(3)

Harding Lawson Associates

A Report Prepared for

Exxon Company, U.S.A.
P.O. Box 4388
Houston, Texas 77210

SUBSURFACE INVESTIGATION - PHASE 2
KING PETROLEUM
ALAMEDA, CALIFORNIA

HLA Job No. 4167,076.12

by

Ronald N. Stoufer
Ronald N. Stoufer,
Engineering Geologist - 1206

Donald G. Gray
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Civil Engineer - 25220

Harding Lawson Associates
7655 Redwood Boulevard, P.O. Box 578
Novato, California 94948
415/892-0821

June 4, 1985

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been no tanks on the premises since 1983. Earth Metrics has received no information that would indicate leakage from historic aboveground and below ground tanks.

Confirmation and verification of the above information and materials types/ throughput will be provided later by Earth Metrics Incorporated. At this time, we ask you to accept for your file the promised archival reports by Harding Lawson and Kennedy/Jenks Engineers and related correspondence from the California Regional Water Quality Control Board. The Work Plan for site closure activities is forthcoming.

Enclosures

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I INTRODUCTION

This report presents the results of the investigation performed by Harding Lawson Associates (HLA) of the soil and ground water beneath the King Petroleum property at 2001 Versailles Avenue, Alameda, California. This report follows up our initial report dated December 3, 1984. After reviewing that report, the California Regional Water Quality Control Board (CRWQCB) required the construction of an additional ground-water monitoring well, four additional shallow borings, and chemical analyses of water and soil samples. The CRWQCB approved Exxon's proposed scope of work stated in a letter to the Board dated March 13, 1985. The purpose of our investigation was to fulfill the commitments in that letter. Our services were authorized by Exxon on April 17, 1985.

II INVESTIGATION

A. Exploration

We drilled one boring, W-4, to a depth of 35 feet with hollow-stem auger equipment. We also drilled four additional borings, designated SB-1 through SB-4, to a depth of 5.5 feet. Soil samples from a depth of 5.0 to 5.5 feet from Borings W-4 and SB-1 through SB-4 were collected for chemical analysis. The locations of the borings are shown on Plate 1. Our geologist logged the borings and obtained samples of the soils by driving a split-barrel soil sampler. The logs of the borings are presented on Plates 2 and 3. The soils are classified in accordance with the Unified Soil Classification System, which is described on Plate 4.

B. Well Completion

A well was constructed in W-4 using 2-inch-diameter PVC casing and slotted (0.020-inch) PVC screen. The annular space around the screen was packed with silica sand, and above the screen the annular space was sealed with cement-bentonite grout. The well construction details are shown on the log of Well W-4, Plate 2. After construction, the well was developed by pumping with a centrifugal pump. The pump suction hose was steam-cleaned before it was placed in the well.

C. Determination of Ground-Water Gradient

A licensed surveyor determined the elevation of W-4 in reference to the same datum (Mean Sea Level) that was used for surveying the previous wells.

We measured the water levels in all six wells on May 6, 1985. The contours of equal water elevations are shown on Plate 1.

D. Soil and Ground-Water Sampling

The split-barrel sampler was steam-cleaned before each sample, and the augers were steam-cleaned before each boring. Soil samples were retained in the brass tubes which line the sampler. The tubes were sealed with foil-lined taped caps, and kept on ice until delivery to EAL Corporation (EAL) for chemical analysis. EAL Corporation is U.S. EPA-approved to do such analyses, as demonstrated by their status as an EPA contract laboratory.

Well W-4 was developed on April 30, 1985. Wells W-3, W-4, and SW-2 were sampled on May 1, 1985. Four casing volumes of water were removed with a centrifugal pump (Wells W-3 and W-4) or a Guzzler diaphragm pump (SW-2) prior to withdrawing water samples with a stainless steel bailer. All equipment was steam-cleaned before placement in each well.

The water samples were kept on ice until delivery to EAL on the day of sampling. Chain of custody procedures were followed to preserve the legal integrity of the samples. A water travel blank was taken to the site for quality control.

On May 6, 1985, a cut of the top of the water column in W-4 was removed with a transparent bailer and inspected for any floating, free product or sheen.

III DISCUSSION AND CONCLUSIONS

A. Site Hydrogeology

The geology encountered during the drilling of Well W-4 was similar to the conditions encountered previously in Borings W-1, W-2, and W-3. A clay cap was underlain by a sand aquifer from a depth of 13.3 to 30.0 feet. This sand overlies a clay confining layer at least 5 feet thick.

Our water level measurements indicate that the ground water moves toward the north at a gradient of 0.008. This direction and gradient are the same as those we measured in October 1984.

B. Chemistry of Soil and Water Samples

As required by the CRWQCB, soil samples from a depth of 5 feet in each of the 5 borings performed during this investigation were analyzed for the volatile, acid, and base/neutral priority pollutant organic chemicals by EPA Methods 624 and 625. Water samples from Wells W-3, W-4, and SW-2 were analyzed for the same parameters.

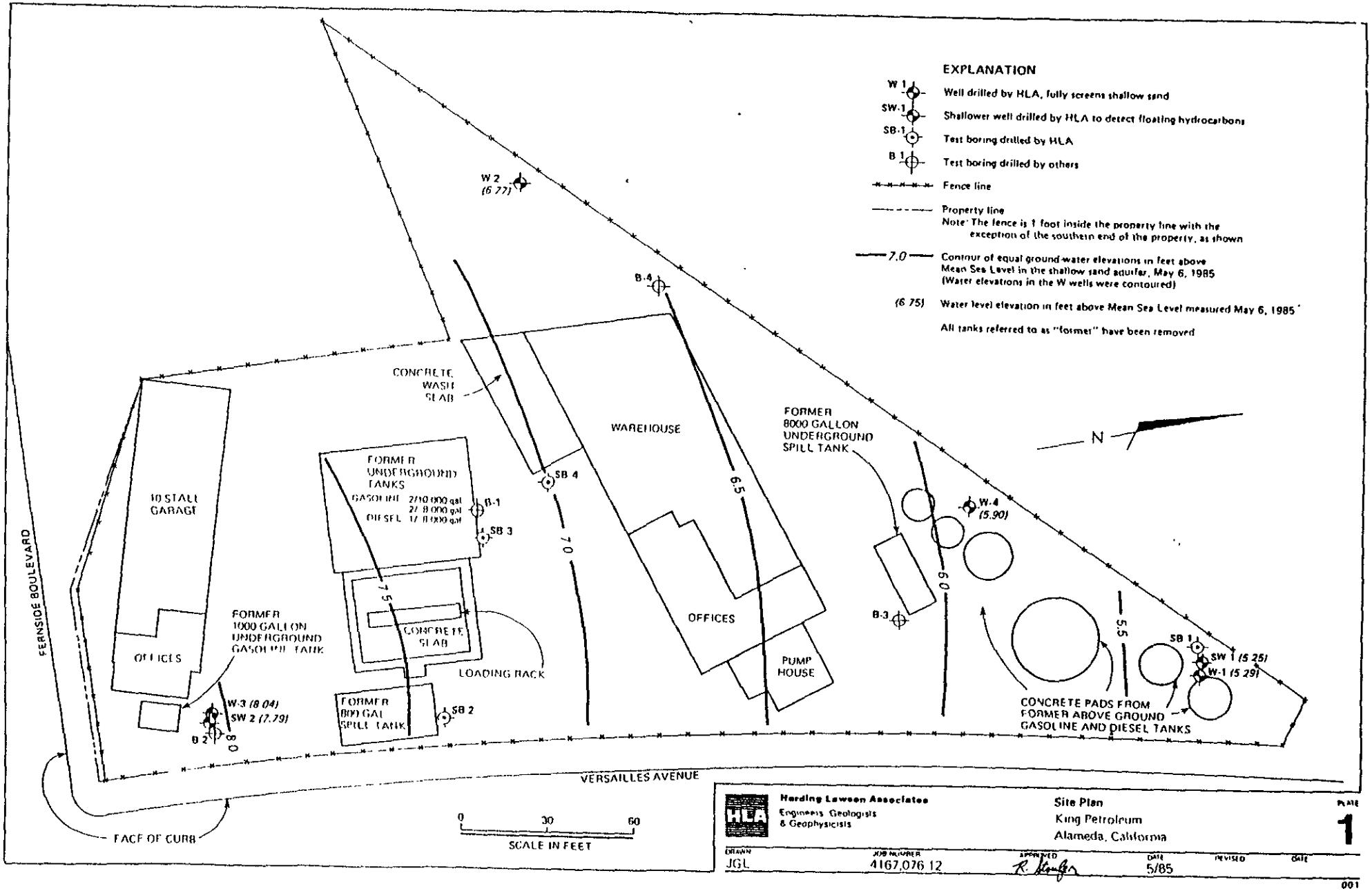
The results of the chemical analyses of the water samples are listed in Table 1. The inspection of the ground-water surface in Well W-4 on May 6, 1985, detected no floating, free product or sheen. No priority pollutant chemicals were detected in any of the ground-water samples by EPA Methods 624 and 625.

The results of the chemical analyses of the soils are listed in Table 2. Both methylene chloride and either bis (2-ethylhexyl) phthalate or di-n-butyl phthalate, or both, were detected in all the soil samples. Those parameters

are common laboratory chemicals, and we believe they are not indicative of in situ chemicals in the soil. The methylene chloride concentrations are not credible due to its presence in the water travel blank. Our chemist has informed us that phthalates are notorious for having chromatographic "memory peaks," which elute off the column at a later time. He suggests that phthalate concentrations are not reliable below 10 parts per million (ppm). The higher phthalate (plasticizer) concentrations may be due to contact of the soil and the plastic caps on the ends of the brass soil sample tubes. We lined the caps with aluminum foil to avoid this problem, but a break in the foil may have occurred. Toluene was detected in Boring SB-1 at 15 micrograms of chemical per kilogram of soil (ppb). The only other chemical detected by EPA Methods 624 and 625 was ethylbenzene in Boring SB-4 at 6 ppb.

The California Department of Health Services (DOHS) has a set of guidelines for action levels for soil contamination by various chemicals. These guidelines, in a publication titled "Action Levels Recommended by Department of Health Services," August 24, 1984, are based on the 1977 National Academy of Sciences report Drinking Water and Health. The DOHS action levels for toluene and ethylbenzene in soil are 100 ppm and 1400 ppm, respectively. The concentrations of these chemicals detected in soil during this investigation at King Petroleum are 6000 to 20,000 times below the action levels.

IV ILLUSTRATIONS



Harding Lawson Associates
Engineers Geologists & Geophysicists

Site Plan
King Petroleum
Alameda, California

PLATE 1

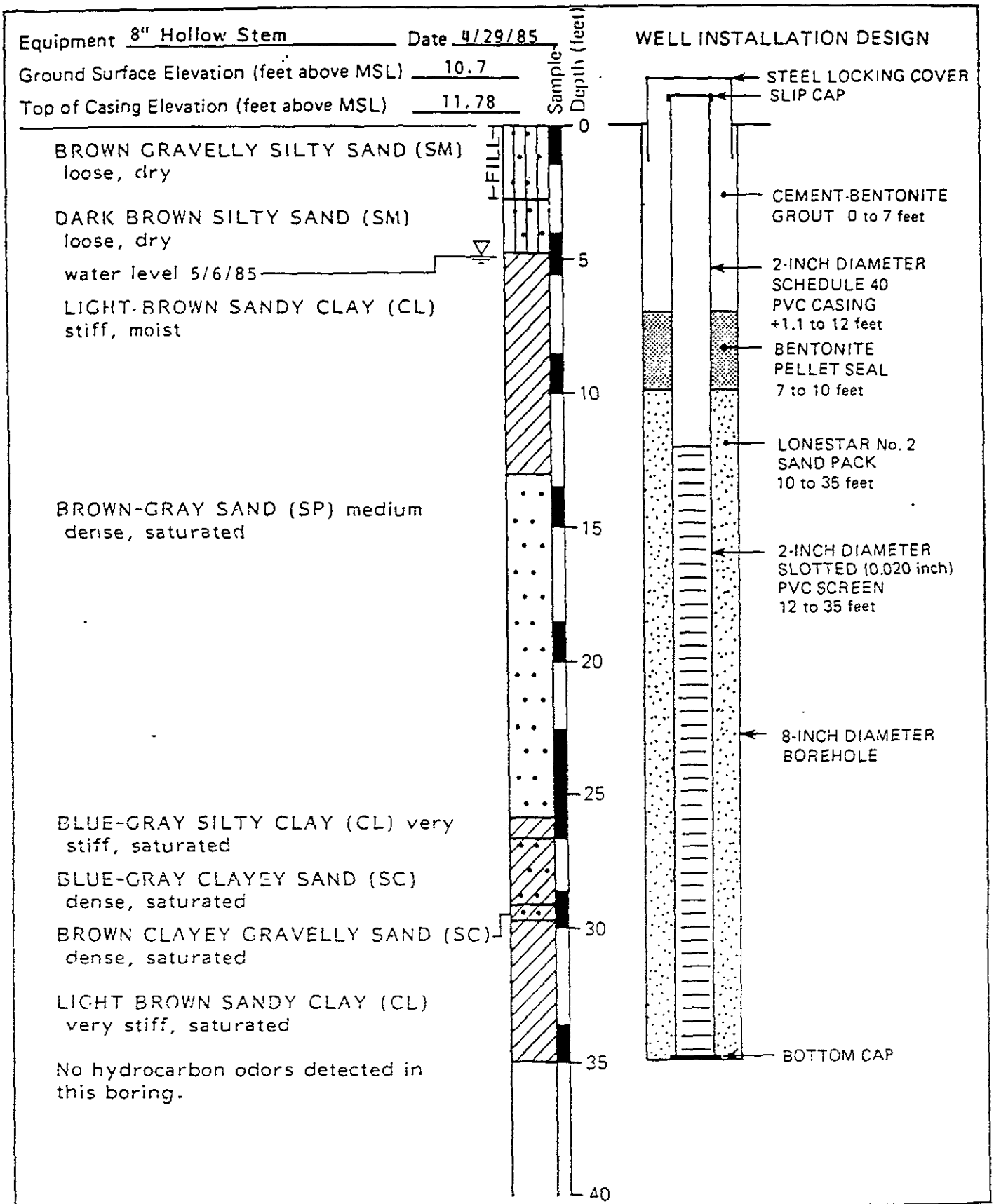
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JGL	4167,076 12	R. Stanley	5/85		

001

Equipment 8" Hollow Stem Date 4/29/85

Ground Surface Elevation (feet above MSL) 10.7

Top of Casing Elevation (feet above MSL) 11.78



Harding Lawson Associates
Engineers, Geologists & Geophysicists

Log of Well W-4
King Petroleum
Alameda, California

PLATE 2

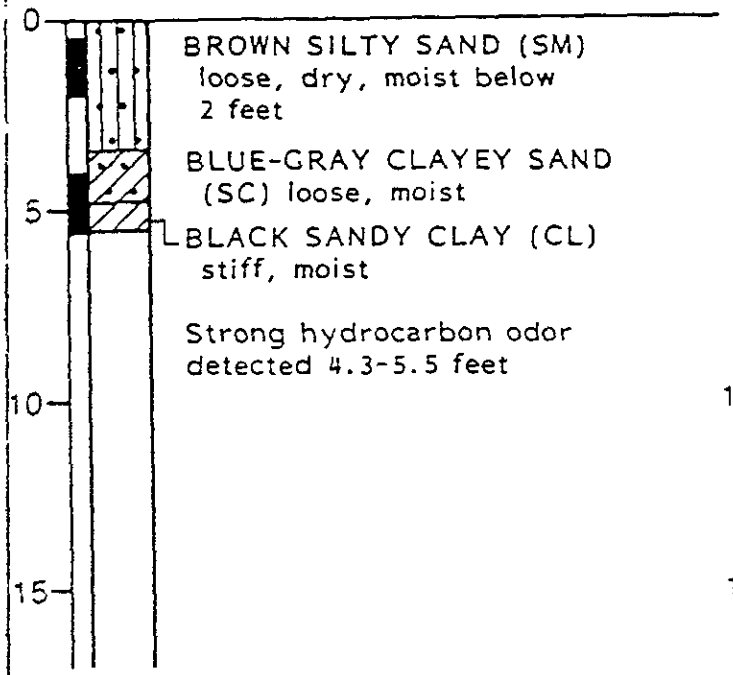
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JGL	4167,076.12	R. Stauler	5/85		

002

LOG OF BORING SB-1

Equipment 8" Hollow Stem Auger

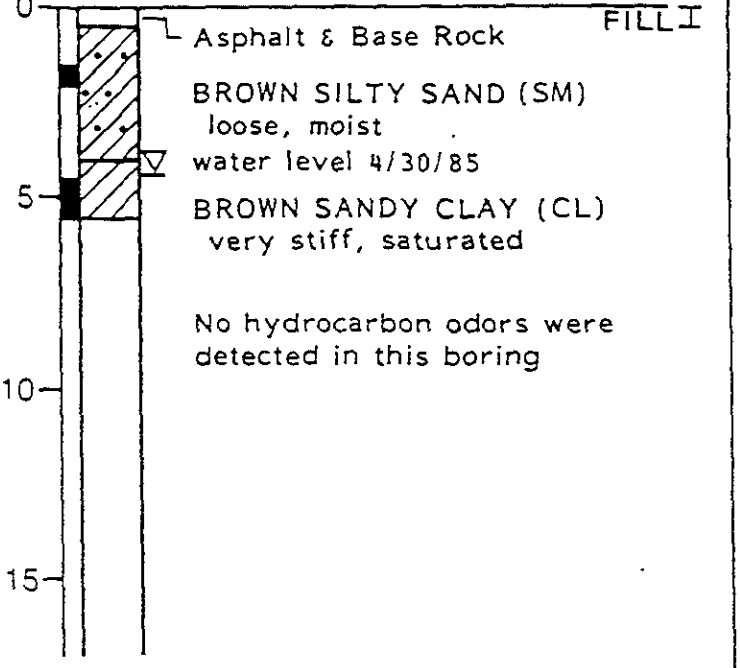
Elevation — Date 4/30/85



LOG OF BORING SB-2

Equipment 8" Hollow Stem Auger

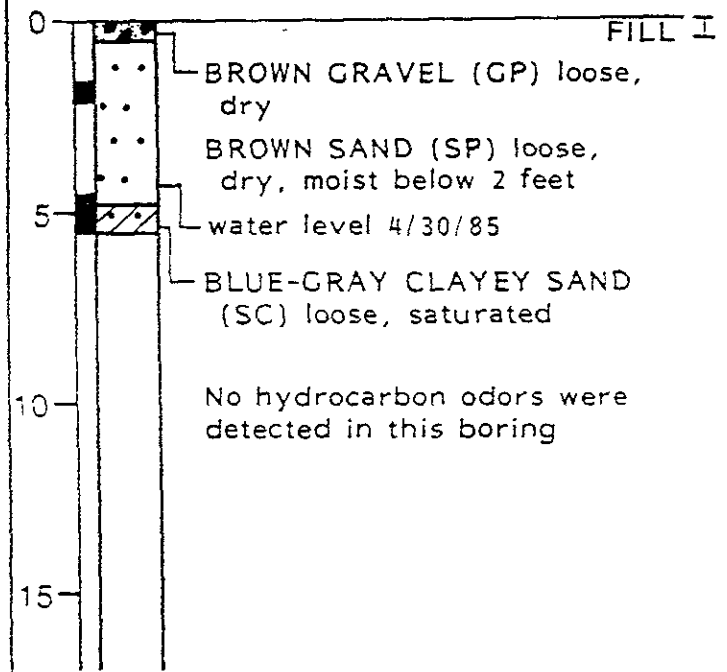
Elevation — Date 4/30/85



LOG OF BORING SB-3

Equipment 8" Hollow Stem Auger

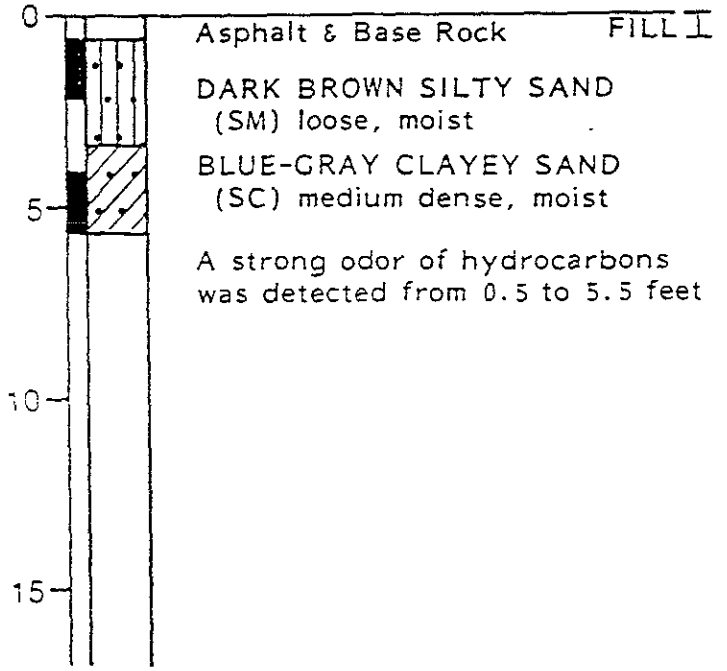
Elevation — Date 4/30/85



LOG OF BORING SB-4

Equipment 8" Hollow Stem Auger

Elevation — Date 4/30/85



Harding Lawson Associates
Engineers Geologists & Geophysicists

Log of Borings SB-1, SB-2, SB-3, SB-4
King Petroleum
Alameda, California

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED
JGL	4167.076.12	R. Fowler	5/85	

003

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS (MORE THAN HALF IS LARGER 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 GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS GRAVEL SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS (MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO 4 SIEVE SIZE)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS GRAVELLY SANDS
			SP	POORLY GRADED SANDS GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS POORLY GRADED SAND SILT MIXTURES
			SC	CLAYEY SANDS POORLY GRADED SAND-CLAY MIXTURES
FINE-GRAINED SOILS (MORE THAN HALF IS SMALLER THAN NO 200 SIEVE)	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		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 CLAYS AND ORGANIC SILTY 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 SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS ELASTIC SILTS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

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 Geologists & Geophysicists

Unified Soil Classification Chart and Key to Test Data
King Petroleum
Alameda, California

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JGL	4167.076.12	R. Fowler	5/85		

V TABLES

Table 1. Concentrations of Chemicals in Ground-Water Samples

EAL Corporation

Thermo Electron CORPORATION

2030 Wright Avenue
Richmond, California 94804
(415) 235-2633
(TWX) 910-382-8132

Harding Lawson
P.O. Box 578
Novato, CA 94947
Attention: Ron Stoufer

Date: May 23, 1985
EAL Lab No.: 255-136-1R
Client I.D.: W-3 Water
Job No.: 4167,076.12

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/L(ppb)	VOLATILES	ug/L(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	< 1	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Bennett J. Tyson
Program Manager

BJT/dss

Harding Lawson

Date: May 28, 1985
EAL Lab No.: 255-136-1
Client I.D.: W-3 Water

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/L(ppb)	COMPOUNDS	ug/L(ppb)
2,4,6-trichlorophenol	<1	hexachlorobutadiene	<1
p-chloró-m-cresol	<1	hexachlorocyclopentadiene	<1
2-chlorophenol	<1	isophorone	<1
2,4-dichlorophenol	<1	naphthalene	<1
2,4-dimethylphenol	<1	nitrobenzene	<1
2-nitrophenol	<1	N-nitrosodiphenylamine	<1
4-nitrophenol	<5	N-nitrosodipropylamine	<1
2,4-dinitrophenol	<5	bis(2-ethylhexyl)phthalate	<1
4,6-dinitro-2-methylphenol	<5	benzyl butyl phthalate	<1
pentachlorophenol	<5	di-n-butyl phthalate	<1
phenol	<1	di-n-octyl phthalate	<1
acenaphthene	<1	diethyl phthalate	<1
benzidine	<5	dimethyl phthalate	<1
1,2,4-trichlorobenzene	<1	benzo(a)anthracene	<1
hexachlorobenzene	<1	benzo(a)pyrene	<1
hexachloroethane	<1	benzo(b)fluoranthene	<1
bis(2-chloroethyl)ether	<1	benzo(k)fluoranthene	<1
2-chloronaphthalene	<1	chrysene	<1
1-2-dichlorobenzene	<1	acenaphthylene	<1
1,3-dichlorobenzene	<1	anthracene	<1
1,4-dichlorobenzene	<1	benzo(ghi)perylene	<1
3,3'-dichlorobenzidine	<2	fluorene	<1
2,4-dinitrotoluene	<1	phenanthrene	<1
1,2-diphenylhydrazine	<1	dibenzo(a,h)anthracene	<1
4-chlorophenyl phenyl ether	<1	indeno(1,2,3-cd)pyrene	<1
bis(2-chloroisopropyl)ether	<1	pyrene	<1
fluoranthene	<1	2,6-dinitrotoluene	<1
bis(2-chloroethoxy)methane	<1	4-bromophenyl phenyl ether	<1

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-2
Client I.D.: W-4 Water

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/L(ppb)	VOLATILES	ug/L(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	< 1	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 28, 1985
EAL Lab No.: 255-136-2
Client I.D.: W-4 Water

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/L(ppb)	COMPOUNDS	ug/L(ppb)
2,4,6-trichlorophenol	<1	hexachlorobutadiene	<1
p-chloro-m-cresol	<1	hexachlorocyclopentadiene	<1
2-chlorophenol	<1	isophorone	<1
2,4-dichlorophenol	<1	naphthalene	<1
2,4-dimethylphenol	<1	nitrobenzene	<1
2-nitrophenol	<1	N-nitrosodiphenylamine	<1
4-nitrophenol	<5	N-nitrosodipropylamine	<1
2,4-dinitrophenol	<5	bis(2-ethylhexyl)phthalate	<1
4,6-dinitro-2-methylphenol	<5	benzyl butyl phthalate	<1
pentachlorophenol	<5	di-n-butyl phthalate	<1
phenol	<1	di-n-octyl phthalate	<1
acenaphthene	<1	diethyl phthalate	<1
benzidine	<5	dimethyl phthalate	<1
1,2,4-trichlorobenzene	<1	benzo(a)anthracene	<1
hexachlorobenzene	<1	benzo(a)pyrene	<1
hexachloroethane	<1	benzo(b)fluoranthene	<1
bis(2-chloroethyl)ether	<1	benzo(k)fluoranthene	<1
2-chloronaphthalene	<1	chrysene	<1
1-2-dichlorobenzene	<1	acenaphthylene	<1
1,3-dichlorobenzene	<1	anthracene	<1
1,4-dichlorobenzene	<1	benzo(ghi)perylene	<1
3,3'-dichlorobenzidine	<2	fluorene	<1
2,4-dinitrotoluene	<1	phenanthrene	<1
1,2-diphenylhydrazine	<1	dibenzo(a,h)anthracene	<1
4-chlorophenyl phenyl ether	<1	indeno(1,2,3-cd)pyrene	<1
bis(2-chloroisopropyl)ether	<1	pyrene	<1
fluoranthene	<1	2,6-dinitrotoluene	<1
bis(2-chloroethoxy)methane	<1	4-bromophenyl phenyl ether	<1

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-3
Client I.D.: SW-2 Water

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/L(ppb)	VOLATILES	ug/L(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	< 1	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 28, 1985
EAL Lab No.: 255-136-3
Client I.D.: SW-2 Water

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/L(ppb)	COMPOUNDS	ug/L(ppb)
2,4,6-trichlorophenol	<1	hexachlorobutadiene	<1
p-chloro-m-cresol	<1	hexachlorocyclopentadiene	<1
2-chlorophenol	<1	isophorone	<1
2,4-dichlorophenol	<1	naphthalene	<1
2,4-dimethylphenol	<1	nitrobenzene	<1
2-nitrophenol	<1	N-nitrosodiphenylamine	<1
4-nitrophenol	<5	N-nitrosodipropylamine	<1
2,4-dinitrophenol	<5	bis(2-ethylhexyl)phthalate	<1
4,6-dinitro-2-methylphenol	<5	benzyl butyl phthalate	<1
pentachlorophenol	<5	di-n-butyl phthalate	<1
phenol	<1	di-n-octyl phthalate	<1
acenaphthene	<1	diethyl phthalate	<1
benzidine	<5	dimethyl phthalate	<1
1,2,4-trichlorobenzene	<1	benzo(a)anthracene	<1
hexachlorobenzene	<1	benzo(a)pyrene	<1
hexachloroethane	<1	benzo(b)fluoranthene	<1
bis(2-chloroethyl)ether	<1	benzo(k)fluoranthene	<1
2-chloronaphthalene	<1	chrysene	<1
1-2-dichlorobenzene	<1	acenaphthylene	<1
1,3-dichlorobenzene	<1	anthracene	<1
1,4-dichlorobenzene	<1	benzo(ghi)perylene	<1
3,3'-dichlorobenzidine	<2	fluorene	<1
2,4-dinitrotoluene	<1	phenanthrene	<1
1,2-diphenylhydrazine	<1	dibenzo(a,h)anthracene	<1
4-chlorophenyl phenyl ether	<1	indeno(1,2,3-cd)pyrene	<1
bis(2-chloroisopropyl)ether	<1	pyrene	<1
fluoranthene	<1	2,6-dinitrotoluene	<1
bis(2-chloroethoxy)methane	<1	4-bromophenyl phenyl ether	<1

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-4
Client I.D.: Travel Blank Water

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/L(ppb)	VOLATILES	ug/L(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	1.7	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Table 2. Concentrations of Chemicals in Soil Samples

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-5
Client I.D.: W-4 Soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/kg(ppb)	VOLATILES	ug/kg(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	5	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 24, 1985
EAL Lab No.: 255-136-5
Client I.D.: W-4 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/kg(ppb)	COMPOUNDS	ug/kg(ppb)
2,4,6-trichlorophenol	<30	hexachlorobutadiene	<30
p-chloro-m-cresol	<30	hexachlorocyclopentadiene	<30
2-chlorophenol	<30	isophorone	<30
2,4-dichlorophenol	<30	naphthalene	<30
2,4-dimethylphenol	<30	nitrobenzene	<30
2-nitrophenol	<30	N-nitrosodiphenylamine	<30
4-nitrophenol	<150	N-nitrosodipropylamine	<30
2,4-dinitrophenol	<150	bis(2-ethylhexyl)phthalate	80
4,6-dinitro-2-methylphenol	<150	benzyl butyl phthalate	<30
pentachlorophenol	<150	di-n-butyl phthalate	1,900
phenol	<30	di-n-octyl phthalate	<30
acenaphthene	<30	diethyl phthalate	<30
benzidine	<150	dimethyl phthalate	<30
1,2,4-trichlorobenzene	<30	benzo(a)anthracene	<30
hexachlorobenzene	<30	benzo(a)pyrene	<30
hexachloroethane	<30	benzo(b)fluoranthene	<30
bis(2-chloroethyl)ether	<30	benzo(k)fluoranthene	<30
2-chloronaphthalene	<30	chrysene	<30
1-2-dichlorobenzene	<30	acenaphthylene	<30
1,3-dichlorobenzene	<30	anthracene	<30
1,4-dichlorobenzene	<30	benzo(ghi)perylene	<30
3,3'-dichlorobenzidine	<60	fluorene	<30
2,4-dinitrotoluene	<30	phenanthrene	<30
1,2-diphenylhydrazine	<30	dibenzo(a,h)anthracene	<30
4-chlorophenyl phenyl ether	<30	indeno(1,2,3-cd)pyrene	<30
bis(2-chloroisopropyl)ether	<30	pyrene	<30
fluoranthene	<30	2,6-dinitrotoluene	<30
bis(2-chloroethoxy)methane	<30	4-bromophenyl phenyl ether	<30

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-6
Client I.D.: SB-1 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/kg(ppb)	VOLATILES	ug/kg(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	21	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	15
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 24, 1985
EAL Lab No.: 255-136-6
Client I.D.: SB-1 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/kg(ppb)	COMPOUNDS	ug/kg(ppb)
2,4,6-trichlorophenol	<30	hexachlorobutadiene	<30
p-chloro-m-cresol	<30	hexachlorocyclopentadiene	<30
2-chlorophenol	<30	isophorone	<30
2,4-dichlorophenol	<30	naphthalene	<30
2,4-dimethylphenol	<30	nitrobenzene	<30
2-nitrophenol	<30	N-nitrosodiphenylamine	<30
4-nitrophenol	<150	N-nitrosodipropylamine	<30
2,4-dinitrophenol	<150	bis(2-ethylhexyl)phthalate	67
4,6-dinitro-2-methylphenol	<150	benzyl butyl phthalate	<30
pentachlorophenol	<150	di-n-butyl phthalate	970
phenol	<30	di-n-octyl phthalate	<30
acenaphthene	<30	diethyl phthalate	<30
benzidine	<150	dimethyl phthalate	<30
1,2,4-trichlorobenzene	<30	benzo(a)anthracene	<30
hexachlorobenzene	<30	benzo(a)pyrene	<30
hexachloroethane	<30	benzo(b)fluoranthene	<30
bis(2-chloroethyl)ether	<30	benzo(k)fluoranthene	<30
2-chloronaphthalene	<30	chrysene	<30
1-2-dichlorobenzene	<30	acenaphthylene	<30
1,3-dichlorobenzene	<30	anthracene	<30
1,4-dichlorobenzene	<30	benzo(ghi)perylene	<30
3,3'-dichlorobenzidine	<60	fluorene	<30
2,4-dinitrotoluene	<30	phenanthrene	<30
1,2-diphenylhydrazine	<30	dibenzo(a,h)anthracene	<30
4-chlorophenyl phenyl ether	<30	indeno(1,2,3-cd)pyrene	<30
bis(2-chloroisopropyl)ether	<30	pyrene	<30
fluoranthene	<30	2,6-dinitrotoluene	<30
bis(2-chloroethoxy)methane	<30	4-bromophenyl phenyl ether	<30

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-7
Client I.D.: SB-2 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/kg(ppb)	VOLATILES	ug/kg(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	6	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 24, 1985
EAL Lab No.: 255-136-7
Client I.D.: SB-2 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/kg(ppb)	COMPOUNDS	ug/kg(ppb)
2,4,6-trichlorophenol	<30	hexachlorobutadiene	<30
p-chloro-m-cresol	<30	hexachlorocyclopentadiene	<30
2-chlorophenol	<30	isophorone	<30
2,4-dichlorophenol	<30	naphthalene	<30
2,4-dimethylphenol	<30	nitrobenzene	<30
2-nitrophenol	<30	N-nitrosodiphenylamine	<30
4-nitrophenol	<150	N-nitrosodipropylamine	<30
2,4-dinitrophenol	<150	bis(2-ethylhexyl)phthalate	100
4,6-dinitro-2-methylphenol	<150	benzyl butyl phthalate	<30
pentachlorophenol	<150	di-n-butyl phthalate	700
phenol	<30	di-n-octyl phthalate	<30
acenaphthene	<30	diethyl phthalate	<30
benzidine	<150	dimethyl phthalate	<30
1,2,4-trichlorobenzene	<30	benzo(a)anthracene	<30
hexachlorobenzene	<30	benzo(a)pyrene	<30
hexachloroethane	<30	benzo(b)fluoranthene	<30
bis(2-chloroethyl)ether	<30	benzo(k)fluoranthene	<30
2-chloronaphthalene	<30	chrysene	<30
1-2-dichlorobenzene	<30	acenaphthylene	<30
1,3-dichlorobenzene	<30	anthracene	<30
1,4-dichlorobenzene	<30	benzo(ghi)perylene	<30
3,3'-dichlorobenzidine	<60	fluorene	<30
2,4-dinitrotoluene	<30	phenanthrene	<30
1,2-diphenylhydrazine	<30	dibenzo(a,h)anthracene	<30
4-chlorophenyl phenyl ether	<30	indeno(1,2,3-cd)pyrene	<30
bis(2-chloroisopropyl)ether	<30	pyrene	<30
fluoranthene	<30	2,6-dinitrotoluene	<30
bis(2-chloroethoxy)methane	<30	4-bromophenyl phenyl ether	<30

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-8
Client I.D.: SB-3 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/kg(ppb)	VOLATILES	ug/kg(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	8	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	< 1
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 24, 1985
EAL Lab No.: 255-136-8
Client I.D.: SB-3 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/kg(ppb)	COMPOUNDS	ug/kg(ppb)
2,4,6-trichlorophenol	<30	hexachlorobutadiene	<30
p-chloro-m-cresol	<30	hexachlorocyclopentadiene	<30
2-chlorophenol	<30	isophorone	<30
2,4-dichlorophenol	<30	naphthalene	<30
2,4-dimethylphenol	<30	nitrobenzene	<30
2-nitrophenol	<30	N-nitrosodiphenylamine	<30
4-nitrophenol	<150	N-nitrosodipropylamine	<30
2,4-dinitrophenol	<150	bis(2-ethylhexyl)phthalate	230
4,6-dinitro-2-methylphenol	<150	benzyl butyl phthalate	<30
pentachlorophenol	<150	di-n-butyl phthalate	1,100
phenol	<30	di-n-octyl phthalate	<30
acenaphthene	<30	diethyl phthalate	<30
benzidine	<150	dimethyl phthalate	<30
1,2,4-trichlorobenzene	<30	benzo(a)anthracene	<30
hexachlorobenzene	<30	benzo(a)pyrene	<30
hexachloroethane	<30	benzo(b)fluoranthene	<30
bis(2-chloroethyl)ether	<30	benzo(k)fluoranthene	<30
2-chloronaphthalene	<30	chrysene	<30
1-2-dichlorobenzene	<30	acenaphthylene	<30
1,3-dichlorobenzene	<30	anthracene	<30
1,4-dichlorobenzene	<30	benzo(ghi)perylene	<30
3,3'-dichlorobenzidine	<60	fluorene	<30
2,4-dinitrotoluene	<30	phenanthrene	<30
1,2-diphenylhydrazine	<30	dibenzo(a,h)anthracene	<30
4-chlorophenyl phenyl ether	<30	indeno(1,2,3-cd)pyrene	<30
bis(2-chloroisopropyl)ether	<30	pyrene	<30
fluoranthene	<30	2,6-dinitrotoluene	<30
bis(2-chloroethoxy)methane	<30	4-bromophenyl phenyl ether	<30

Harding Lawson

Date: May 23, 1985
EAL Lab No.: 255-136-9
Client I.D.: SB-4 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 624)

VOLATILES	ug/kg(ppb)	VOLATILES	ug/kg(ppb)
chloromethane	< 1	1,2-dichloropropane	< 1
bromomethane	< 1	trans-1,3-dichloropropene	< 1
vinyl chloride	< 1	trichloroethene	< 1
chloroethane	< 1	chlorodibromomethane	< 1
methylene chloride	12	1,1,2-trichloroethane	< 1
1,1-dichloroethene	< 1	benzene	< 1
1,1-dichloroethane	< 1	cis-1,3-dichloropropene	< 1
trans-1,2-dichloroethene	< 1	2-chloroethylvinyl ether	< 1
chloroform	< 1	bromoform	< 1
1,2-dichloroethane	< 1	tetrachloroethene	< 1
1,1,1-trichloroethane	< 1	toluene	< 1
carbon tetrachloride	< 1	chlorobenzene	< 1
bromodichloromethane	< 1	ethylbenzene	6
1,1,2,2,-tetrachloroethane	< 1		

Harding Lawson

Date: May 24, 1985
EAL Lab No.: 255-136-9
Client I.D.: SB-4 soil 5-5.5 feet

PRIORITY POLLUTANTS (EPA METHOD 625)

COMPOUNDS	ug/kg(ppb)	COMPOUNDS	ug/kg(ppb)
2,4,6-trichlorophenol	<30	hexachlorobutadiene	<30
p-chloro-m-cresol	<30	hexachlorocyclopentadiene	<30
2-chlorophenol	<30	isophorone	<30
2,4-dichlorophenol	<30	naphthalene	<30
2,4-dimethylphenol	<30	nitrobenzene	<30
2-nitrophenol	<30	N-nitrosodiphenylamine	<30
4-nitrophenol	<150	N-nitrosodipropylamine	<30
2,4-dinitrophenol	<150	bis(2-ethylhexyl)phthalate	400
4,6-dinitro-2-methylphenol	<150	benzyl butyl phthalate	<30
pentachlorophenol	<150	di-n-butyl phthalate	1,800
phenol	<30	di-n-octyl phthalate	<30
acenaphthene	<30	diethyl phthalate	<30
benzidine	<150	dimethyl phthalate	<30
1,2,4-trichlorobenzene	<30	benzo(a)anthracene	<30
hexachlorobenzene	<30	benzo(a)pyrene	<30
hexachloroethane	<30	benzo(b)fluoranthene	<30
bis(2-chloroethyl)ether	<30	benzo(k)fluoranthene	<30
2-chloronaphthalene	<30	chrysene	<30
1-2-dichlorobenzene	<30	acenaphthylene	<30
1,3-dichlorobenzene	<30	anthracene	<30
1,4-dichlorobenzene	<30	benzo(ghi)perylene	<30
3,3'-dichlorobenzidine	<60	fluorene	<30
2,4-dinitrotoluene	<30	phenanthrene	<30
1,2-diphenylhydrazine	<30	dibenzo(a,h)anthracene	<30
4-chlorophenyl phenyl ether	<30	indeno(1,2,3-cd)pyrene	<30
bis(2-chloroisopropyl)ether	<30	pyrene	<30
fluoranthene	<30	2,6-dinitrotoluene	<30
bis(2-chloroethoxy)methane	<30	4-bromophenyl phenyl ether	<30

Kennedy/Jenks Engineers

657 Howard Street
San Francisco California 94105
415-362-6065

30 May 1984

RECEIVED
JUN 1 1984
E. L. S.

Clean Air Technology
151 University Avenue
Suite 205
Palo Alto, CA 94301

Attn.: Ms. Patricia Barrentine

Subject: Final Report of Initial Site Investigation - King Petroleum, Inc. Property, Alameda, CA (K/J 4011)

Gentlemen:

Attached herewith is our final report on the initial investigation of the King Petroleum, Inc. property in Alameda, California for potential site contamination.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

KENNEDY/JENKS ENGINEERS, INC.

James F. Norton

James F. Norton

JFN/lh

Attachment

cc: Edward L. Strohbehn, Jr.
Orrick, Herrington & Sutcliffe

FINAL REPORT

INITIAL SITE INVESTIGATION OF THE KING PETROLEUM, INC. PROPERTY ALAMEDA, CALIFORNIA

Presented To

Ms. Patricia Barrentine
Chief Executive Officer
Clean Air Technology, Inc.
151 University Avenue
Suite 205
Palo Alto, California

28 May 1984

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INTRODUCTION

Mr. John Barni, a developer, plans to purchase the property of King Petroleum, Inc. in Alameda for construction of a multiple unit housing complex. The property, which is on the corner of Versailles and Fernside Avenues, has been used for several years as a bulk loading facility for gasoline, lubrication oils, and other petroleum products. The Planning Board of the City of Alameda requested that the soil and groundwater at the King Petroleum, Inc. property be tested for the presence of heavy metals and hydrocarbons prior to the Board's approval of the pending zoning change for the property.

Clean Air Technology, Inc. has retained Kennedy/Jenks Engineers for the sampling and analyzing of the soil and groundwater samples. King Petroleum, Inc. has retained Subsurface Consultants, Inc. to direct the soil test borings and prepare the geophysical logs for the test borings.

TECHNICAL APPROACH

Kennedy/Jenks Engineers originally proposed to collect and analyze three surface samples and one groundwater sample in order to assess the presence of heavy metals and toxic organic compounds on the King Petroleum, Inc. property. A composite of the three soil samples would be analyzed for polychlorinated biphenyls (PCBs) using EPA Method 608 and for 17 metals using an ICAP instrument (a modified EPA method). A groundwater sample was to be collected from an existing well on a property adjacent to the King Petroleum, Inc. property. The groundwater sample would be analyzed for purgeable halocarbons (EPA Method 601) and purgeable hydrocarbons (EPA Method 602).

Upon review of the proposed technical approach, the Director of the City of Alameda Planning Board requested that the three soil samples be taken at three feet below the ground surface. An additional soil sample was to be taken in the area and at the depth of the bottom of the previous underground tanks.

The field program for collection of the soil and groundwater samples was completed on March 5, 1984. Prior to the initiation of the soil borings, Subsurface Consultants, Inc. was directed to make deeper borings so that additional geotechnical information could be obtained for designing the future development for the site. The four soil borings were logged their entire depth (i.e., about 15 feet below the surface).

The test borings were drilled with 8-inch diameter, hollow stem auger equipment. Four soil borings were taken on the King Petroleum, Inc. property at the locations shown on Plate 1 of Appendix A.

The soil samples were obtained in 2.5-inch inside diameter brass liners using a modified California sampler having a 3.0-inch outside diameter. The sampler was driven by a 140 pound hammer with a 30-inch drop.

Test boring 1 was drilled on the northern edge of the area that Mr. King indicated as being the previous location of the underground tanks. From our discussion with Mr. Richard King, it is our understanding that Exxon Corporation had removed all underground tanks from the site in 1982. In discussions with the staff of Kennedy/Jenks Engineers on March 5, 1984, Mr. Richard King indicated that the bottoms of the tanks were approximately 12 feet below the ground surface (i.e., the tanks were eight feet in diameter and placed four feet below the ground surface). The soil sample was taken from boring 1 at the depth of 12.5 feet below the ground surface.

The soil samples were taken in borings 2, 3, and 4 at the depths of 3.0 feet, 3.5 feet, and 4.0 feet, respectively.

All downhole equipment was steam cleaned prior to drilling each boring. The sample liners were steam cleaned prior to use. The sample liners were promptly sealed and labeled after retrieval. Teflon sheeting was placed between the caps and the soil samples to minimize possible contamination of the samples. The caps were sealed with plastic tape. The chain-of-custody forms were filled out and the soil samples with the forms were given to Kennedy/Jenks Engineers staff that were on-site. The Kennedy/Jenks Engineers staff reviewed the chain-of-custody forms and placed the samples in a plastic cooler chest.

When boring 1 was completed, the subsurface water was observed to be within a few feet of the surface. At this time, Mr. King had not obtained verbal approval for Kennedy/Jenks Engineers to test the existing groundwater well just off-site of the King Petroleum, Inc. property. To ensure a sample of subsurface water was collected and analyzed for the King Petroleum, Inc. site, Kennedy/Jenks Engineers' staff decided to sample the surface waters in boring 1 even though the normal procedures recommended by the United States Environmental Protection Agency and the California Regional Water Quality Control Board for installation and development of groundwater monitoring wells could not be followed. The subsurface water was sampled from boring 1 with a Kemmerer sampler within a few minutes of completion of the boring. The unfiltered subsurface water sample was

submerged-filled into four vials. A Teflon septum was placed on the vials and the vials were capped so that there was no air space above the samples. The labeled vials were promptly placed into the plastic cooler, and the chain-of-custody form was filled out. The Kemmerer sampler and the other downhole equipment was steam cleaned prior to being lowered into the boring.

Just before the last boring was finished, Mr. King informed the Kennedy/Jenks Engineers staff that the owner of the adjacent property with the existing groundwater well was available so that the well could be sampled. (See Drawing 1 for location of the well.) According to the owner, he had constructed the well by pumping sandy water out of the well through a long PVC pipe. He estimated the well to be about 30 feet deep. The well was pumped for about five minutes using the owner's pump and piping system. A water sample was pumped from the well with the owner's pump into four sample vials. The vials were capped using the procedure described above and placed into the plastic cooler.

All the borings except boring 4 were backfilled with the cuttings from the borings as soon as the soil and (the subsurface water) samples were taken. Boring 4 was left open for one day so that the level of the subsurface water could equilibrate in the boring.

The soil and groundwater samples were brought back to the laboratory for analysis.

RESULTS

The King Petroleum, Inc. site is essentially level and mostly covered concrete pavement. Several buildings and abandoned tank pads are on the site as shown in Drawing 1, Site Plan.

The test borings encountered medium dense to dense clayey sands of the Merritt Formation. The upper seven feet of boring 1, the upper two feet of boring 2, the upper three to four feet of boring 3, and the upper two feet of boring 4 were dark gray and had a strong petroleum odor. Below these depths the soil changed to blue-gray and did not possess the petroleum odor. See Subsurface Consultants, Inc. report in Appendix A.

Because of the strong petroleum odor of the upper soils at the King Petroleum, Inc. property, the soil sample from boring 3, which was collected from the upper soils, was analyzed for purgeable halocarbons (EPA Method 601) and purgeable hydrocarbons (EPA Method 602). No purgeable halocarbons were detected in the sample. However, the sample contained 350 µg/kg of ben-

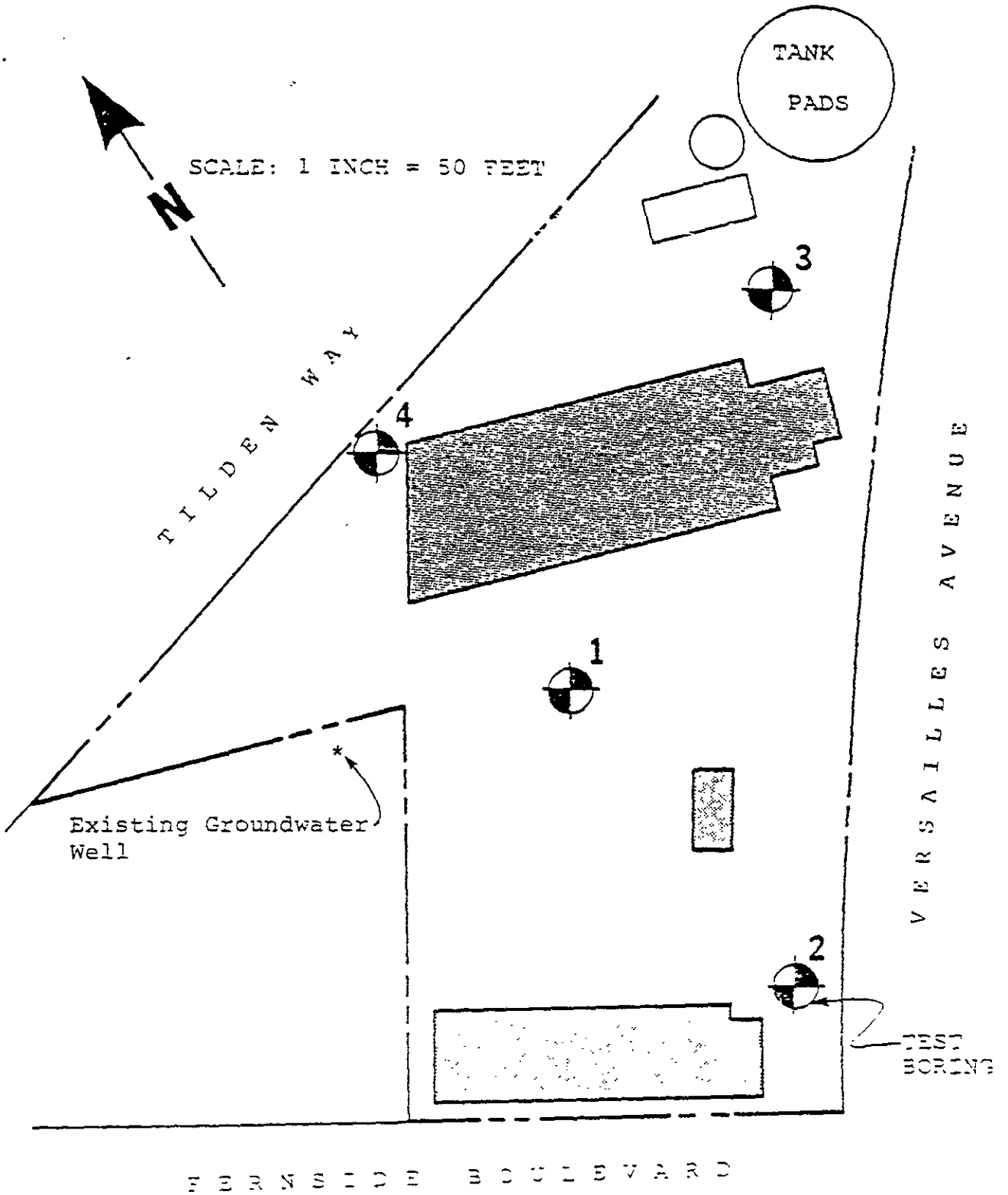
zene, and 640 µg/kg of ethylbenzene. Numerous other compounds were observed on the chromatograph for the sample, but were not identified by EPA Method 602 (See Table 1.)

The groundwater appears to be within a few feet of the ground surface of the King Petroleum, Inc. site. Prior to flushing the well adjacent to the King Petroleum property, the water surface in the well was within a few feet of the ground surface. After one day of drilling boring 4, the groundwater was within two feet of the top of the boring.

No purgeable halocarbons were found in the subsurface water sample collected from boring 1. However, 29 µg/l (ppb) of benzene was measured in the subsurface water sample.

No purgeable halocarbons or hydrocarbons were found in the groundwater sample from the off-site well to the west of the property.

Table 2 presents the measured concentrations of 17 metals for which the soil sample from boring 1 and the composite sample from the soil samples of borings 2, 3, and 4 were tested. No PCBs were detected in the samples from boring 1 and the composite sample (see Table 2).



SITE MAP

KING PETROLEUM FACILITY- ALAMEDA

JOB NUMBER	DATE	APPROVED
120.001	3/9/84	

PLATE

TABLE 1

BORING 3
SOIL SAMPLE
PURGEABLE HYDROCARBON ANALYSES[1]

HYDROCARBON	CONCENTRATION[2] (ug/kg)
Benzene	350
Chlorobenzene	<5
1,2-Dichlorobenzene	<5
1,3-Dichlorobenzene	<5
1,4-Dichlorobenzene	<5
Ethylbenzene	640
Toluene	<5

[1] Analysis by EPA Method 602 (purgeable aromatics).

[2] The chromatograph showed numerous unidentified peaks.

TABLE 2

SOIL METAL AND
POLYCHLORINATED BIPHENYL ANALYSES

METAL	MEASURED CONCENTRATION (mg/kg)[1] BORING 1	COMPOSITE SAMPLE[2]
Arsenic	<2	<2
Antimony	<5	<5
Barium	63	110
Beryllium	0.18	0.23
Cadmium	0.29	0.39
Chromium (T)	53	36
Cobalt	8.6	3.8
Copper	110	20
Lead	<1	<1
Mercury	0.1	0.1
Nickel	50	52
Selenium	<0.5	<0.5
Silver	<1	<1
Thallium	<2	<2
Vanadium	15	17
Zinc	93	27
Polychlorinated biphenyls	<1.0	<1.0

[1]Milligram per kilogram, wet weight (as received)
[2]Equal weight composite of the soil samples from borings 1, 3, and 4.

March 20, 1984
SCI 120.001

Mr. James F. Norton
Kennedy/Jenks Engineers
657 Howard Street,
San Francisco, California 94105

Report
Geotechnical Services
King Petroleum Facility
Alameda, California

Dear Mr. Norton,

This letter records the results of our geotechnical engineering services for Kennedy/Jenks Engineers' initial site assessment of the King Petroleum facility in Alameda, California. The project is located at 2100 Versailles Avenue. The location of the site in relation to nearby streets is shown on Plate 1, Site Plan. We understand that the site will eventually be developed as a multi unit housing tract. Because of the site's past history as a petroleum products bulk storage facility, having both above and below ground storage tanks, the Alameda Zoning Board has requested that a soil and groundwater investigation be performed.

The scope of our services initially consisted of drilling four, shallow test borings to obtain soil samples at depths of about 3 feet at three locations and at about 12 feet at one other location. During our investigation, the scope of our services was expanded to include deeper test borings to provide soil information for future site development. However, developing conclusions and design recommendations for future development were excluded from our current scope of services.

Field Investigation

The test borings were drilled using 8-inch-diameter, hollow stem auger equipment. Test boring locations and sample depths were specified by Mr. James Norton of Kennedy/Jenks Engineers. Our field engineer observed drilling operations, logged the soils encountered and obtained soil samples. The samples were obtained in 2.5 inch diameter brass liners using a Modified California Drive Sampler having a 3.0 inch outside diamater. The sampler was driven by a 140 pound hammer with a 30 inch drop. The blow counts required to drive the sampler were

recorded and are presented on the Logs of Test Borings, Plates 2 and 3. The liners were promptly sealed with plastic caps after sample retreival. Teflon sheeting was placed between the caps and the soil samples to minimize the likelihood of sample contamination. Finally, the caps were sealed with plastic tape. Upon completion of drilling, the appropriate soil samples and chain of custody records were given to an on-site representative of Kennedy/Jenks Engineers.

The sampler, sample tubes and augers were steam cleaned prior to their initial use. The sampler and augers were again steam cleaned before each subsequent use.

Upon completion of drilling, all test borings, were backfilled with soil cuttings generated by drilling. Test Boring 4 was left open for several days so that a stabilized water level could be measured.

Site and Subsurface Conditions

The site is essentially level and covered by asphalt concrete pavement. Several buildings and tank pads also exist on site; their locations are shown on the Site Plan, Plate 1.

The test borings encountered medium dense to dense clayey sands of the Merritt Formation. These materials extended to the bottom of the test borings. The upper 7 feet of soil in Boring 1 and upper 2 to 4 feet in Borings 2 through 4 was dark gray in color and had a strong petroleum odor. Below this surface layer, the soils changed color to gray-brown and did not possess a petroleum odor. All of the soils contained significant quantities of silt and clay, and generally became dense with depth.

Groundwater was encountered in Test Boring 4 at a depth of about 2 feet. We judge that this water level is characteristic of conditions throughout the site.

If you have any questions regarding our services, please call.

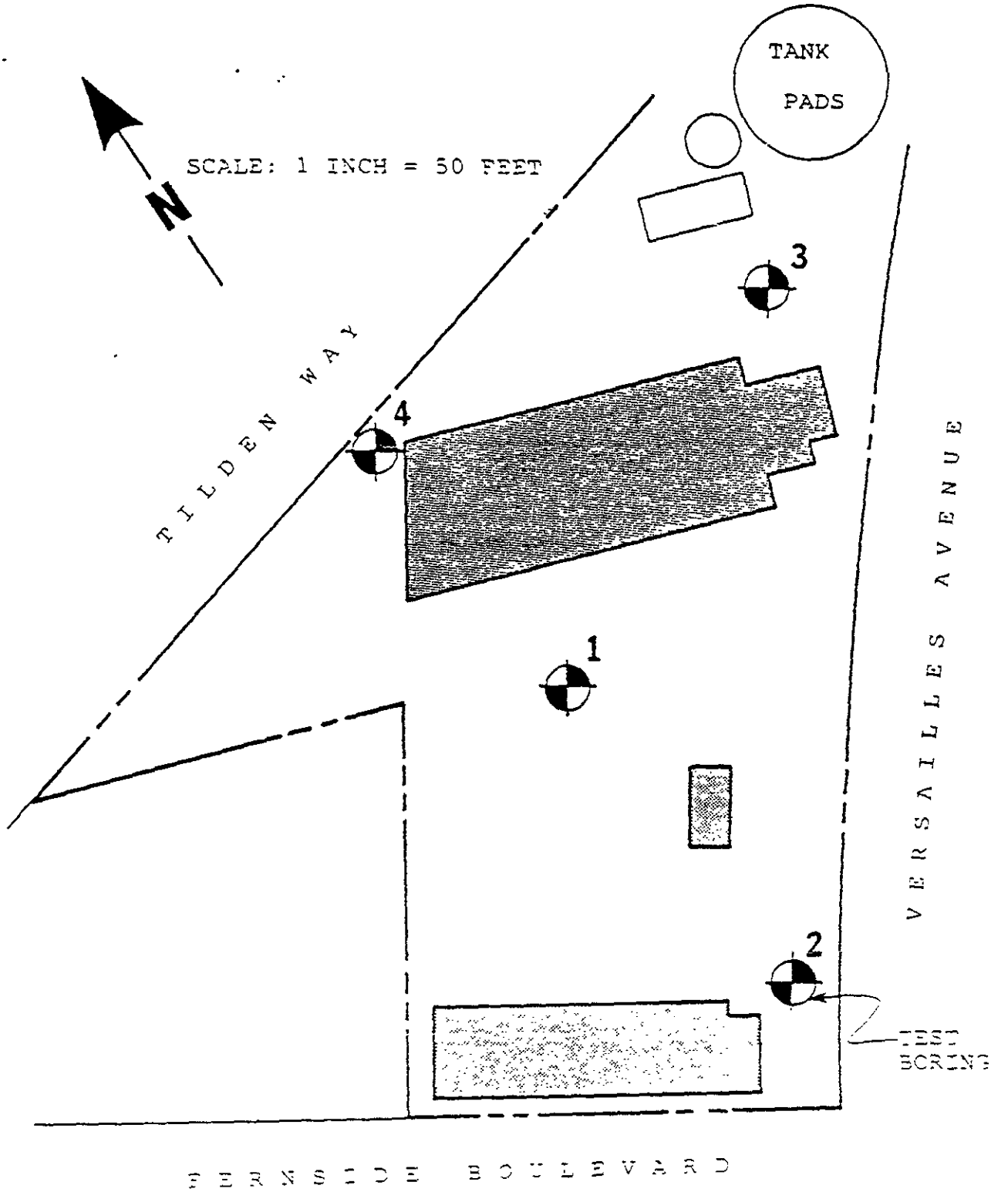
Very truly yours,
Subsurface Consultants, Inc.

James P. Bowers
Civil Engineer 28962

Attachments: Plates 1 thru 3

cc: King Petroleum, Inc.
Attention: Mr. Richard King

RWR/JB/lb



SITE PLAN

Subsurface Consultants

KING PETROLEUM FACILITY- ALAMEDA

JOB NUMBER	DATE	APPROVED
120.001	3/9/84	

PLATE 1

LOG OF TEST BORING 1

EQUIPMENT 8" Hollow Auger
DATE DRILLED 3/5/84
ELEVATION*

LABORATORY TESTS	MOISTURE CONTENT %	DRY DENSITY (PCF)	DEPTH (FT)	SAMPLE	BLOWS PER FOOT	
			0			DARK GREY CLAYEY SAND (SC) medium dense, moist, strong odor of petroleum
			5			color change to mottled grey brown, becomes dense
			10		45	boring was backfilled prior to obtaining a stabilized water level
			15			

SAMPLER OD: 3 INCHES
SAMPLER ID: 2.5 INCHES

HAMMER WEIGHT: 140 LBS.
HAMMER DROP: 30 INCHES

*BORING ELEVATIONS WERE NOT MEASURED; HOWEVER, THEY ARE JUDGED THE SAME FOR ALL BORINGS

LOG OF TEST BORING 2

EQUIPMENT 8" Hollow Auger
DATE DRILLED 3/5/84
ELEVATION*

LABORATORY TESTS	MOISTURE CONTENT %	DRY DENSITY (PCF)	DEPTH (FT)	SAMPLE	BLOWS PER FOOT	
			0			DARK GREY CLAYEY SAND (SC) medium dense, moist, strong petroleum odor
					21	MOTTLED GREY BROWN CLAYEY SAND (SC) medium dense, moist
			5			
					21	
			10			boring was backfilled prior to obtaining a stabilized water level
			15		60+	becomes dense

Subsurface Consultants

KING PETROLEUM FACILITY-ALAMEDA

JOB NUMBER	DATE	APPROVED
120..001	3/12/84	WB

PLATE 2

LOG OF TEST BORING 3

EQUIPMENT 8" Hollow Auger
DATE DRILLED 3/5/84
ELEVATION *

LABORATORY TESTS	MOISTURE CONTENT %	DRY DENSITY (PCF)	DEPTH (FT)	SAMPLE	BLOWS PER FOOT	
			0			DARK GREY CLAYEY SAND (SC) medium dense, moist
					26	
			5			MOTTLED GREY BROWN CLAYEY SAND (SC) medium dense, moist
					27	
			10			
			15		54	becomes dense and less clayey

SAMPLER OD: 3 INCHES
SAMPLER ID: 2.5 INCHES

HAMMER WEIGHT: 140 LBS.
HAMMER DROP: 30 INCHES

boring was backfilled prior to obtaining stabilized water level

LOG OF TEST BORING 4

EQUIPMENT 8" Hollow Auger
DATE DRILLED 3/5/84
ELEVATION *

LABORATORY TESTS	MOISTURE CONTENT %	DRY DENSITY (PCF)	DEPTH (FT)	SAMPLE	BLOWS PER FOOT	
			0			3 INCHES ASPHALT 15 INCHES GRAVEL BLACK CLAYEY SAND (SC) loose, moist, strong petroleum odor
					13	
			5			MOTTLED GREY BROWN CLAYEY SAND (SC) medium dense, moist groundwater, 3/12/84
					23	
			10			becomes dense
					90	becomes less clayey
			15			

Subsurface Consultants

KING PETROLEUM FACILITY-ALAMEDA

JOB NUMBER	DATE	APPROVED	PLATE
120.001	3/12/84		3

Soil Analysis Report

Kennedy/Jenks Engineers
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065 495-6627

Received 3/5/84
Reported 3/26/84

For Attention Address: Kennedy/Jenks Engineers
J. F. Norton
657 Howard Street
San Francisco, CA 94105

Lab. No.		84694	84695-7
Source King Petroleum Alameda, CA	Boring: Depth:	#1 12.5'	#2, #3, & #4 (1) -
Date Collected		3/5/84	3/5/84
Time Collected		0930	0945-1110
Collected by		Subsurface Consultants, Inc.	

Analysis	Units	Analytical Results	
Arsenic (As)	mg/Kg(2)	<2	<2
Antimony (Sb)	mg/Kg(2)	<5	<5
Barium (Ba)	mg/Kg(2)	63	110
Beryllium (Be)	mg/Kg(2)	0.18	0.23
Cadmium (Cd)	mg/Kg(2)	0.29	0.39
T. Chromium (Cr)	mg/Kg(2)	53	36
Cobalt (Co)	mg/Kg(2)	8.6	3.8
Copper (Cu)	mg/Kg(2)	110	20
Lead (Pb)	mg/Kg(2)	<1	<1
Mercury (Hg)	mg/Kg(2)	0.1	0.1
Molybdenum (Mo)	mg/Kg(2)	<2	<2
Nickel (Ni)	mg/Kg(2)	50	52
Selenium (Se)	mg/Kg(2)	<0.5	<0.5
Silver (Ag)	mg/Kg(2)	<1	<1
Thallium (Tl)	mg/Kg(2)	<2	<2
Vanadium (V)	mg/Kg(2)	15	17
Zinc (Zn)	mg/Kg(2)	93	27
Polychlorinated Biphenyls (PCBs)	mg/Kg(2)	<1.0	<1.0
Total Solids	%	84.9	83.3

Comments:

(1) Equal weight composite of Boring #2 @ 3 ft, Boring #3 @ 3.5 ft and Boring #4 @ 4 ft.
(2) Milligrams per Kilogram, Wet Weight (as received) basis

cc: T. G. Erler, Kennedy/Jenks Engineers, Inc.

Analyst CAL, JW Manager Leverett R. Smith

Kennedy/Jenks Engineers, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-495-6627

Received 3/5/84
Reported 3/26/84

Soil Analysis Report

For Kennedy/Jenks Engineers
657 Howard Street, San Francisco, CA 94105
Attention: J. F. Norton

Lab.No.:		84696
Source:	King Petroleum Alameda, CA	Boring #3
Treatment:		Depth 3.5 ft
Date Collected:		3/5/84
Time Collected:		1110
Collected by:		Subsurface Consultants, Inc.

Analysis	Units *	Analytical Results
PURGEABLES		
Carbon Tetrachloride	ug/Kg	<2
1,2-Dichloroethane	ug/Kg	<2
1,1,1-Trichloroethane	ug/Kg	<2
1,1-Dichloroethane	ug/Kg	<2
1,1,2,-Trichloroethane	ug/Kg	<2
1,1,2,2-Tetrachloroethane	ug/Kg	<2
2-Chloroethylvinyl ether	ug/Kg	<2
Chloroform	ug/Kg	<2
1,1-Dichloroethene	ug/Kg	<2
Trans-1,2-dichloroethene	ug/Kg	<2
1,2-Dichloropropane	ug/Kg	<2
Trans-1,3-dichloropropene	ug/Kg	<2
cis-1,3-Dichloropropene	ug/Kg	<2
Methylene Chloride	ug/Kg	<2
Bromoform	ug/Kg	<2
Bromodichloromethane	ug/Kg	<2
Fluorotrichloromethane	ug/Kg	<2
Chlorodibromomethane	ug/Kg	<2
Tetrachloroethene	ug/Kg	<2
Trichloroethene	ug/Kg	<2
1,1,2-Trichloro-1,2,2-trifluoroethane(1)	ug/Kg	<2

Comments: Analysis by EPA Method 601, Purgeable Halocarbons.
* Micrograms per Kilogram, Wet (as received) Weight Basis

cc: T. G. Erler, Kennedy/Jenks Engineers

Analyst JW

Manager Leverett R. Smith

Kennedy/Jenks Engineers, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-495-6627

Received 3/5/84
Reported 3/26/84

Soil Analysis Report

For Kennedy/Jenks Engineers
657 Howard Street, San Francisco, CA 94105
Attention: J. F. Norton

Lab.No.:		84696
Source:	King Petroleum, Alameda, CA	Boring #3 Depth 3.5 ft
Date Collected:		3/5/84
Time Collected:		1110
Collected by:		Subsurface Consultants, Inc.

Analysis	Units *	Analytical Results
PURGEABLES		
Benzene (1)	ug/Kg	350
Chlorobenzene (1)	ug/Kg	<5
1,2-Dichlorobenzene (1)	ug/Kg	<5
1,3-Dichlorobenzene (1)	ug/Kg	<5
1,4-Dichlorobenzene (1)	ug/Kg	<5
Ethylbenzene (1)	ug/Kg	640
Toluene (1)	ug/Kg	<5

Comments: (1) Analysis by EPA Method 602 (Purgeable Aromatics).

Note:
The chromatogram showed numerous unidentifiable peaks.

cc: T. G. Erler, Kennedy/Jenks Engineers

Analyst JW

Manager Everett R. Smith

Kennedy/Jenks Engineers, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-495-6627

Received 3/5/84
Reported 3/26/84

Groundwater Analysis Report

For Kennedy/Jenks Engineers
657 Howard Street, San Francisco, CA 94105
Attention: J. F. Norton

Lab.No.:		84698	84699
Source:		Boring #1 Groundwater	Off-site Well #1 Groundwater
Date Collected:		3/5/84	3/5/84
Time Collected:	Grab:	0945	1200
Collected by:		T. Holsen	

Analysis	Units *	Analytical Results	
PURGEABLES			
Carbon Tetrachloride	ug/L	<2	<2
1,2-Dichloroethane	ug/L	<2	<2
1,1,1-Trichloroethane	ug/L	<2	<2
1,1-Dichloroethane	ug/L	<2	<2
1,1,2,-Trichloroethane	ug/L	<2	<2
1,1,2,2-Tetrachloroethane	ug/L	<2	<2
2-Chloroethylvinyl ether	ug/L	<2	<2
Chloroform	ug/L	<2	<2
1,1-Dichloroethene	ug/L	<2	<2
Trans-1,2-dichloroethene	ug/L	<2	<2
1,2-Dichloropropane	ug/L	<2	<2
Trans-1,3-dichloropropene	ug/L	<2	<2
cis-1,3-Dichloropropene	ug/L	<2	<2
Methylene Chloride	ug/L	<2	<2
Bromoform	ug/L	<2	<2
Bromodichloromethane	ug/L	<2	<2
Fluorotrichloromethane	ug/L	<2	<2
Chlorodibromomethane	ug/L	<2	<2
Tetrachloroethene	ug/L	<2	<2
Trichloroethene	ug/L	<2	<2
1,1,2-Trichloro-1,2,2-trifluoroethane(1)	ug/L	<2	<2

Comments: Analysis by EPA Method 601, Purgeable Halocarbons.
Sample No. 84698 showed numerous unidentifiable peaks on the purgeables chromatogram.

cc: T. G. Erler, Kennedy/Jenks Engineers

Analyst JW

Manager Everett R. Smith

Kennedy/Jenks Engineers, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-495-6627

Received 3/5/84
Reported 3/26/84

Soil Analysis Report

For Kennedy/Jenks Engineers
657 Howard Street, San Francisco, CA 94105
Attention: J. F. Norton

Lab.No.:		84698	84699
Source:		Boring #1 Groundwater	Off-site Well #1 Groundwater
Date Collected:		3/5/84	3/5/84
Time Collected:	Grab:	0945	1200
Collected by:		T. Holsen	

Analysis	Units *	Analytical Results	
PURGEABLES			
Benzene (1 and 2)	ug/L	29	<2
Chlorobenzene (2)	ug/L	<2	<2
1,2-Dichlorobenzene (2)	ug/L	<2	<2
1,3-Dichlorobenzene (2)	ug/L	<2	<2
1,4-Dichlorobenzene (2)	ug/L	<2	<2
Ethylbenzene (2)	ug/L	<2	<2
Toluene (1 and 2)	ug/L	<2	<2

Comments: (1) Analysis by EPA Method 601 (Purgeable Halocarbons).
(2) Analysis by EPA Method 602 (Purgeable Aromatics).

cc: T. G. Erler, Kennedy/Jenks Engineers

Analyst JW

Manager Leverett R. Smith

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

GEORGE DEUKMEJIAN, Governor

Phone: Area Code 415
464-1255

July 2, 1985

File No. 2199.9225(RHC)

Donald J. Wolosenka, Counsel
Exxon Company, U.S.A.
P.O. Box 2180
Houston, Texas 77001

Dear Mr. Wolosenka,

This is in reference to your letter of June 6, 1985 and the Harding Lawson Associates report,"Subsurface Investigation Phase 2, King Petroleum, Alameda, California" dated June 4, 1985.

We have reviewed the above correspondence and feel that this case should be closed. This conclusion is based on the absence of groundwater contamination in three monitoring wells sampled on May 1, 1985. These wells showed no detectable concentrations of volatile, acid extractable and base/neutral extractable organic chemicals. I do request however, that the monitoring wells be properly abandoned and that this be accomplished by July 19, 1985. Please submit a letter to me by July 29th stating that this activity has been completed.

We have appreciated your cooperation during this subsurface investigation of the King Petroleum, Inc. property located at 2001 Versailles Avenue in Alameda, California.

If you have any questions in regard to this matter please contact Ronald Clawson at (415) 464-0825.

Sincerely,

Roger B. James
Executive Officer

cc: Howard Hatayama, DOHS, Toxics
Cliff Bowen, DOHS, Sanitary Engineering
Jack Lindley, Alameda County Flood Control and Water Conservation District
Arnold Jonas, City of Alameda
Fred Anderson, Exxon Company, U.S.A.
Richard King, King Petroleum, Inc.
Tim Walker, Orrick, Herrington & Sutcliffe
L.E. Thompson, Fitzgerald, Abbott & Beardley