic watering in the area.

PROJECT BACKGROUND

Through conversations with employees at the service station, HLA understands that this station was previously a Thrifty ser-

vice station. As evidenced by the its appearance, the station previously contained a service garage.

In July 1985, Gettler-Ryan Inc. (GRI) installed one soil boring (S-A) and one 4-inch monitoring well (S-1) on site to approximately 12 feet. Boring logs, well construction details, and previous analytical reports are presented in a letter from EMCON Associates dated August 1, 1985 in Appendix A. Relatively small concentrations of TPH as gasoline were detected in soil and ground-water samples. A soil sample obtained from S-A at the maximum depth explored, 10 to 11.5 feet below grade, did not contain detectable concentrations of TPH as gasoline. These data indicate the presence of petroleum hydrocarbons in the ground water on site.

On August 10, 1989, Shell retained HLA to complete the site assessment and evaluate the need for remediation.

RECENT WORK

On August 15, 1989, HLA obtained a ground-water sample from S-1. At least 3 well volumes were purged from S-1. The temperature, pH, and conductivity, of purged water was monitored until these parameters stabilized. Purged water was put into Department of Transportation (DOT) approved drums for subsequent recycling at the Shell Martinez Refinery. This sample contained 0.17 parts per million (ppm) of TPH as gasoline and 6 parts per billion (ppb) of benzene.

On September 14, 1989, HLA contracted a private underground utility locator for the purpose of clearing proposed monitoring well locations of utilities. A site utility plan is included as Plate 2.

On September 18, HLA installed two soil borings at locations shown on Plate 3 by initially hand augering to approximately 4 feet below grade. The borings were then advanced using truck-mounted, 8-inch, hollow-stem augers and sampled using a 2-1/2-inch inside diameter Sprague and Henwood (S&H), split-barrel sampler lined with 6-inch-long stainless steel tubes. Drilling was performed under the direction of an HLA field engineer, who logged the borings in accordance with the Unified Soil Classification System (Plates 4, 5, and 6). Soil samples were screened in the field with a photoionization detector (PID)* and measurements recorded in the boring logs. Soil samples were obtained from each boring, sealed with aluminum foil, plastic end caps, and electrical tape. Shallow soil grab samples were obtained from above the water table at approximately 3 feet below grade and analyzed for TPH as gasoline and the fuel constituents benzene, toluene, ethylbenzene, and xylenes (BTEX). All drill cuttings were placed on a plastic tarp and covered. An additional composite soil sample (COMP) was obtained and analyzed for TPH as gasoline, BTEX, and total lead for the purpose of evaluating treatment options.

---

* Photovac TIP used to measure the presence of volatile organic compounds in the soil samples and cuttings.

These borings were converted to ground-water monitoring wells using 4-inch-diameter, flush threaded, 0.020-inch slotted, Schedule 40 PVC casing. The annular space between the casing and the borehole wall was filled with No. 3 Monterey sand to approximately one foot above the top of the screened casing. A 1-foot-thick bentonite seal was placed above the sand pack, and the remainder of the annulus filled with a cement/bentonite grout to just below the ground surface. The top of the wells were placed slightly below the ground surface, capped with locking, water-tight caps to minimize intrusion of surface water, and covered with water-tight traffic boxes, set slightly above the surrounding grade (Plates 7 and 8).

On September 22, these wells were developed by purging at least 10 well volumes while monitoring the temperature, pH, and conductivity of the ground water until these parameters stabilized. Subsequently, ground-water samples were obtained and analyzed for TPH as gasoline and BTEX.

Ground-water samples were collected from each well with a clean stainless steel bailer, and decanted into laboratory prepared bottles. These samples were immediately sealed, labeled, and placed in an ice-chilled cooler and transported under chain-of-custody documentation to a state-certified chemical testing laboratory. All sampling equipment was washed with an Alconox solution and rinsed with deionized water between wells.

Appropriate quality assurance/quality control (QA/QC) measures are employed during field activities. HLA maintains an internal QA/QC program that includes provisions for avoiding cross-contamination during site investigation and procedures for decontamination, sample handling, preservation, and chain-of-custody documentation.

Results of Chemical Analyses

Results of chemical analyses on soil samples indicate the presence of TPH as gasoline and BTEX fuel constituents in soil sample S-2-1. With the exception of low concentrations of toluene and xylenes, 62 and 120 ppb respectively, S-3-1 did not contain detectable concentrations of TPH as gasoline or BTEX at the reporting limits. Results of these analyses are summarized in Table 2.

Table 2. Summary of Analyses on Soil Samples

Sample Number	Sample Date	TPH as Gasoline (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	Total Lead (ppm)
S-2-1 (3.0')*	09/18/89	92	120	800	580	4200	--
S-3-1 (3.0')	09/18/89	ND	ND	62	ND	120	--
COMP	09/18/89	ND	ND	67	ND	ND	0.2
Reporting Limits		10	25	25	25	75	0.2

* Sample depth in parentheses.

Results of chemical analyses on ground-water samples indicate the presence of relatively small concentrations of TPH as gasoline and BTEX fuel constituents in ground-water sample S-1 and S-2. Sample S-3 did not contain detectable concentrations of petroleum hydrocarbons at the reporting limits of the analysis. Results of these analyses are summarized in Table 3.

Table 3. Summary of Analyses on Ground-water Samples

Sample Number	Sample Date	TPH as Gasoline (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
S-1	08/15/89	0.17	0.6	ND	ND	ND
S-2	09/22/89	0.26	15	2	1	13
S-3	09/22/89	ND	ND	ND	ND	ND
Reporting Limits		0.05	0.5	0.5	1.5	1.5

Analytical results are presented in Appendix B.

Calculation of Ground-water Gradient

On September 22, 1989, the tops of the well casing were surveyed to within 0.01 feet of a common datum with an assumed elevation of 100.00 feet. Water-level measurements were conducted using a chalked steel tape accurate to 0.01 feet. Well survey and water-level data are presented in Table 4.

Table 4. Well-survey and Water-level Data

Well Number	Date	Top of Casing (feet)	Depth to Ground Water (feet)	Relative Ground-water Elevation (feet)
S-1	10/05/89	100.00	3.80	96.20
S-2	10/05/89	98.92	4.44	94.48
S-3	10/05/89	101.67	3.97	97.70

Based upon HLA's calculations, the hydraulic gradient is toward the south at 0.03 ft/ft.

CONCLUSIONS

Results of chemical analyses of samples from S-1 and S-2 indicate the presence of petroleum hydrocarbons in soil and ground water. The lateral extent of dissolved petroleum hydrocarbons in the ground water has not been determined at this time.

PROPOSED INVESTIGATION AT SHELL SERVICE STATION

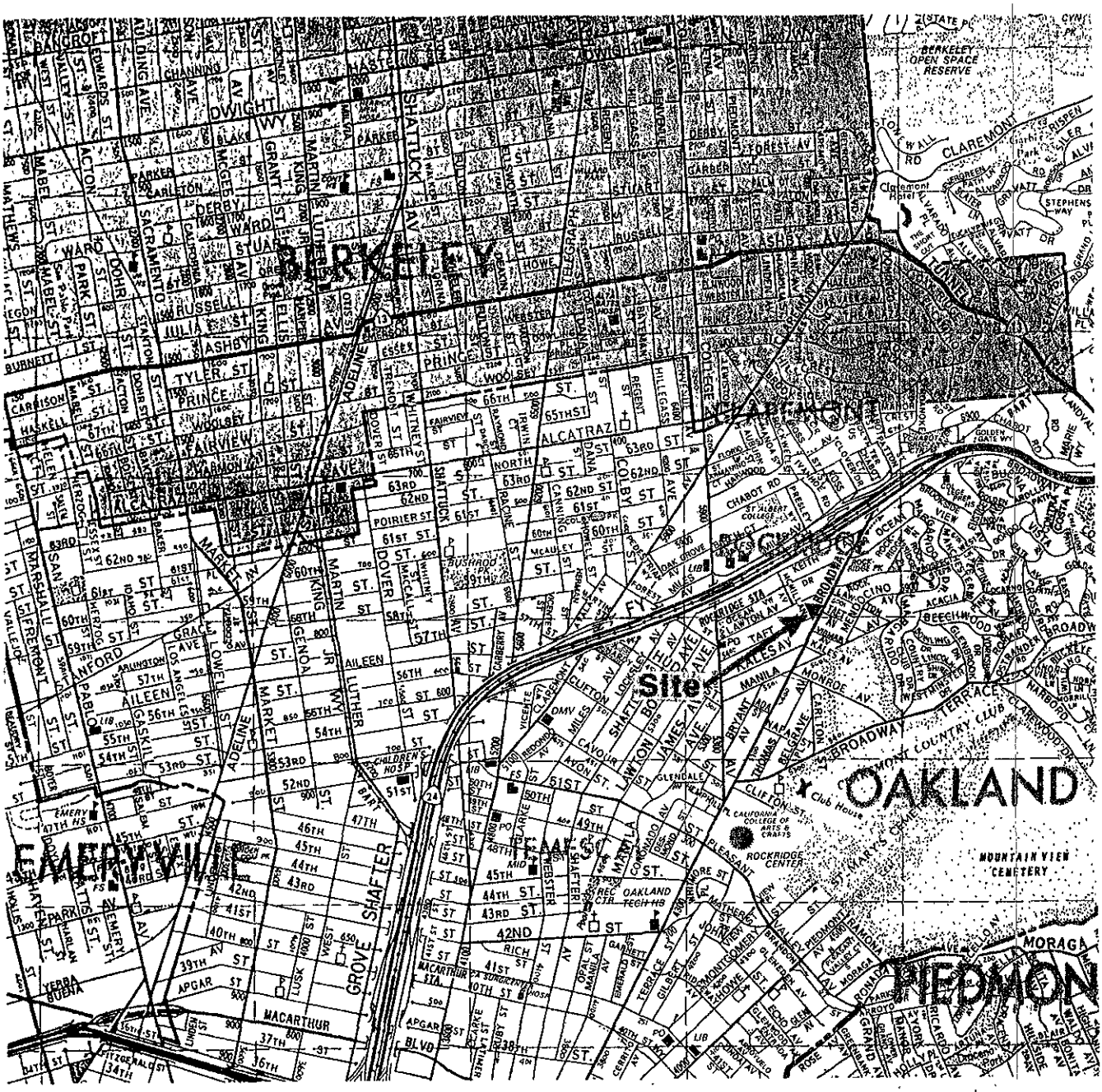
On the basis of the low levels of TPH and BTEX concentrations detected in ground-water samples from S-1 and S-2, and the apparent low permeability of underlying bedrock, HLA does not recommend additional field ~~investigation~~ at this time. The low concentrations in the two wells may be the result of periodic overfilling during product delivery. We propose to monitor the three ground-water monitoring wells on a quarterly basis for one year. If the concentrations of petroleum hydrocarbons remain at

or near the same levels, we will likely recommend site closure. We believe that these low concentrations do not constitute a significant threat to off-site migration nor to human health.

Report Preparation

HLA will prepare a brief quarterly report documenting the results of ground-water sample analysis and an evaluation of data collected. The report will include an evaluation of data collected.

LIST OF ILLUSTRATIONS

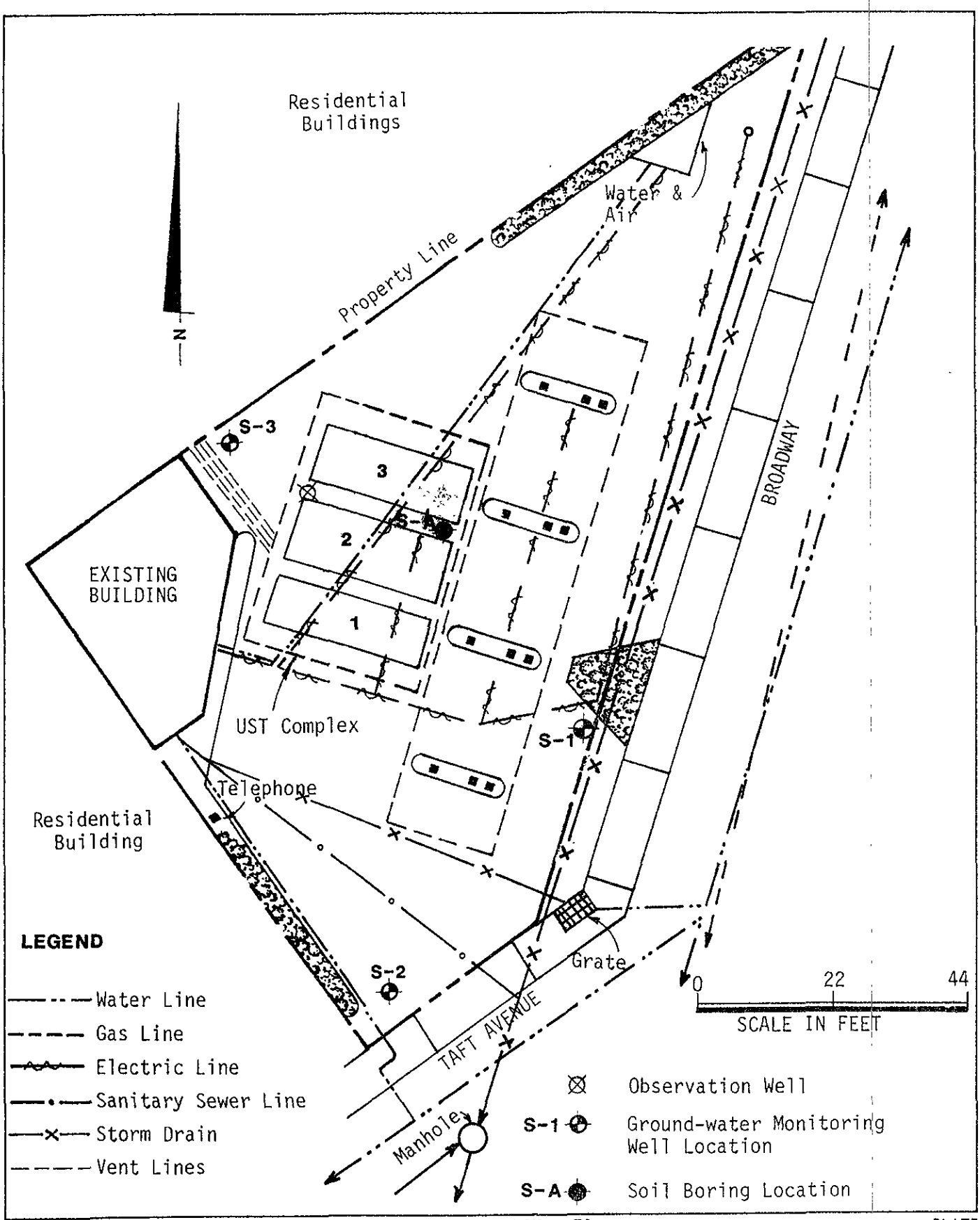


Harding Lawson Associates
Engineering and
Environmental Services

Vicinity Map
Shell Service Station
5755 Broadway
Oakland, California

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
KH	4022,218.03		8/89	

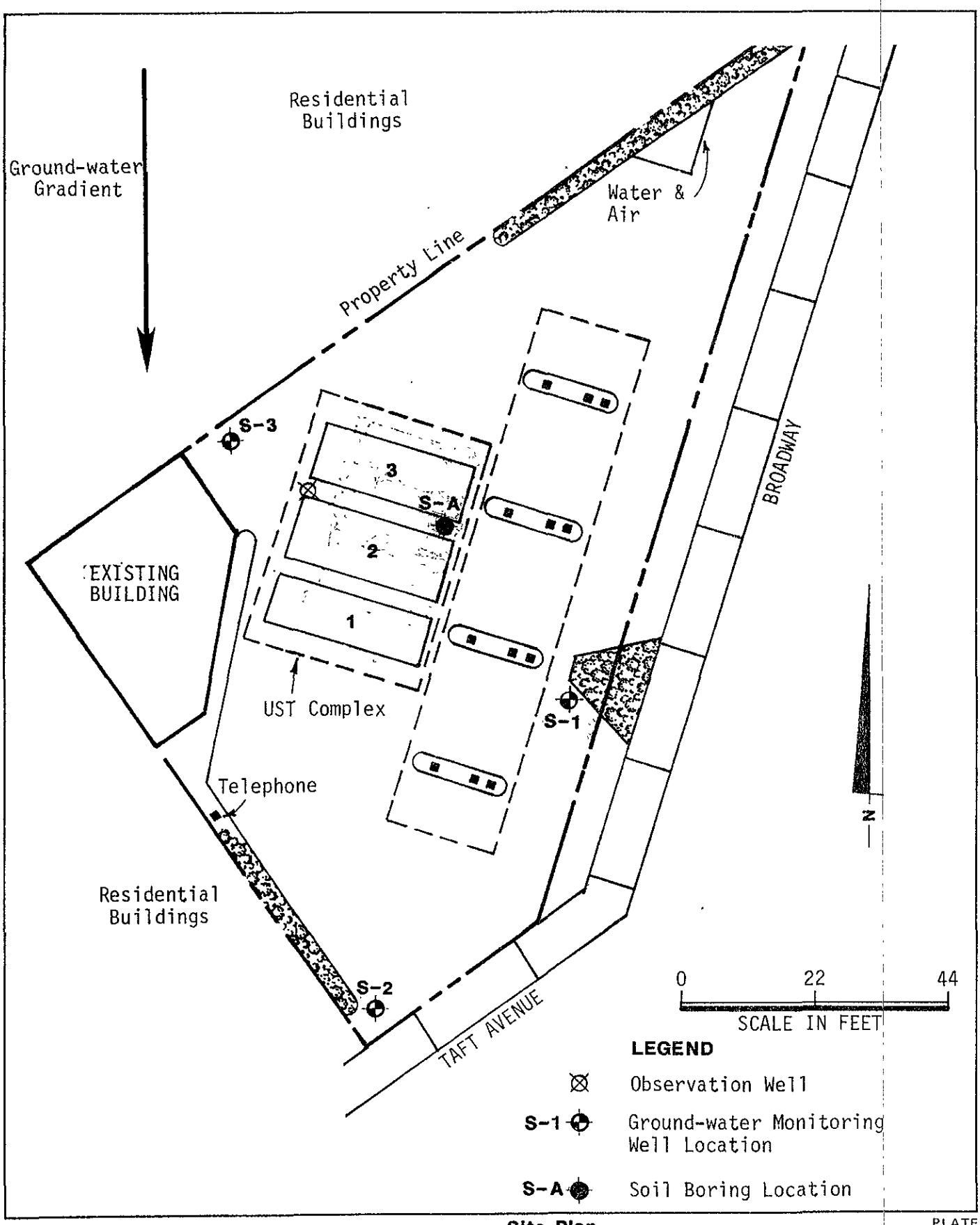


Harding Lawson Associates
Engineering and Environmental Services

Utility Plan
Shell Service Station
5755 Broadway
Oakland, California

PLATE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
KH	4022,218.03		8/89	



Harding Lawson Associates
Engineering and Environmental Services

Site Plan
Shell Service Station
5755 Broadway
Oakland, California

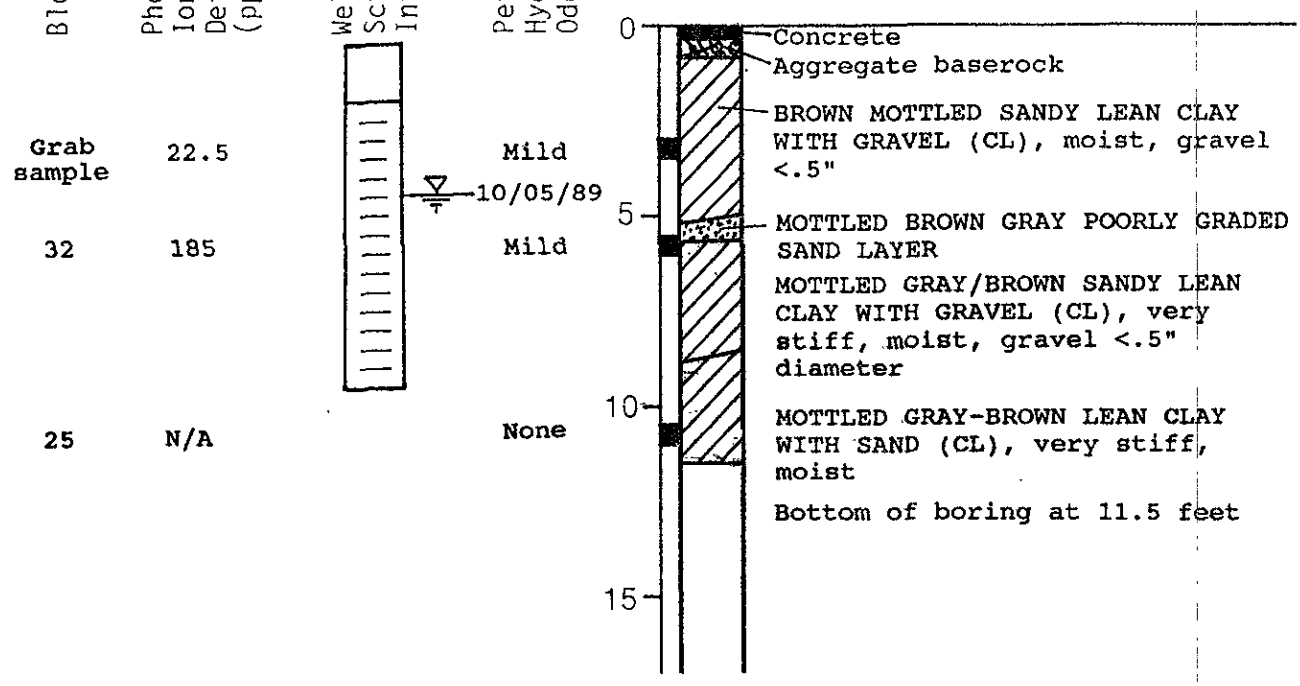
PLATE
3

DRAWN	JOB NUMBER	APPROV	DATE	REVISED DATE
KH	4022,218.03		8/89	

LOG OF BORING S-2

Equipment 10" Hollow Stem Auger

Elevation ~99.0* Date 09/18/89

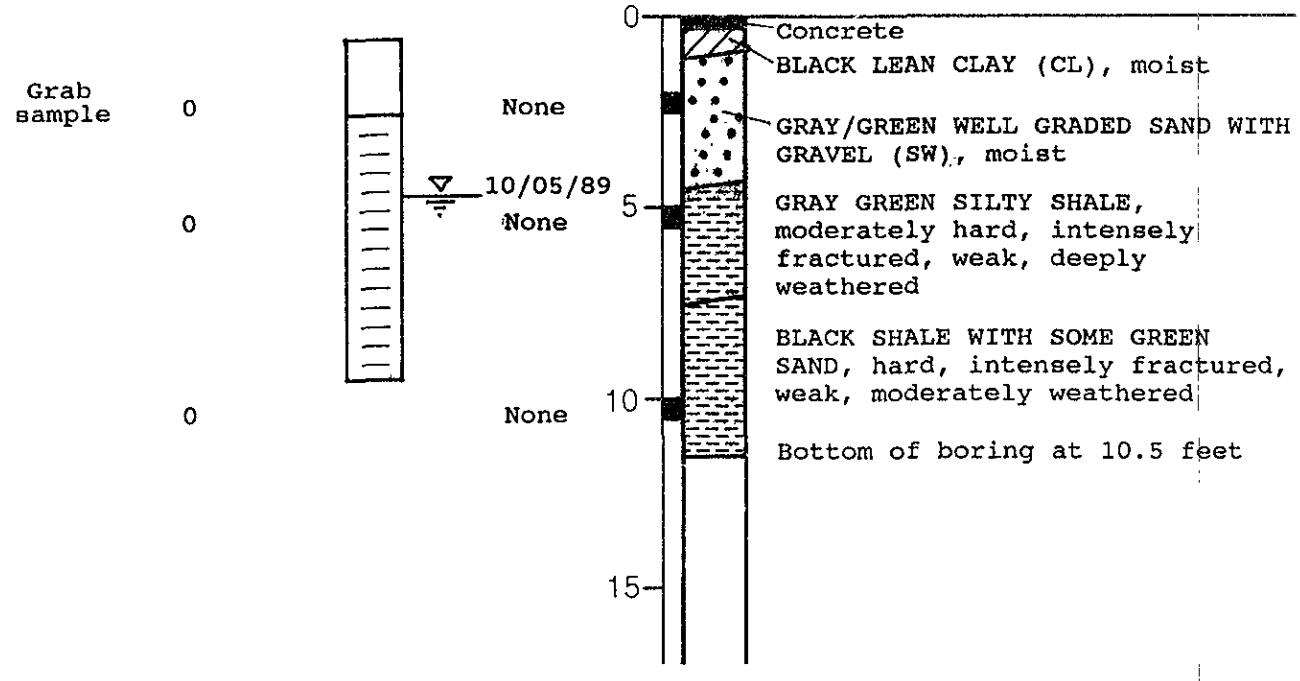


* Relative to assigned datum

LOG OF BORING S-3

Equipment 10" Hollow Stem Auger

Elevation ~102* Date 09/18/89



Harding Lawson Associates
Engineers, Geologists & Geophysicists

Logs of Borings S-2 and S-3
Shell Service Station
5755 Broadway
Oakland, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	4022,218.03		9/89		

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN No 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION - ASTM D2487-85

Perm — Permeability
Consol — Consolidation
LL — Liquid Limit (%)
PI — Plastic Index (%)
G_s — Specific Gravity
MA — Particle Size Analysis
■ — "Undisturbed" Sample
☒ — Bulk or Classification Sample

Shear Strength (psf) ↓ | Confining Pressure ↓

TxUU (FM) or (S)	3200	(2600)	—	Unconsolidated Undrained Triaxial Shear (field moisture or saturated)
TxCU (P)	3200	(2600)	—	Consolidated Undrained Triaxial Shear (with or without pore pressure measurement)
TxCD	3200	(2600)	—	Consolidated Drained Triaxial Shear
SSCU (P)	3200	(2600)	—	Simple Shear Consolidated Undrained (with or without pore pressure measurement)
SSCD	3200	(2600)	—	Simple Shear Consolidated Drained
DSCD	2700	(2000)	—	Consolidated Drained Direct Shear
UC	470		—	Unconfined Compression
LVS	700		—	Laboratory Vane Shear

KEY TO TEST DATA

Harding Lawson Associates
Engineers and Geoscientists

Unified Soil Classification and Test Data Key
Shell Service Station
5755 Broadway
Oakland, California

PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	4022,218.03		9/89		

I **CONSOLIDATION OF SEDIMENTARY ROCKS;** usually determined from unweathered samples. Largely dependent on cementation

U = unconsolidated
P = poorly consolidated
M = moderately consolidated
W = well consolidated

II **BEDDING OF SEDIMENTARY ROCKS**

Splitting Property	Thickness	Stratification
Massive	Greater than 4.0 ft.	very thick bedded
Blocky	2.0 to 4.0 ft.	thick-bedded
Slabby	0.2 to 2.0 ft.	thin-bedded
Flaggy	0.05 to 0.2 ft.	very thin-bedded
Shaly or platy	0.01 to 0.05 ft.	laminated
Papery	less than 0.01 ft.	thinly laminated

III **FRACTURING**

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0
Occasionally fractured	1.0 to 4.0
Moderately fractured	0.5 to 1.0
Closely fractured	0 1 to 0.5
Intensely fractured	0.05 to 0.1
Crushed	Less than 0.05

IV **HARDNESS**

1. **Soft** — Reserved for plastic material alone
2. **Low hardness** — can be gouged deeply or carved easily with a knife blade
3. **Moderately hard** — can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away.
4. **Hard** — can be scratched with difficulty; scratch produces little powder and is often faintly visible.
5. **Very hard** — cannot be scratched with knife blade; leaves a metallic streak.

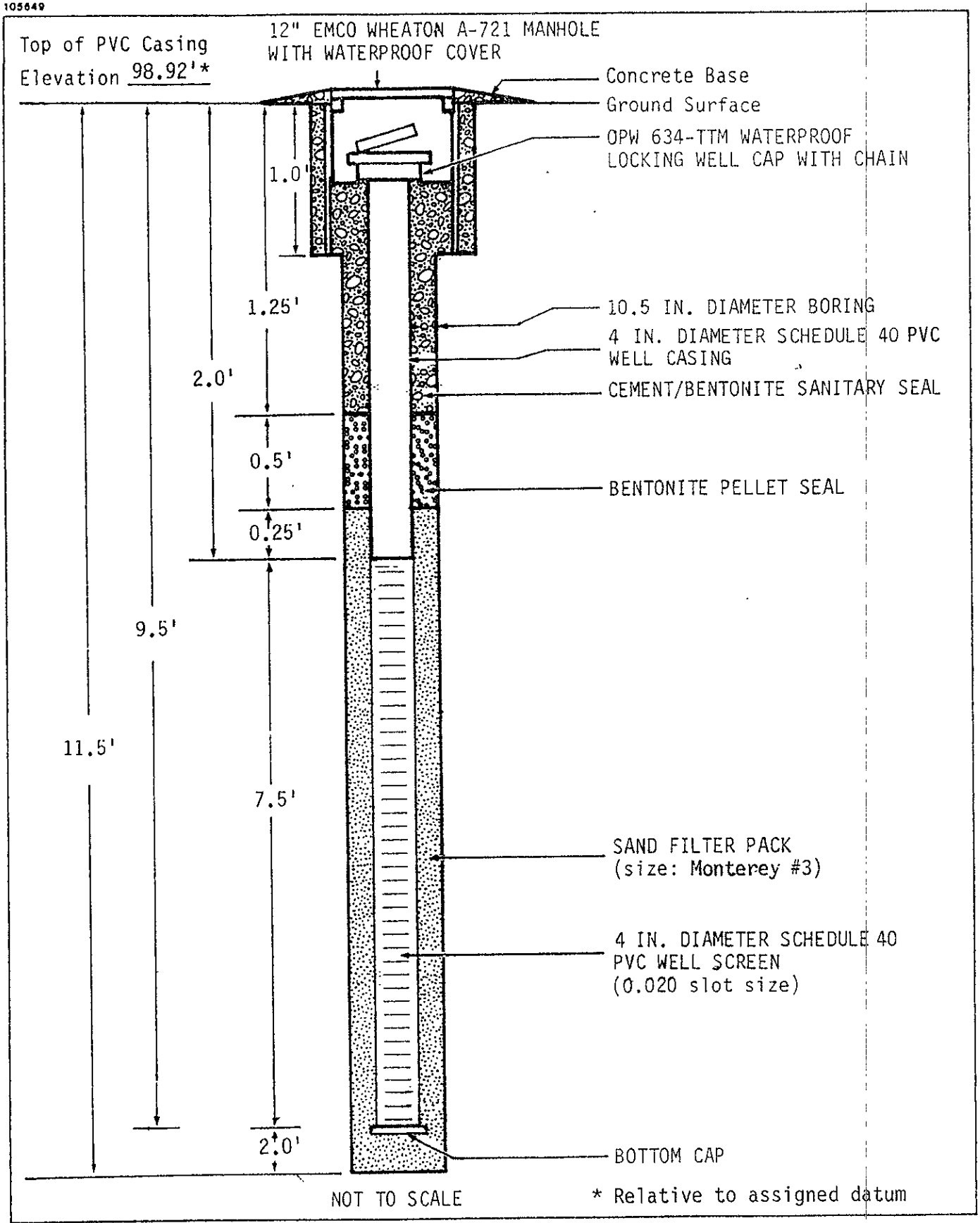
V **STRENGTH**

1. **Plastic** or very low strength
2. **Friable** — crumbles easily by rubbing with fingers
3. **Weak** — An unfractured specimen of such material will crumble under light hammer blows.
4. **Moderately strong** — Specimen will withstand a few heavy hammer blows before breaking
5. **Strong** — Specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.
6. **Very strong** — Specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

VI **WEATHERING** — The physical and chemical disintigration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, and freezing and thawing.

D. **Deep** — Moderate to complete mineral decomposition; extensive disintegration, deep and thorough discoloration; many fractures, all extensively coated or filled with oxides, carbonates and/or clay or silt.
M. **Moderate** — Slight change or partial decomposition of minerals; little disintegration, cementation little to unaffected. Moderate to occasionally intense discoloration. Moderately coated fractures.
L. **Little** — No megascopic decomposition of minerals; little or no effect on normal cementation. Slight and intermittent, or localized discoloration. Few stains on fracture surfaces.
F. **Fresh** — Unaffected by weathering agents No disintegration or discoloration Fractures usually less numerous than joints.

105649



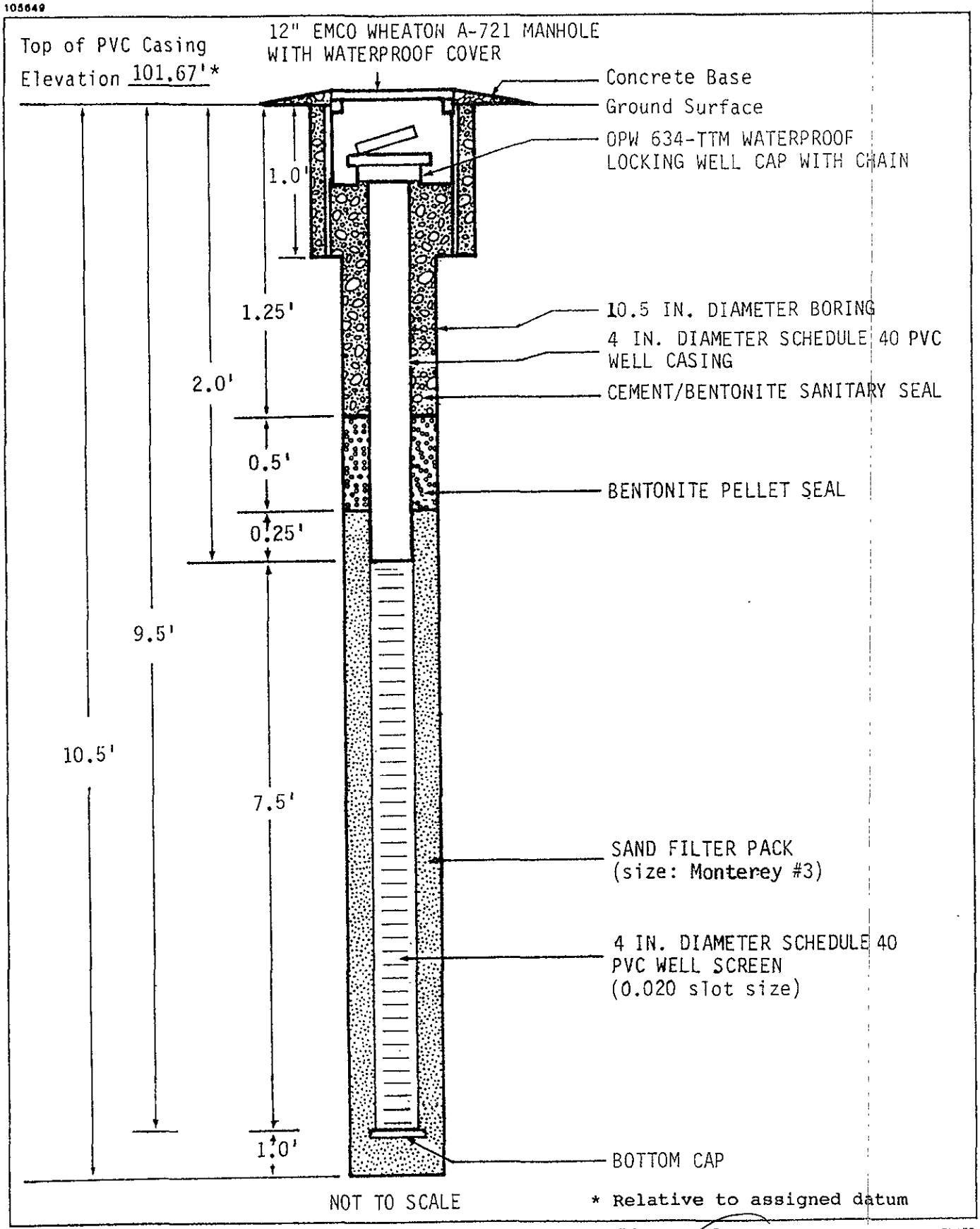
Harding Lawson Associates
Engineers and Geoscientists

Well Completion Diagram S-2
Shell Service Station
5755 Broadway
Oakland, California

PLATE **7**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	4022,218.03	[signature]	9/89		

105649

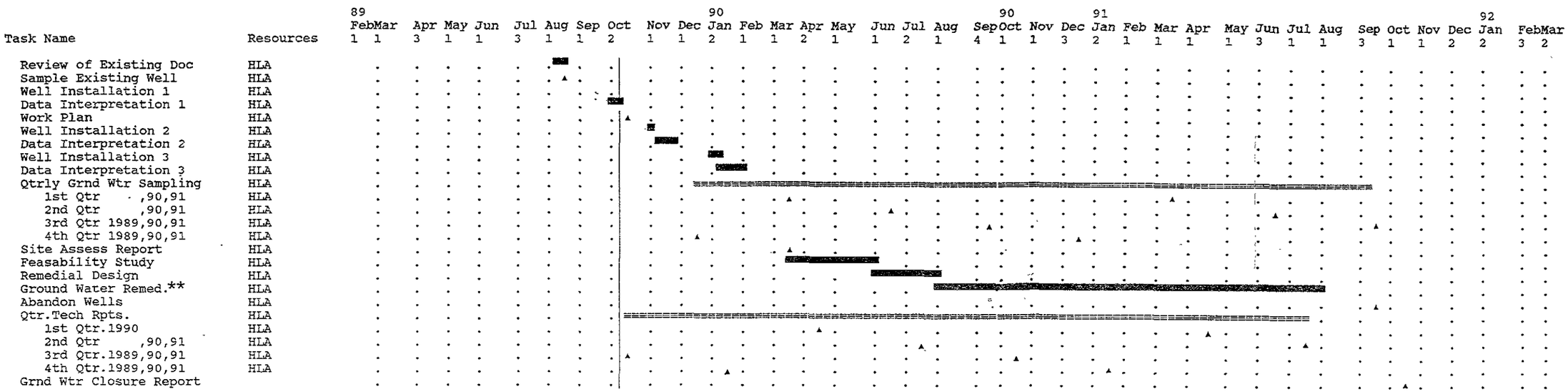


Harding Lawson Associates
Engineers and Geoscientists

Well Completion Diagram S-3
Shell Service Station
5755 Broadway
Oakland, California

PLATE
8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	4022,218.03		9/89		



** Assumes that ground-water remediation can be implemented within a one-year period.
This is only a rough estimate at this time.

Harding Lawson Associates
Engineering and
Environmental Services

Anticipated Closure Schedule
Shell Service Station
5755 Broadway
Oakland, California

PLATE 9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
YC	4022,218.03		10/89	

APPENDIX A

Case No. 20551

No major problem, technically interim screened
2.4 ppm in water
3 ppm in soil

ASSOCIATES
Consultants in Wastes
Management and
Environmental Control

August 1, 1985
Project 738-04.01

Gettler-Ryan, Incorporated
1992 National Avenue
Hayward, California 94545

Attention: Mr. Jeffrey M. Ryan

Re: Shell Service Station, Broadway and Taft Streets, Oakland, California

Gentlemen:

This letter presents the results of a soil and ground-water investigation conducted by EMCON Associates at the Shell service station located at Broadway and Taft Streets in Oakland, California. The purpose of this investigation was to examine soil and ground-water conditions adjacent to the subsurface product storage tanks located at the site.

FIELD INVESTIGATION PROCEDURES

Two exploratory borings (S-A and S-1) were drilled at the locations shown on Figure 1. The borings were drilled using continuous-flight hollow-stem auger drilling equipment and were logged by an EMCON geologist. Soil samples for logging and chemical analysis were obtained from auger-return materials and by advancing a California split-spoon sampler into undisturbed soil beyond the tip of the auger. Soil samples for chemical testing were placed in glass containers, packed on ice and delivered directly to an independent laboratory as authorized by Gettler-Ryan. Laboratory results accompany this report.

Upon completion of Boring S-1 it was converted to a ground-water monitoring well by the installation of 3-inch-diameter PVC casing. Well construction details accompany the attached Exploratory Boring Logs. Boring S-A was backfilled with soil cuttings to a depth of 0.5 foot and cemented to the ground surface.

Headquarters
91 Archer Street San Jose, California ... 408 ... 1444
Branch Office ... 91204

SITE CONDITIONS

Soil Boring S-A was placed within the subsurface gasoline tank complex. Ground-water monitoring Well S-1 was placed downgradient of the tank complex. Subsurface conditions explored by the borings ranged in depth from 11 to 12.5 feet. Boring S-A encountered clay, gravel and sand fill to a depth of 9 feet, underlain by shale bedrock to a depth of 11 feet. Boring S-1 encountered gravelly clay fill to a depth of 3.5 feet, underlain by gravelly clay to a depth of 12 feet. The gravelly clay is underlain by gravel to a depth of 12.5 feet. Ground water was encountered in both borings at a depth of approximately 3 feet.

Product odor was noted in soils from Boring S-A to a depth of 11 feet and in Boring S-1 to a depth of 6 feet.

LABORATORY INVESTIGATIONS AND RESULTS

Three soil samples collected from Boring S-A between a depth of 4 to 11.5 feet were analyzed for gasoline. Relatively low concentrations were detected in the soil between 4 and 10 feet at 2 to 3 parts per million (ppm). No gasoline was detected in the soil sample analyzed from a depth of 10 to 11.5 feet.

Laboratory analysis of ground water from Well S-1 revealed dissolved gasoline concentrations of 2,400 micrograms per liter or 2,400 parts per billion (see attached laboratory results).

If you have any questions regarding the contents of this letter, please do not hesitate to call.

Very truly yours,

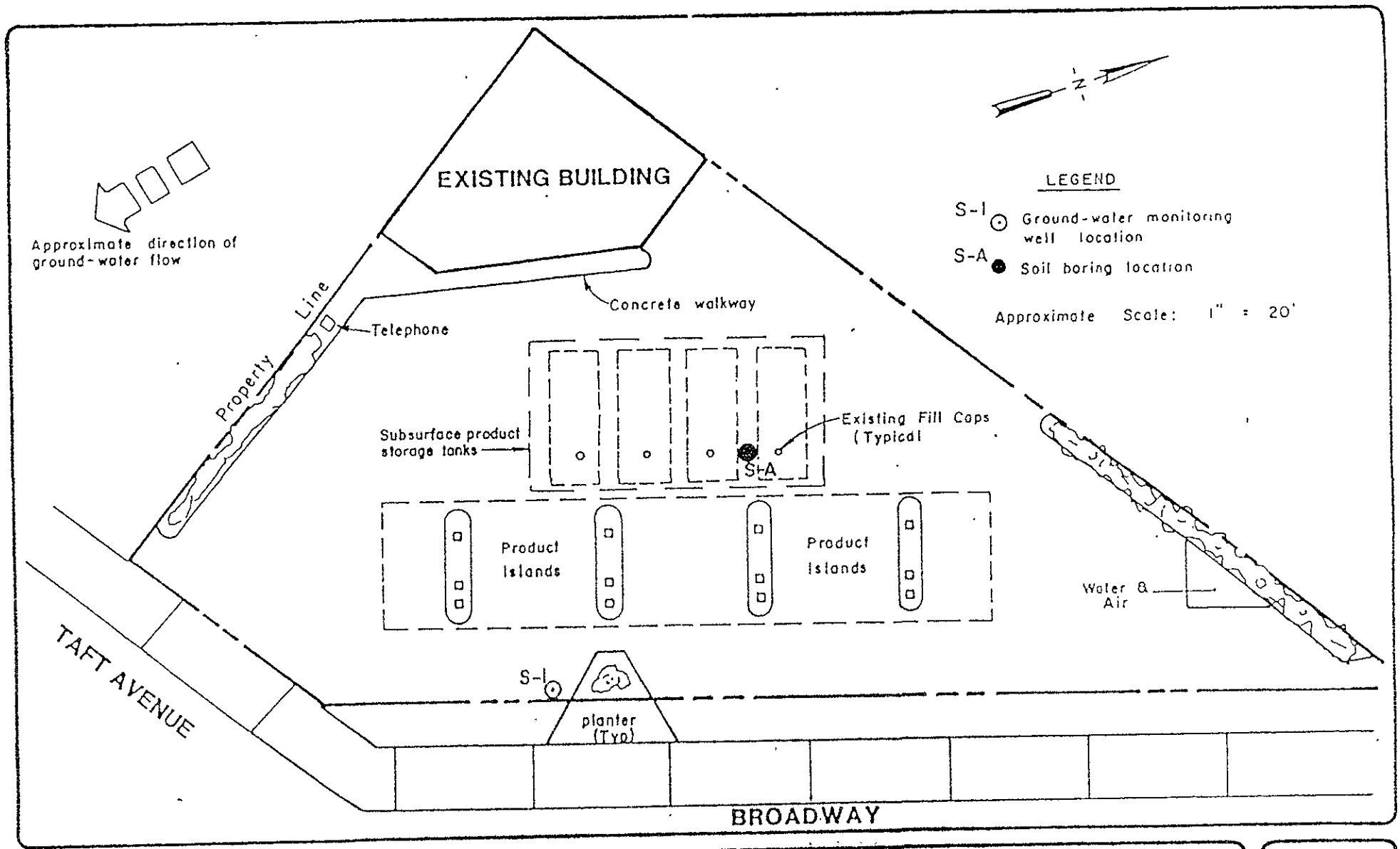
EMCON Associates

Erin Garner
Staff Geologist

Susan M. Willhite
Project Geologist

EG/SMW:mtg

Enclosures



EMCON Associates
San Jose, California

GETTLER-RYAN, INC.
SUBSURFACE HYDROGEOLOGIC INVESTIGATION
SHELL STATION, 5755 BROADWAY
OAKLAND, CALIFORNIA

MONITORING WELL LOCATION MAP

FIGURE 1

PROJECT NO. 736-04.01

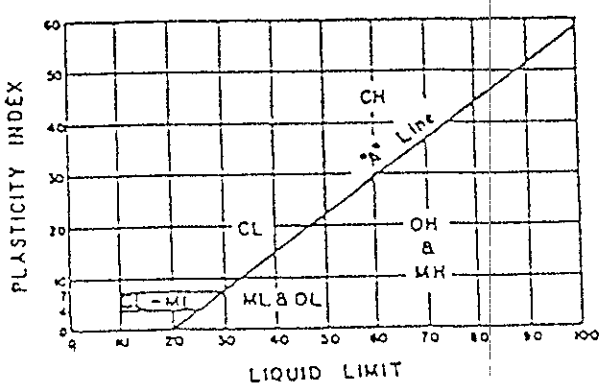
MAJOR DIVISIONS		SYMBOLS	TYPICAL SOIL DESCRIPTIONS
COARSE GRAINED SOILS (More than 1/2 of soil > no 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > no. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction < no. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (More than 1/2 of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL > 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils

CLASSIFICATION CHART

(Unified Soil Classification System)

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL	3" to No. 4	76.2 to 4.76
coarse	3" to 3/4"	76.2 to 19.1
fine	3/4" to No. 4	19.1 to 4.76
SAND	No. 4 to No. 200	4.76 to 0.074
coarse	No. 4 to No. 10	4.76 to 2.00
medium	No. 10 to No. 40	2.00 to 0.420
fine	No. 40 to No. 200	0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

GRAIN SIZE CHART



PLASTICITY CHART

METHOD OF SOIL CLASSIFICATION

EMCON

NOTES: Logs of Exploratory Borings

2.5 YR 6/2 — Denotes color as field checked to Munsell Soil Color Charts (1975 Edition)

 Denotes undisturbed sample taken in 2-inch split-spoon sampler.

 Denotes disturbed sample (bag sample).

 Denotes first observation of ground water.

 Denotes static ground-water level.

Penetration — Sample drive hammer weight - 140 pounds, drop - 30 inches. Blows required to drive sampler 1 foot are indicated on the logs.

LOG OF EXPLORATORY BORING

PROJECT NUMBER 738-04.01 BORING NO. S-A

PROJECT NAME Gettler-Ryan Shell at Broadway and Taft, Oakland PAGE 1 OF 1

BY JOB DATE 6/11/85 SURFACE ELEV.

TORVANE (TSF)	POCKET PENETROMETER (TSF)	PENETRATION (Blows/Ft.)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOGRAPHIC COLUMN	DESCRIPTION
			▽	5		CL	CONCRETE CLAY; Fill; very dark grayish brown (2.5Y, 3/2); trace sand; 25-30% fine to coarse gravel; (60% gravel at 3'); stiff; wet; product odor.
		5				SP - GP - GC	SAND; COARSE GRAVEL; CLAYEY GRAVEL, Fill; light olive brown (2.5Y, 5/6); loose; wet; product odor.
		47		10		Bed Rock	BEDROCK; SHALE; olive (5Y, 4/3); silty; FeO stained; highly fractured; hard; wet; slight product odor.
		75					HOLE TERMINATED AT 11 FEET
				15			

REMARKS Boring was backfilled with cuttings, to a depth of .5 feet, then cement to surface.

EMCON ASSOCIATES

PLATE A

LOG OF EXPLORATORY

PROJECT NUMBER 738-04.01

PROJECT NAME Gettler-Ryan, Shell @ Broadway & Taft.

BY JDB DATE 6/11/85

TORVANE (TSF)	POCKET PENETROMETER (TSF)	PENETRATION (Blows/FT.)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOGRAPHIC COLUMN	
							CONCRETE
						CL Fill	CLAY; Fill; very ... (2.5Y, 3/2); ... no product odor.
			▽			CL	GRAVELLY CLAY; dar... (10YR, 4/6); tr... product odor.
				5			@6': becomes o... slight product ...
	2.5-5	37					@7': becomes dar... (10YR, 4/6); 30... gravel; very s... no product odor. @8½': gravel ... 9½'; no produ...
	2-4	20		10			
		50for 3"				GW	GRAVEL; olive gra... coarse angular ... very dense; da...
				15			HOLE TERMINATED ...
				20			

REMARKS Boring converted to ground water monitoring ...

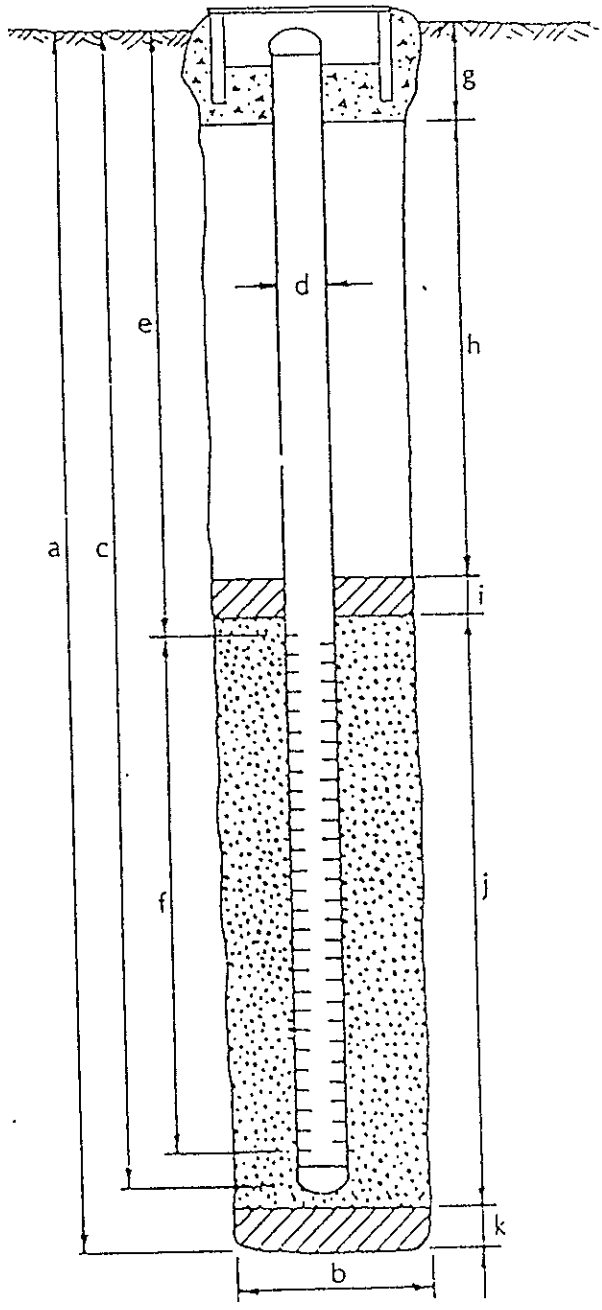
on Plate C.

WELL DETAILS

EMKON ASSOCIATES

PROJECT NUMBER 738-04.01 BORI
PROJECT NAME Gettler-Ryan, Shell Broadway & Taft TOP O
COUNTY Alameda GROUN
WELL PERMIT NO. DATUM

G-5 vault box (Std.)



EXPLORATORY

a. Total depth
b. Diameter
Drilling method

WELL CONSTR

c. Casing length
Material Sched
d. Diameter
e. Depth to top perfo
f. Perforated lengt
Perforated inte
Perforation typ
Perforation siz
g. Surface seal
Seal material Cem
h. Backfill
Backfill material
i. Seal
Seal material
j. Gravel pack
Pack material
k. Bottom seal
Seal material

July 12, 1985

Emcon Associates
90 Archer Street
San Jose, CA 95112

Reference: Shell Purchase Order No. MOH056751

ATTN: Erin Garner

Following are the results of our analysis for the presence of volatile hydrocarbons due to gasoline in three samples of soil received on June 21, 1985.

The samples were examined using the purge and trap technique. Final detection was by gas chromatography using a flame ionization detector and a Carbopack B/3% SP-1500 column. This method allows for the detection of aliphatic hydrocarbons from C_5 through C_{12} and aromatic hydrocarbons through substituted benzenes. Hydrocarbons C_5-C_7, benzene and toluene were calculated by comparing the sample chromatogram to a fresh gasoline standard. Hydrocarbons C_8-C_{12}, benzene, xylenes and other substituted aromatics were calculated by comparing to a standard of gasoline which had been evaporated to 90% of its original weight. The results given below are the sum of the hydrocarbons in these two ranges.

nd = none detected

Lab. #	Sample Identification	Results Parts per Million (dry soil) Volatile Hydrocarbons Due to Gasoline
	Job 738-04.01, 5755 Broadway	
29613	S-A @ 4 - 5.5', 6/11/85	3.
29614	S-A @ 8.5 - 10', 6/12/85	2.
29615	S-A @ 10 - 11.5', 6/11/85	nd
Detection Limit		2.

Patricia L. Murray

PLM/jd

cc: Stan Roller
Shell Oil Co.

EMCON ASSOCIATES • CHEMICAL LABORATORIES

Analysis • Consultation • Research • Environmental Studies

State Approved Water Laboratory

CERTIFIED ANALYTICAL REPORT

Report to: Gettler-Ryan
1992 National Avenue
Hayward, CA 94545

Location: Shell

Date Received: July 3, 1985

Laboratory Number: E85-0517

Project Number: 738-04.01

Date Sampled: July 3, 1985

WATER

SAMPLE ID	S-1
SAMPLE DATE	7/3
PARAMETER	
Benzene ug/l	240
Toluene ug/l	9.8
Xylenes and Ethylbenzene ug/l	380
Gasoline ug/l	2400

Reported by: [signature] Date: 7-24-85

APPENDIX B

NATIONAL ENVIRONMENTAL TESTING, INC.

HARDING ASSOC
OCT 05 1989

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Formerly: ANATEC Labs, Inc.

Glenn Young
Harding Lawson Associates
1355 Willow Way, Ste. 109
Concord, CA 94520

09-30-89
NET Pacific Log No: 7840
Series No: 281.2
Client Ref: Job # 4022,218.03

Subject: Analytical Results for "Shell - Broadway" Received 09-22-89.

Dear Mr. Young:

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Submitted by:

Susan Joy Griffin
Group Leader
Gas Chromatography

Approved by:

Brian Fies
Group Leader
Atomic Spectroscopy

/sm
Enc: Sample Custody Document

KEY TO ABBREVIATIONS and METHOD REFERENCES

Abbreviations

mean : Average; sum of measurements divided by number of measurements.

ppm (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.

NR : Not requested.

NTU : Nephelometric turbidity units.

RPD : Relative percent difference, 100 [Value 1 - Value 2]/mean value.

SNA : Standard not available.

ppm (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.

SAMPLE DESCRIPTION: S-2-1 09-19-89 1000
LAB NO.: (-35327)

Parameter	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS VOLATILE (SOIL)			
DILUTION FACTOR *		1	
DATE ANALYZED		09-27-89	
METHOD GC FID/5030			
as Gasoline	10	92	ppm
METHOD 8020			
Benzene	0.025	0.12	ppm
Ethylbenzene	0.075	0.58	ppm
Toluene	0.025	0.80	ppm
Xylenes, total	0.075	4.2	ppm

SAMPLE DESCRIPTION: S-3-1 09-19-89 1000
LAB NO.: (-35328)

Parameter	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS VOLATILE (SOIL)			
DILUTION FACTOR *		1	
DATE ANALYZED		09-27-89	
METHOD GC FID/5030			
as Gasoline	10	ND	ppm
METHOD 8020			
Benzene	0.025	ND	ppm
Ethylbenzene	0.075	ND	ppm
Toluene	0.025	0.062	ppm
Xylenes, total	0.075	0.12	ppm

SAMPLE DESCRIPTION: comp 09-19-89 1000
LAB NO.: (-35329)

Parameter	Reporting Limit	Results	Units
METHOD 7421			
Lead	0.2	0.2	ppm
PETROLEUM HYDROCARBONS VOLATILE (SOIL)			
DILUTION FACTOR *		1	
DATE ANALYZED		09-27-89	
METHOD GC FID/5030			
as Gasoline	10	ND	ppm
METHOD 8020			
Benzene	0.025	ND	ppm
Ethylbenzene	0.075	ND	ppm
Toluene	0.025	0.067	ppm
Xylenes, total	0.075	ND	ppm

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, California 94520
415/687-9660
Telecopy: 415/687-9673

CHAIN OF CUSTODY FORM

7840

Lab: NET

Samplers: MIKE B. RINK

Job Number: 4022,218.03

Name/Location: SHELL; BROADWAY

Project Manager: GLENN S. YOUNG

Recorder: (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV: Unpres.	H_2SO_4	HNO_3	ICE	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene/E	Total Petrol. Hydrocarb. GAS	TOTAL LEAD
48			X					X	5	2	-1	89	09	19	1000						X	X	
48			X					X	5	3	-1	89	09	19		5-day turnaround					X	X	
48			X					X	C	O	M	P	89	09	19		as per Shell contact					X	X	X

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
	Jeff Winkler	9/21 17:40
RELINQUISHED BY: (Signature) Jeff Winkler	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) CVIA NCS	DATE/TIME	RECEIVED FOR LAB BY: (Signature) Krample 9/22/09 0700

METHOD OF SHIPMENT

Laboratory Copy White | Project Office Copy Yellow | Field or Office Copy Pink

6533

NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Formerly: ANATEC Labs, Inc.

HARDING ASSOC.
SEP 14 1989

Glenn Young
Harding Lawson Associates
1355 Willow Way, Ste. 109
Concord, CA 94520

08-23-89
NET Pacific Log No: 7437
Series No: 281.2
Client Ref: Job # 4022218.03

Subject: Analytical Results for "Shell - Broadway" Received 08-17-89.
REISSUED 09-12-89

Dear Mr. Young:

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Submitted by:

Susan Joy Griffin
Group Leader
Gas Chromatography

Approved by:

Brian Fies
Group Leader
Atomic Spectroscopy

/sm
Enc: Sample Custody Document

KEY TO ABBREVIATIONS and METHOD REFERENCES

Abbreviations

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.
NR	:	Not requested.
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.

SAMPLE DESCRIPTION: S-1 08-15-89
LAB NO.: (-33041)

Parameter	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS VOLATILE (WATER)			
DILUTION FACTOR		1	
DATE ANALYZED		08-19-89	
METHOD GC FID/5030 as Gasoline	0.05	0.17	mg/L
METHOD 602			
Benzene	0.5	0.61	ug/L
Ethylbenzene	1.5	ND	ug/L
Toluene	0.5	ND	ug/L
Xylenes, total	1.5	ND	ug/L

QUALITY CONTROL RESULTS - GASOLINE AND PURGEABLE AROMATICS

	Lab No, Spike and Spike Replicate Results % Recovery		
Blank (mg/L)	(32995S)	(32995SD)	RPD (%)
Gasoline			
<0.5	92	105	13
Purgeable Aromatics			
Benzene	90	93	3.3
Toluene	90	93	3.3
Ethylbenzene	88	91	3.3
Xylenes	87	90	3.4

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, California 94520
415/687-9660
Telecopy 415/687-9673

CHAIN OF CUSTODY FORM (7437)

Lab: NET

Samplers: Hank Steffe

Number: 4022218.03

Me/Location: Shell Briceburg

oject Manager: Glenn Kwong

Recorder: (Signature Required)

CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	VOA	HCl VOA	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene	Total Petrol. Hydrocarb. GAS
W	X				4				X	S	1		8	9	0	8	15						X	X

5 - DAY TURNAROUND

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME 8/16/88 13:20
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME 8/17 0300
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) CUIA NCSJ — DATE/TIME	RECEIVED FOR LAB BY: (Signature) K Temple	DATE/TIME 8/17/88 0720
METHOD OF SHIPMENT		

6533

Laboratory Copy White — Project Office Copy Yellow — Field or Office Copy Pink

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Formerly: ANATEC Labs, Inc.

Fax No:
Time Faxed:

FAX TRANMISSION SHEET

DATE: 10-6-89 TIME: 1710

TO: Glenn

COMPANY: HLA in Concord

SENDER: Lori

YOU SHOULD RECEIVE 3 PAGES - INCLUDING THIS COVER SHEET.

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE NOTIFY THE SENDER IMMEDIATELY @ (707) 526-7200

OUR FAX MACHINE IS: GROUP 2 AND 3

OUR FAX NUMBER IS: (707) 526-9623

COMMENTS:

09-27-89

SAMPLE DESCRIPTION: S-2
LAB NO.: (-35902)

Parameter	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS		X	
VOLATILE (WATER)		--	
DILUTION FACTOR *		1	
DATE ANALYZED		10-04-89	
METHOD GC FID/5030		--	
as Gasoline	0.05	0.26	mg/L
METHOD 602		--	
Benzene	0.5	15	ug/L
Ethylbenzene	1.5	1.3	ug/L
Toluene	0.5	1.6	ug/L
Xylenes, total	1.5	13	ug/L

Preliminary Report

SAMPLE DESCRIPTION: S-3 09-27-89
LAB NO.: (-35903)

Parameter	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS		X	
VOLATILE (WATER)		--	
DILUTION FACTOR *		1	
DATE ANALYZED		10-04-89	
METHOD GC FID/5030		**	
as Gasoline	0.05	ND	mg/L
METHOD 602		--	
Benzene	0.5	ND	ug/L
Ethylbenzene	1.5	ND	ug/L
Toluene	0.5	ND	ug/L
Xylenes, total	1.5	ND	ug/L

Preliminary Report

DISTRIBUTION

3 copies: Shell Oil Company
P.O. Box 4023
Concord, California 94520

Attention: Ms. Diane M. Lundquist

GSY/RS/ly 031247L/R28

QUALITY CONTROL REVIEWER

Stephen J. Osborne
Principal Engineer