A Report Prepared for

Blue Print Service Company
149 Second Street
San Francisco, California 94105

OFF-SITE HYDROGEOLOGIC INVESTIGATION
CITY BLUE PRODUCTION FACILITY SITE
17TH AND JEFFERSON STREETS
OAKLAND, CALIFORNIA

HLA Job No. 18106,004.04

Nov 28, 88

by

Robert G. Breynaert
Hydrogeologist

Mark G. Filippini
Engineering Geologist

Harding Lawson Associates
666 Howard Street, Third Floor
San Francisco, California 94105
415/543-8422

November 28, 1988

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I INTRODUCTION

This report presents ground-water chemical analysis results and describes construction methods of Monitoring Well MW-5. Harding Lawson Associates (HLA) installed MW-5 approximately 170 feet north of the City Blue Production Facility in Oakland, California. Installation of off-site well MW-5 was originally proposed by HLA in a letter submitted to the Alameda County Environmental Health Services Department on November 16, 1988.

The City Blue Production facility is located at 1700 Jefferson Street in Oakland, California (Plate 1). Before construction of the City Blue facility, the site was surfaced with asphalt pavement, except in the southwest corner, where a small service station was located. During construction, the service station was demolished and its three buried gasoline tanks removed. Two of the buried tanks had a 1000-gallon capacity and the other had a 550-gallon capacity. The buried fuel lines connecting the tanks with the pump island were also removed. Construction of the City Blue facility began in December 1987 and was completed in July 1988. The building is located on the eastern two-thirds of the property, with an asphalt-paved parking lot covering the land occupied by the former gas station and associated underground tanks. The objectives of this technical report are to:

1. Interpret the off-site geologic conditions and compare them to conditions encountered on-site
2. Evaluate the extent of free phase petroleum hydrocarbons measured within the four on-site and one off-site monitoring wells.
3. Estimate the direction of ground water using ground-water elevation data collected from on- and off-site wells

4. Assess the degree to which dissolved concentrations of petroleum hydrocarbons have migrated to the location of Well MW-5

5. Recommend additional tasks to characterize the off-site extent of chemicals in the ground water.

II BACKGROUND

In February of 1987, five soil borings were drilled as part of a preliminary hazardous waste assessment at the City Blue property. Two of the five soil borings were drilled to a depth of 30 feet adjacent to the three underground storage tanks used by the gas station formerly located on the northwestern portion of the property. Selected soil samples were analyzed for total petroleum hydrocarbons (TPH) using EPA Method 8015. TPH concentrations in the two borings ranged from 46 ppm to 3300 parts per million (ppm). The highest concentration values were detected approximately from 19 to 27 feet. The results from the soil borings, as well as from observations during the removal of the tanks, indicated that one or more of the tanks had released petroleum hydrocarbons.

During the tank excavation, the soil beneath the tanks was excavated to a depth of approximately 9 feet, aerated at the surface in accordance with Bay Area Air Quality Control Management District's Regulation 8, Rule 40, and used as backfill for the excavation. On June 24 and 25, 1987, three monitoring wells (MW-1, MW-2, and MW-3) were installed on the property to evaluate the distribution of petroleum hydrocarbons in the soil and ground water and determine the direction of ground-water movement.

Petroleum hydrocarbons, presumably gasoline or degraded gasoline, were found floating on the ground water in MW-1. Skimming of the floating gasoline has been taking place on a daily basis since early September 1987, with recovery of approximately 200 to 250 gallons of product. In January 1988, two additional monitoring wells (MW-1A and MW-4) were installed at the facility. Well MW-1A replaced MW-1, whose casing had failed due to prolonged contact with the floating product. MW-1 and MW-1A are currently being used for product recovery. MW-1 will be sealed during the cleanup program.

On May 25, 1988, a work plan was submitted that recommended an interim on-site soil and ground-water remediation plan. A soil venting system was recommended to remediate hydrocarbon concentrations present in the vadose zone. A product recovery/ground-water extraction system was also recommended as the ground-water remediation technique. At present, implementation of the proposed interim soil and ground-water remediation system is being reevaluated to accommodate the results from MW-5 that are discussed below.

III FIELD EXPLORATION

Monitoring Well M-5 was installed on August 15, 1988 in the sidewalk along 18th Street, approximately 40 feet east of Jefferson Street (Plate 1). The well location is approximately 170 feet north of the location of the former on-site underground storage tank area.

Prior to well installation, a Ground-Water Protection Ordinance Permit was obtained from the Alameda County Flood Control and Water Conservation District (Zone 7). The soil boring was drilled and the monitoring well installed according to Zone 7 and state regulatory protocol.

Monitoring Well M-5 was installed using a CME-45 truck-mounted drill rig equipped with an 8-inch-diameter, hollow-stem auger. Soil samples were obtained during drilling of the boring using a 2.3-inch-outside-diameter Sprague and Henwood (S&H) split-barrel sampler equipped with stainless steel liners. Samples were taken approximately every 5 feet. The soil samples were screened in the field for petroleum hydrocarbons using a Gastech 1314 HNU PID 101 (HNU). After collection, the liners were sealed on both ends with aluminum foil, plastic caps, and tape. Detailed descriptions of the materials encountered in the borings are presented on Plate 3. The boring log includes the results of HNU field screening. The soils were classified in the field by an HLA engineer in accordance with the ASTM Unified Soil Classification System outlined on Plate 2. To avoid cross contamination, augers were steam-cleaned prior to use on the site. After collection, the soil samples were placed on ice and delivered under chain-of-custody procedures to Curtis & Tompkins, Ltd., Laboratories for analysis.

After the soil boring was terminated at 41.5 feet below ground surface, a 2-inch-diameter PVC casing was lowered through the hollow-stem auger to a depth of 39 feet. The slotted portion of the casing extended from 19 feet below ground surface, 1 foot above the depth at which ground water was encountered, to 39 feet. A Lonestar Monterey No. 3 sand pack was tremied into position around the PVC casing from 39 to 18 feet, 1 foot above the top of the screen. Well MW-5 was sealed with 2 feet of bentonite pellets followed by cement-bentonite grout to the surface. Well completion details are given on Plate 4. The well casing elevation was surveyed by a licensed surveyor.

Following the well installation, ground-water samples were collected from Well MW-5 on August 17, 1988. The ground-water samples were analyzed for TPH using EPA Method 8015 and for volatile aromatic hydrocarbons using EPA Method 8020. A second round of sampling was performed on September 7, 1988. Before the samples were collected, Well MW-5 was purged of five casing volumes of ground water using a clean, stainless steel bailer. Ground-water samples were then obtained by decanting water into two sterile, volatile organic analysis (VOA) vials and two 1/2-liter brown glass bottles.

All sampling equipment was decontaminated in a solution of Alconox and tap water and rinsed in tap water before each sampling episode. After collection, the ground-water samples were placed on ice and delivered under chain-of-custody for analysis to Curtis & Tompkins, Ltd., Laboratories.

IV SURFACE AND SUBSURFACE CONDITIONS

The subsurface soils at MW-5 consist of poorly graded silty sand and sand from ground surface to a depth of 36 feet (Plate 3). The sandy material is underlain by lower permeability sandy silt from 36 to approximately 39 feet. The boring was terminated in a silty clay unit that extends from 39 feet to the maximum depth of the boring, 41.5 feet (Plate 3).

The soils encountered in MW-5 are similar to soils encountered in the on-site borings drilled during previous phases of the investigation. For example, in MW-5, the change from higher permeability sands and silty sands to sandy silt and clay occurred at 36 feet. On-site, in MW-1, a similar change was encountered at approximately 33 feet; in MW-2, the change occurred at 31 feet; and in MW-4 at 32 feet. From the soils data collected thus far, it appears that the stratigraphy encountered off-site in MW-5 is similar to that encountered in on-site soil borings.

On September 9, 1988, water level and product thickness data were collected from all on- and off-site monitoring wells. The water-level and product thickness data were collected using an electronic interface probe. In addition, the thickness of any free phase product was checked using a Lucite bailer. The water level data, calculated ground-water elevation data, and adjusted product thickness data are presented in Table 1. A reliable estimate of the ground-water flow direction and magnitude of gradient could not be calculated using the data collected on September 9, 1988 because free product was present in four of the five monitoring wells. If reliable estimates are obtained from future water-level measurement episodes, a potentiometric surface map will be constructed and presented in the next report. On the basis of ground-water elevation data collected in the past, the flow direction is believed to be towards the north to northwest.

The greatest thicknesses of free product were measured in on-site wells MW-1 and MW-1A (Table 1). Free product was also detected in on-site Well MW-4 and newly installed off-site Well MW-5. The product thickness in MW-5 was approximately 0.03 feet (measured in the field to be 1 mm). Product thickness measurements will be taken from all of the on-site and off-site wells in the future to monitor changes in product thickness, as well as to verify that free product is present in off-site well MW-5.

Table 1. Ground-Water Elevation Data
September 12, 1988
City Blue Production Facility
Oakland, California

Well No.	Well Elevation (feet)	Adjusted Depth to Ground Water (feet)	Ground-Water Elevation (feet)	Adjusted Product Thickness (feet)
MW-1	31.44	26.31	5.13	1.57
MW-1A	30.74	26.24	4.50	1.76
MW-3	31.77	24.47	7.30	0.00
MW-4	31.59	25.97	5.62	0.37
MW-5	29.22	24.05	5.17	0.03

V RESULTS OF CHEMICAL ANALYSES

Two soil samples, Sample Numbers CB-4 and CB-6, taken from the MW-5 soil boring were analyzed for TPH using modified EPA Method 8015. The samples were collected within the saturated zone at 21 and 31 feet below ground surface. TPH quantified as gasoline, kerosene, and diesel were not detected in either of the soil samples at a detection limit of 10 mg/kg. Sample CB-4 was also analyzed for volatile aromatic hydrocarbons using EPA method 8020. The only aromatic hydrocarbon detected in CB-4 was benzene at 0.009 ppm. The soil chemical analyses results are summarized in Table 2.

Ground-water samples were collected from MW-5 on August 17, 1988. The samples were analyzed for TPH as gasoline, kerosene, and diesel using modified EPA method 8015 and for volatile aromatic hydrocarbons using EPA method 8020. In the samples, gasoline was detected at 32 ppm. In addition, benzene was detected at 17 ppm, toluene at 13 ppm, ethyl benzene at 1.5 ppm, and total xylenes at 5.2 ppm.

To verify the concentration values detected in Well MW-5, a second set of ground-water samples was collected on September 12, 1988. The ground-water samples were analyzed for TPH using modified EPA Method 8015 and volatile aromatic compounds using EPA Method 8020. The concentration values detected in the samples collected on September 12, 1988 were similar in magnitude to those collected on August 17, 1988 (Table 2). TPH as gasoline was detected at 31 ppm, benzene at 15 ppm, toluene at 11 ppm, ethyl benzene at 1.3 ppm, and xylenes at 4.4 ppm.

The results of the ground-water chemical analyses are summarized in Table 2. The laboratory data reports are enclosed as Appendix A.

Table 2. Summary of Chemical Analysis Results (ppm)[1]

Sample	Matrix	Date	TPH as Gasoline	Benzene	Toluene	Ethyl Benzene	Xylene
CB-4	Soil	8/15/88	ND (10)	0.009	ND (0.005)[2]	ND (0.005)	ND (0.005)
CB-6	Soil	8/15/88	ND (10)	NA[3]	NA	NA	NA
CB-W2	Water	8/17/88	32	17	13	1.5	5.2
8809MW05	Water	9/12/88	31	15	11	1.3	4.4

(1) ppm = parts per million

(2) ND (0.005) = Not detected at or above the detection limit of 0.005 ppm

(3) NA = Not analyzed.

VI DISCUSSION AND CONCLUSIONS

The results of the chemical analyses indicate that petroleum hydrocarbons were detected in off-site Well M-5, located approximately 170 feet northeast of the City Blue Production Facility. The concentration values of the constituents detected in MW-5 are similar in magnitude to values detected in the past within wells installed on site (see Table 3). The chemical analyses results imply that chemicals have either migrated off site from the City Blue facility or, alternatively, from an additional source area separate from City Blue. Further investigation should be performed to determine if an additional potential source areas exist in the vicinity of the City Blue facility.

We recommend that a soil gas survey be performed to locate additional potential source areas as well as to help define the extent of the on-site and off-site ground-water chemical plume. The advantages of performing a soil gas survey are that you can collect a substantial amount of data in a short period of time at minimal cost. In addition, the sampling plan can be modified in the field to maximize the effectiveness of the survey.

Soil gas samples should be taken on site directly adjacent to one of the monitoring wells to determine the relationship between chemical concentrations in the vapor state and those in the ground water. Off-site samples should be taken along the margins of the city streets in the vicinity of the City Blue facility, including 18th Street, Jefferson Street, and San Pablo Avenue. Additional samples should be taken at the site locations suspected of contributing to the ground-water problem. The off-site samples will help to define the areal extent of the off-site plume as well as to locate additional potentially responsible parties. If the results of the soil gas survey indicate that additional potential source areas exist or that the size of the off-site plume is extensive, additional off-site monitoring wells may need to be installed.

In addition to the soil gas survey, we recommend that an additional round of water-level and product thickness measurements be performed at all of the on- and off-site monitoring wells. The product thickness measurements will aid in determining whether the product removal program has been successful in decreasing the thickness of product in the on-site wells.

Since the size of the off-site plume not well defined at this time, we recommend that implementation of the on-site remedial program be delayed until after the results of the soil gas survey and product thickness measurements are evaluated. The results of the on- and off-site investigatory work that we have proposed may modify the design of the remedial system. We conclude that the on-site remedial system would be more technically sound, as well as more cost effective, if implementation is deferred until after the size and magnitude of the off-site plume is better defined.

Table 3. Analytical Results:
Data Collected Previously from On-Site Wells

Monitoring Well	MW-1	MW-1A	MW-2	MW-3	MW-4
Soil Analyses					
Volatile Hydrocarbons (Modified EPA 8015)	4,500 ppm	--	ND(10)	ND(10)	270 ppm
Moisture Content (by weight)	13%	--	11%	11%	--
Field Density	109 pcf	--	106 pcf	122 pcf	--
Ground-Water Analyses (ppm)					
Volatile Hydrocarbons (Modified EPA 8015)	190	40	8.2	6.2	12
Benzene	18	4.0	1.5	0.18	0.20
Toluene	26	7.0	0.35	0.50	<30
Xylene	3.7	7.0	0.087	0.17	2.00

mg/kg = Milligrams per kilogram
pcf = Pounds per cubic foot
ppm = Parts per million
ND = Not detected at or above the detection limit given in parentheses.

102187

JEFFERSON STREET

SEVENTEENTH STREET

EIGHTEENTH STREET

Concrete Sidewalk

Concrete Sidewalk

MW-2

MW-5

Approximate Boundary of Tank Removal Excavation

Site Boundary

MW-1A

MW-1

MW-3

MW-4

PRODUCTION FACILITY

N

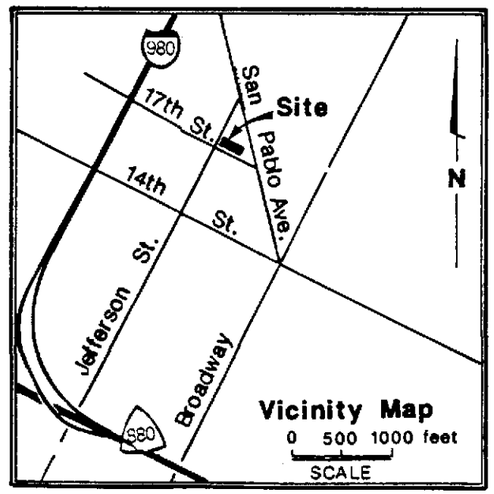
EXPLANATION

MW-5 — Newly Installed Monitoring Well Location and Number

MW-1 — Monitoring Well Location and Number

0 10 20 40 60

Scale in Feet



Harding Lawson Associates
Engineers, Geologists & Geophysicists

Site Plan

Remedial Investigation
City Blue Production Facility
Oakland, California

PLATE **1**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RS	18106.004.04	RSB	10/88		

Equipment 8 inch Hollow Stem Auger

Elevation not surveyed Date 8/15/88

Laboratory Tests	Blows/foot	HNV (ppm)	Time	Depth (ft)	Sample	
				0		BROWN SAND (SP) poorly graded, dense, slightly moist
	24	0	1345	5		BROWN SILTY SAND (SM) dense, slightly moist
	9	50	1350	10		BROWN SILTY SAND (SM) with orange and gray mottling, dense, moist
	27	50	1355	15		BROWN SAND (SP) gray petroleum staining, hydrocarbon odor, dense, moist
				20		▽
	57	50	1405			BROWN SAND (SP) petroleum staining, hydrocarbon odor, poorly graded, very dense, saturated
	60	44	1415	25		BROWN SAND (SP) petroleum staining, hydrocarbon odor, poorly graded, very dense, saturated
	22	15	1425	30		BROWN SILTY CLAY (CL) no hydrocarbon odor, very stiff, moist
	23	5	1438	35		BROWN SANDY SILTY (ML) no hydrocarbon odor, very stiff, moist
				40		

(Continuation of Log)

Laboratory Tests	Blows/foot	HNV (ppm)	Time	Depth (ft)	Sample	
	20	0	1453	40		GRAY SILTY CLAY (CL) orange and dark gray mottling, no hydrocarbon odor, very stiff, moist
				45		bottom of boring 41.5 feet
				50		
				55		
				60		
				65		
				70		
				75		
				80		

Harding Lawson Associates
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Log of Monitoring Well MW-5

City Blue Production Facility
Oakland, California

PLATE 2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RS	18106,004.04	RGB	11/88		

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 (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 (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 (SI	3200	(2600)	—	Unconsolidated Undrained Triaxial Shear (field moisture or saturated)
TxCU (PI	3200	(2600)	—	Consolidated Undrained Triaxial Shear (with or without pore pressure measurement)
TxCD	3200	(2600)	—	Consolidated Drained Triaxial Shear
SSCU (PI	3200	(2600)	—	Simple Shear Consolidated Undrained (with or without pore pressure measurement)
SSCD	3200	(2600)	—	Simple Shear Consolidated Drained
DSCD	3700	(2000)	—	Consolidated Drained Direct Shear
UC	470		—	Unconfined Compression
LVS	700		—	Laboratory Vane Shear

KEY TO TEST DATA

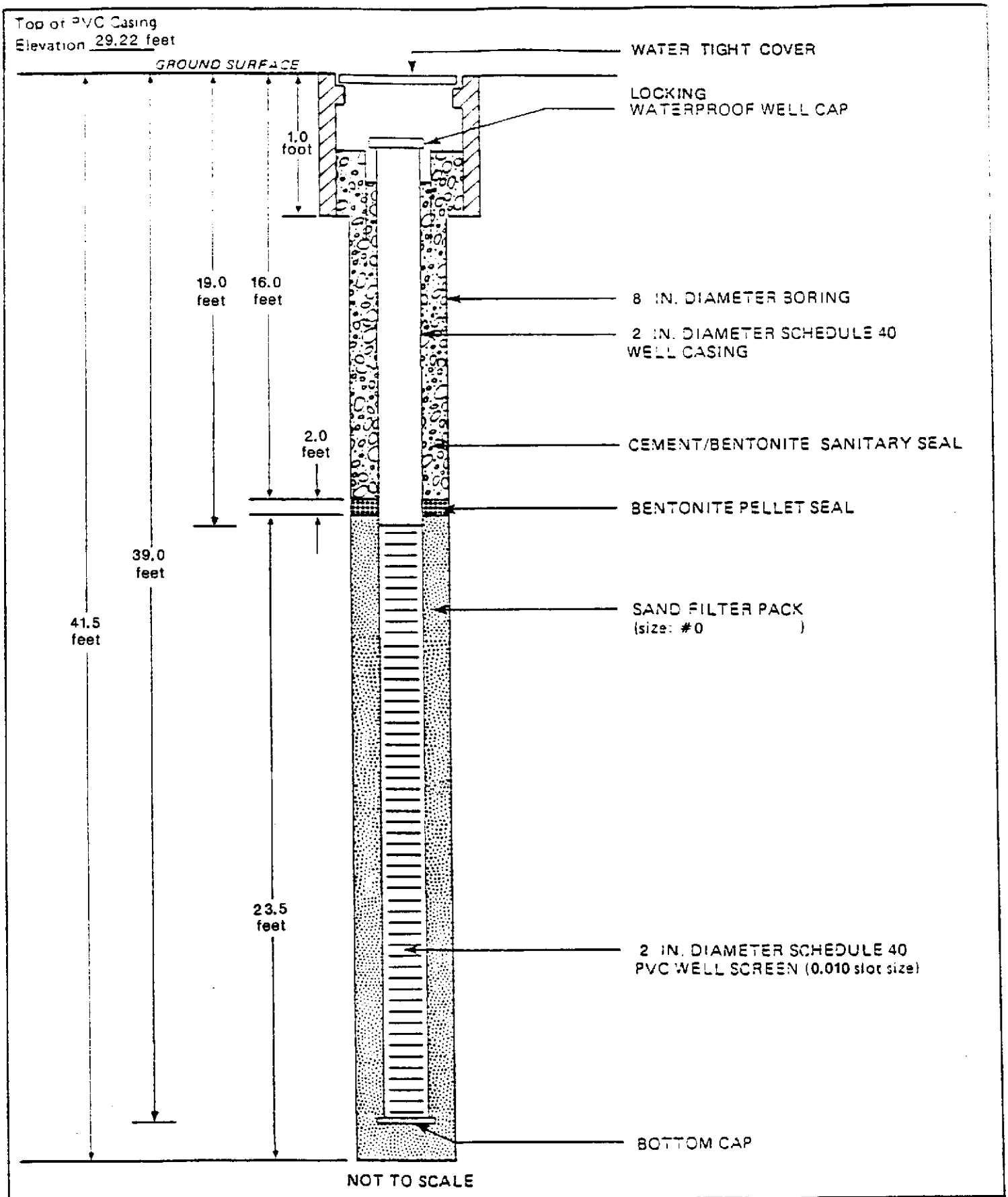
Harding Lawson Associates
Engineers and Geoscientists

Soil Classification Chart and Key to Test Data

City Blue Production Facility
Oakland, California

3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
AG	18106,004.04	RGB	11/88		



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Monitoring Well MW-5 Completion Detail

City Blue Production Facility
Oakland, California

4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RS	18106,004.04	RGB	11/88		

FORM GW3

Appendix A

CHEMICAL ANALYSIS RESULTS

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 15395
CLIENT: HARDING LAWSON ASSOCIATES
JOB #: 18106,004.04, CITY BLUE-OAKLAND

DATE RECEIVED: 08/16/88
DATE ANALYZED: 08/17/88
DATE REPORTED: 09/01/88

Total Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	GASOLINE (mg/Kg)	KEROSINE (mg/Kg)	DIESEL (mg/Kg)
15395-1	CB-4	ND(10)	ND(10)	ND(10)
15395-2	CB-6	ND(10)	ND(10)	ND(10)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	11
Spike: % Recovery	110

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 15395-1
CLIENT: HARDING LAWSON ASSOCIATES
SAMPLE ID:CB-4
JOB ID: 18106,004.04, CITY BLUE-OAKLAND

DATE RECEIVED: 08/16/88
DATE ANALYZED: 08/25/88
DATE REPORTED: 09/01/88

EPA 8020: Volatile Aromatic Hydrocarbons in Soils & Wastes
Extraction Method: EPA 5030 - Purge & Trap

COMPOUND	Result ug/Kg	LOD ug/Kg
Benzene	9	5
Toluene	ND	5
Ethyl Benzene	ND	5
Total Xylenes	ND	5
Chlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,3-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

ND = None Detected. Limit of detection (LOD) in last column.

QA/QC:

Duplicate: Relative % Difference	15
Average Spike Recovery %	80

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 15402-2
CLIENT: HARDING LAWSON ASSOCIATES
JOB #: 18106,004.04
LOCATION: CITY BLUE, OAKLAND

DATE RECEIVED: 08-17-88
DATE ANALYZED: 08-26-88
DATE REPORTED: 09-01-88

Total Petroleum Hydrocarbons in Aqueous Solutions
EPA 8015 (Modified)
Extraction Method: EPA 3510

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)
15402-2	CB-W2	32	ND(0.05)	ND(0.05)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	6
Spike: % Recovery	100

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (415) 486-0900

LABORATORY NUMBER: 15402-1
CLIENT: HARDING LAWSON ASSOCIATES
JOB #: 18106,004.04
LOCATION: CITY BLUE, OAKLAND
CLIENT ID: CB-W1

DATE RECEIVED: 08-17-88
DATE ANALYZED: 08-26-88
DATE REPORTED: 09-01-88

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	17,000	500
Toluene	13,000	500
Ethyl Benzene	1,500	500
Total Xylenes	5,150	500
Chlorobenzene	ND	500
1,4-Dichlorobenzene	ND	500
1,3-Dichlorobenzene	ND	500
1,2-Dichlorobenzene	ND	500

ND = None Detected

QA/QC SUMMARY

RPD %	15
SPIKE RECOVERY %	80

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 15649
CLIENT: HARDING LAWSON ASSOCIATES
JOB #: 18106,004.04/CITY BLUE

DATE RECEIVED: 09-12-88
DATE ANALYZED: 09-16-88
DATE REPORTED: 09-20-88

Total Petroleum Hydrocarbons in Aqueous Solutions
EPA 8015 (Modified)
Extraction Method: EPA 3510

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
15649-1	8809MW05	31	ND(0.05)	ND(0.05)	ND(0.05)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	15
Spike: % Recovery	101

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (415) 486-0900

LABORATORY NUMBER: 15649
CLIENT: HARDING LAWSON ASSOCIATES
JOB #: 18106,004.04/CITY BLUE
SAMPLE ID: 8809MW05

DATE RECEIVED: 09-12-88
DATE ANALYZED: 09-14-88
DATE REPORTED: 09-20-88

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	15,000	100
Toluene	11,000	100
Ethyl Benzene	1,300	100
Total Xylenes	4,400	100
Chlorobenzene	ND	100
1,4-Dichlorobenzene	ND	100
1,3-Dichlorobenzene	ND	100
1,2-Dichlorobenzene	ND	100

ND = None Detected

QA/QC SUMMARY

RPD %	14
SPIKE RECOVERY %	94

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RGB/MGF/nlh/A1824-R2

QUALITY CONTROL REVIEWER

Eugenia Zorich

Eugenia A. Zorich
Senior Hydrogeologist

271-4330
Lowell Miller
80 Swan Way
Oak
94611
Suite 200