A Report Prepared for

Redevelopment Agency of the City of Oakland
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Oakland, California 94612

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REPORT OF GROUNDWATER MONITORING
JUNE 1992
CHINATOWN REDEVELOPMENT PROJECT AREA
OAKLAND, CALIFORNIA

HLA Project No. 10874 040

Submitted to: 9-9-92

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1.0 INTRODUCTION

This report presents the results of quarterly groundwater monitoring in the Chinatown Redevelopment Project Area (Project Area) of Oakland, California (Plate 1), for June 1992. Quarterly groundwater monitoring was recommended through June 1992 in Harding Lawson Associates' report titled *Groundwater Monitoring and Dewatering Effluent Treatment System Operation and Monitoring, April through July 1991* (*HLA, 1991*).

Groundwater monitoring in June 1992 consisted of sampling four monitoring wells and measuring water levels in 11 wells. Groundwater flow directions and the presence of gasoline constituents also were evaluated in groundwater in the Project Area.

2.0 QUARTERLY GROUNDWATER MONITORING

Water levels were measured in 11 wells (Table 1) and groundwater samples were collected from Monitoring Wells MW-7, MW-18, MW-19, and MW-23 on June 25, 1992. Water level measurements were recorded to monitor hydraulic conditions in the Project Area and groundwater samples were collected to assess groundwater chemistry in the 4 wells. Six samples were submitted to the laboratory for analysis, including samples from the four monitoring wells, a duplicate from Monitoring Well MW-23, and a field blank.

Standard HLA decontamination protocol for equipment was followed prior to sampling. HLA employees performing field work were trained in safety procedures and used Level D personal protective equipment. → follow up

Three well volumes were purged from the wells prior to sampling, collected in 55-gallon drums, and retained onsite. Groundwater samples were collected with a stainless steel bailer and decanted into 40-milliliter sample bottles, which were labeled and stored on ice until delivery under chain of custody to Pace Laboratories, Inc. (PACE), of Novato, California, for chemical analysis. All groundwater samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Test Method 8020 and samples from Wells MW-7 and MW-19 were also analyzed for total petroleum hydrocarbons (TPH) as gasoline using EPA Test Method 8015.

3.0 RESULTS

3.1 Groundwater Elevations and Potentiometric Contours

Depths to groundwater and calculated water elevations for June 1992 are presented in Table 1 and the potentiometric surface interpreted from the water-elevation data are shown on Plate 1. The data indicate groundwater flow is to the west-northwest in the northwestern portions of the Project Area and generally west to south in the southern portions of the Project Area. The water level elevation along Webster Street at Well MW-3 is higher than at nearby wells, indicating radial components of flow to the north, south, and east.

Water levels decreased in 9 of 11 wells between March 27 and June 25, 1992, with decreases ranging from 0.08 foot at MW-23 to 0.52 feet at MW-19. Water levels increased slightly at Monitoring Wells MW-21 and MW-22 by 0.14 and 0.03 feet, respectively.

3.2 Groundwater Analytical Results

Results of chemical analyses of the groundwater samples collected on June 25, 1992, are presented in Table 2 along with historical groundwater chemistry data. Laboratory reports for groundwater samples collected in June are presented in the Appendix.

BTEX compounds were detected in groundwater samples from Monitoring Wells MW-7, MW-18, and MW-19. In general, BTEX concentrations are similar to concentrations measured before dewatering activities at the PRP site began in November 1990. BTEX compounds were not detected in the samples from MW-23 or in the field blank. Monitoring Wells MW-7 and MW-19 had detectable concentrations of TPH as gasoline.

In addition, toluene was detected in the laboratory method blank associated with the sample from Well MW-7; benzene was detected in the method blank associated with the sample from Well MW-19.

4.0 DISCUSSION AND RECOMMENDATIONS

On the basis of water levels measured in March 1988 (*HLA, 1989*), before the initiation of dewatering activities in the Project Area, HLA estimated groundwater flow to be generally to the west. The June 1992 measurements, the fourth quarter of water-level data collected since dewatering activities ceased, continue to show some influence of the buildings constructed in the Project Area on groundwater flow direction. The potentiometric contours show the effect of the PRP building and shoring system as barriers to groundwater flow. These barriers may affect upgradient (east side) water levels and may account, in part, for the relatively high water levels observed at Wells MW-3 and MW-19 as compared to other nearby wells. In addition, the apparent change in groundwater flow direction on the east side of the Project Area, compared to westerly preconstruction flow directions, suggests the possible presence of a recharge source in this area. Possible explanations for this pattern include exfiltration from storm drains during storm events or a leaking water main. The pattern of potentiometric contours interpreted from the June water-level measurements indicates that the effects of dewatering are no longer evident. In the vicinity of Well MW-19, groundwater flow is estimated to be west to south. At MW-7, the flow direction is estimated to be generally to the west.

Results of analysis of water samples collected in June 1992 indicate that concentrations of petroleum hydrocarbons and BTEX compounds at MW-19 are higher than the March 1992 concentrations and are about the same as December 1991 and pre-dewatering concentrations for those constituents. In addition, the chemical concentrations at MW-7 are similar to pre-dewatering concentrations and appear to originate from an upgradient chemical source associated with the two underground storage tanks removed in December 1991 from near the corner of 10th and Franklin

Streets. This is suggested by the absence of BTEX constituents during dewatering when flow directions at MW-7 were generally south to east (*HLA, 1991*).

Chemical concentrations at MW-7 and MW-19 decreased from December 1991 to March 1992 then increased from March to June 1992. Concurrently, water levels at these wells increased between December and March, then declined between March and June. This suggests that variations in chemical concentrations may be related to seasonal fluctuations in water levels.

A relationship between seasonal water level fluctuations and variations in chemical concentrations would suggest that concentrations in groundwater at MW-7 and MW-19 have stabilized within a range. At MW-7, concentrations of TPH as gasoline have stabilized in a range of approximately 0.1 to 0.5 mg/l. At MW-19, concentrations have stabilized within a range of 3 to 10 mg/l. Chemical data from MW-18 and MW-23 have not consistently shown the presence of gasoline constituents (with the exception of low concentrations of benzene at MW-18).

The quarterly monitoring performed in June 1992 completes the final quarter of monitoring recommended by HLA (*HLA, 1991*). Given chemical concentration conditions at the four wells monitored, it appears that occurrence of gasoline constituents has stabilized. In addition, groundwater flow directions have stabilized since the cessation of PRP dewatering activities. On the basis of these observations, **HLA recommends decreasing the monitoring frequency to biannually, in January and July, for one year.** Monitoring in mid summer and mid winter will enable assessment of seasonal effects on chemical conditions.

The first biannual groundwater monitoring is proposed for January 1993. During each round, water levels will be measured in Monitoring Wells MW-2, MW-3, MW-6,

MW-7, MW-8, and MW-18 through MW-23. Samples from Monitoring Wells MW-18 and MW-23 will be analyzed for BTEX, and samples from MW-7 and MW-19 will be analyzed for TPH as gasoline and BTEX. Results will be presented in reports to the Regional Water Quality Control Board.

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5.0 REFERENCES

Harding Lawson Associates, 1989. *A-Aquifer Monitoring Report, Chinatown Redevelopment Project Area, Oakland, California.* January 31.

_____, 1991. *Groundwater Monitoring and Dewatering Effluent Treatment System, Operation and Monitoring, April through July 1991, Chinatown Redevelopment Project Area, Oakland, California.* August 16.

Table 1. WATER-LEVEL ELEVATIONS - AUGUST 1990 THROUGH JUNE 1992
CHINATOWN REDEVELOPMENT PROJECT AREA

Well No.	MW-2		MW-3		MW-6		MW-7		MW-8		MW-12	
	GROUND SURFACE 40.05	TOP OF CASING 39.55	GROUND SURFACE 39.02	TOP OF CASING 38.35	GROUND SURFACE 39.95	TOP OF CASING 39.59	GROUND SURFACE 39.35	TOP OF CASING 39.10	GROUND SURFACE 40.63	TOP OF CASING 40.47	GROUND SURFACE 37.70	TOP OF CASING 37.00
DATE	Depth to Water	Ele-vation	Depth to Water	Ele-vation	Depth to Water	Ele-vation	Depth to Water	Ele-vation	Depth to Water	Ele-vation	Depth to Water	Ele-vation
3-Aug-90	25.59	13.96	25.33	13.02	25.37	14.22	25.38	13.72	27.02	13.45	21.15	15.85
27-Aug-90	-	-	-	-	-	-	-	-	-	-	-	-
12-Sep-90	-	-	-	-	-	-	-	-	-	-	24.08	12.92
13-Sep-90	-	-	-	-	-	-	25.15	13.95	-	-	-	-
14-Nov-90	25.38	14.17	23.91	14.44	25.25	14.34	24.97	14.13	26.72	13.75	23.37	13.63
3-Dec-90	26.12	13.43	24.69	13.66	25.44	14.15	27.66	11.44	27.28	13.19	25.45	11.55
11-Jan-91	28.60	10.95	28.97	9.38	27.50	12.09	29.82	9.28	29.04	11.43	*	*
11-Feb-91	32.39	7.16	32.37	5.98	29.43	10.16	32.35	6.75	30.88	9.59	*	*
8-Mar-91	33.57	5.98	32.29	6.06	30.41	9.18	32.04	7.06	31.98	8.49	*	*
12-Apr-91	32.67	6.88	31.89	6.46	30.25	9.34	31.37	7.73	32.01	8.46	*	*
10-May-91	31.90	7.65	31.29	7.06	29.94	9.65	30.94	8.16	31.66	8.81	*	*
6-Jun-91	32.56	6.99	30.94	7.41	30.27	9.32	31.06	8.04	31.94	8.53	*	*
19-Sep-91	26.94	12.61	25.28	13.07	26.58	13.01	26.96	12.14	28.65	11.82	*	*
20-Dec-91	25.94	13.61	24.23	14.12	25.74	13.85	25.83	13.27	27.47	13.00	*	*
27-Mar-92	24.05	15.50	21.94	16.41	23.92	15.67	24.01	15.09	25.64	14.83	*	*
25-Jun-92	24.20	15.35	22.37	15.98	24.07	15.52	24.37	14.73	25.84	14.63	*	*

NOTES:

Elevations are in feet above mean sea level (MSL).

Depth to water measured in feet from top of casing.

* Well MW-12 was damaged during excavation and construction activities and can no longer be monitored.

Table 1. WATER-LEVEL ELEVATIONS - AUGUST 1990 THROUGH JUNE 1992
CHINATOWN REDEVELOPMENT PROJECT AREA

Well No.	MW-18		MW-19		MW-20		MW-21		MW-22		MW-23	
	GROUND SURFACE 36.52	TOP OF CASING 35.88	GROUND SURFACE 37.15	TOP OF CASING 36.62	GROUND SURFACE 38.32	TOP OF CASING 37.86	GROUND SURFACE 38.67	TOP OF CASING 38.08	GROUND SURFACE 37.70	TOP OF CASING 37.34	GROUND SURFACE 34.68	TOP OF CASING 34.23
DATE	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation	Depth to Water	Elevation
3-Aug-90	24.41	11.47	25.32	11.30	25.01	12.85	27.60	10.48	-	-	-	-
27-Aug-90	-	-	-	-	-	-	27.52	10.56	22.93	14.41	22.45	11.78
12-Sep-90	-	-	-	-	24.06	13.80	27.38	10.70	-	-	-	-
13-Sep-90	24.33	11.55	22.44	14.18	-	-	-	-	22.78	14.56	21.27	12.96
14-Nov-90	24.13	11.75	21.97	14.65	24.47	13.39	27.32	10.76	22.65	14.69	21.80	12.43
3-Dec-90	24.81	11.07	22.16	14.46	26.29	11.57	27.39	10.69	22.78	14.56	22.00	12.23
11-Jan-91	25.90	9.98	25.33	11.29	28.38	9.48	28.03	10.05	24.98	12.36	22.51	11.72
11-Feb-91	26.40	9.48	26.55	10.07	29.55	8.31	28.08	10.00	26.05	11.29	22.69	11.54
8-Mar-91	26.44	9.44	26.56	10.06	29.95	7.91	28.33	9.75	26.63	10.71	22.77	11.46
12-Apr-91	26.31	9.57	25.92	10.70	29.62	8.24	28.52	9.56	26.22	11.12	22.36	11.87
10-May-91	25.48	10.40	24.90	11.72	29.01	8.85	28.34	9.74	25.84	11.50	22.14	12.09
6-Jun-91	25.61	10.27	24.75	11.87	29.06	8.80	28.21	9.87	25.69	11.65	22.17	12.06
19-Sep-91	25.23	10.65	23.12	13.50	26.46	11.40	27.81	10.27	23.73	13.61	22.35	11.88
20-Dec-91	24.81	11.07	22.37	14.25	25.56	12.30	27.33	10.75	23.11	14.23	22.46	11.77
27-Mar-92	23.70	12.18	20.42	16.20	23.95	13.91	26.82	11.26	21.62	15.72	21.05	13.18
25-Jun-92	23.97	11.91	20.94	15.68	24.27	13.59	26.68	11.40	21.59	15.75	21.13	13.10

NOTES:
Elevations are in feet above mean sea level (MSL).
Depth to water measured in feet from top of casing.

Table 2. RESULTS OF ORGANIC CHEMICAL ANALYSES OF GROUNDWATER SAMPLES FROM MONITORING WELLS CHINATOWN REDEVELOPMENT PROJECT AREA

Purgeable Aromatics (EPA Method 8020)
Petroleum Hydrocarbons (EPA Method 8015)

WELL	DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES, TOTAL	TPH AS GASOLINE
		LOD (mg/l) 0.0005/0.0002 ppb	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.25/0.05 * * ppb
MW-3	10-Mar-88	ND	ND	ND	ND	ND
	18-Mar-88	ND	ND	ND	ND	ND
	25-Mar-88	ND	ND	ND	ND	ND
	1-Apr-88	0.7	0.4	ND	1.2	ND
	15-Apr-88	ND	ND	ND	ND	ND
	28-Apr-88 @	ND/ND (0.4)	ND/ND (0.4)	ND/ND (0.4)	ND/ND (0.4)	ND/ND
	11-May-88	ND	ND	ND	ND	ND
	27-May-88	ND	ND	ND	ND	ND
	16-Jun-88	ND	ND	ND	ND	ND
	27-Jul-88	ND	ND	ND	ND	ND
	26-Aug-88	ND	ND	ND	ND	ND
	30-Sep-88	ND	ND	ND	ND	ND
	2-Nov-88	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
	2-Dec-88	ND	ND	ND	ND	ND
	4-Jan-89	ND	ND	ND	ND	ND
	3-Feb-89	ND	0.0009 .9	ND	ND	ND
	3-Dec-90	ND	0.0002 † .2	ND	ND	ND
	8-Mar-91	ND	ND	ND	ND	ND
need 1 more Q →	6-Jun-91	ND	ND	ND	ND a	NT
MW-7	4-Apr-89	ND	0.0007	0.0010	0.0012	ND
	3-May-89	ND	0.0012	0.0018	0.0048	0.27
	6-Jun-89	0.0010	0.001	0.0022	0.0011	0.40
	7-Jul-89	0.0002	0.001	0.00034	0.0059	0.56
	2-Aug-89	ND	0.0015	0.0054	0.0059	0.70
	7-Sep-89	ND	ND	ND	0.0015	0.59
	5-Oct-89	ND	0.0011	0.0006	0.0013	0.73
	2-Nov-89	0.0002	0.001	0.0055	0.0036	0.63
	6-Dec-89	0.0006	0.0087	0.0059	0.0036	0.32
	3-Jan-90	0.0007	0.0007	0.0006	0.0013	0.18
	1-Feb-90	ND	0.0009	ND	0.0003	ND
	28-Feb-90	ND	0.0006	0.0004	0.0052	0.09
	11-Apr-90	ND	0.0007	0.0033	0.0029	0.13
	18-May-90	ND	0.0008	0.0014	0.0008	0.43
	13-Sep-90	ND	0.0019	ND	ND	NT
	3-Dec-90	0.0002	0.0024	0.0019	0.0012	0.32
	11-Feb-91	ND	ND	ND	ND	ND
	8-Mar-91	ND	ND	ND	ND	ND
	6-Jun-91	ND	ND	ND	ND a	ND
	20-Dec-91	0.0002 .2	ND	0.0029	0.0078	0.32 320
	27-Mar-92	0.0006 .6	ND b	0.0010	0.0020	0.11 110
	25-Jun-92	ND	0.0009 .9	0.0017	0.0035	0.14 140
MW-12	15-Feb-89	ND	ND	ND	ND	ND
	3-Mar-89	NT	NT	NT	NT	ND
	5-Apr-89	0.0014	0.0023	ND	0.0054	ND
	2-May-89	0.026	0.0033	ND	0.0063	0.10
	7-Jun-89	0.034	0.0037	ND	0.012	0.18
	6-Jul-89	0.029	0.0025	ND	0.0059	0.12
	2-Aug-89	0.023	0.002	ND	0.005	ND
	7-Sep-89 @	0.051/0.059	0.0016/0.0022	ND/ND	0.0049/0.0058	ND/ND
	5-Oct-89 @	0.037/0.040	0.0032/0.0031	ND/ND	0.0086/0.0094	ND/ND
	2-Nov-89	0.0056	0.0011	ND	0.0019	0.071
	6-Dec-89	0.0062	0.0012	ND	0.0017	0.06
	3-Jan-90	0.0086	0.0010	ND	0.0012	0.09
	1-Feb-90 @	0.0018/0.0024	0.0010/0.0004	ND/ND	0.0005/0.0004	ND/ND
	1-Mar-90	0.0016	0.0014	ND	0.0003	ND
	11-Apr-90	0.0066	0.0174	0.0015	0.0116	0.147
	18-May-90	ND	0.0009	ND	ND	ND
	12-Sep-90	ND	ND	ND	0.0002	NT
	~~3-Dec-90~~	0.0006 .6	0.0002 †	ND	0.0002 †	ND
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Table 2. RESULTS OF ORGANIC CHEMICAL ANALYSES OF GROUNDWATER SAMPLES FROM MONITORING WELLS CHINATOWN REDEVELOPMENT PROJECT AREA

Purgeable Aromatics (EPA Method 8020)
Petroleum Hydrocarbons (EPA Method 8015)

WELL	DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES, TOTAL	TPH AS GASOLINE
		LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.25/0.05 * *
MW-18	15-Feb-89	ND	ND	ND	ND	ND
	3-Mar-89	NT	NT	NT	NT	ND
	5-Apr-89	ND	ND	ND	ND	ND
	2-May-89	ND	ND	ND	ND	ND
	7-Jun-89	ND	ND	ND	ND	ND
	6-Jul-89	ND	ND	ND	ND	ND
	2-Aug-89	ND	ND	ND	ND	ND
	6-Sep-89	ND	ND	ND	ND	ND
	5-Oct-89	ND	ND	ND	ND	ND
	1-Nov-89	ND	ND	ND	ND	ND
	6-Dec-89	ND	0.0009	ND	0.0013	ND
	2-Jan-90	0.016	0.0080	0.0014	0.0098	0.10
	1-Feb-90	ND	ND	ND	ND	ND
	1-Mar-90	0.0003	ND	ND	0.0002	ND
	11-Apr-90	0.0004	0.0006	0.0005	0.0003	ND
	18-May-90	ND	ND	ND	ND	ND
	13-Sep-90	0.0027	ND	ND	ND	NT
	4-Dec-90	0.0029	0.0002 †	ND	0.0003 †	ND
	8-Mar-91	0.0009	0.0003	ND	ND	ND
	6-Jun-91	ND	ND	ND	ND a	NT
	19-Sep-91	ND b	ND b	ND b	ND b	ND
	20-Dec-91	0.0004	ND	ND b	ND b	NT
	27-Mar-92	0.0016	ND b	ND b	ND b	NT
	25-Jun-92	0.0008 .8	ND b	ND b	0.0007	NT
MW-19	15-Dec-89	5.0	0.30	0.078	0.61	12
	3-Jan-90	3.0	0.46	0.12	1.1	13
	1-Feb-90	1.1	0.022	LT 0.0040	0.032	1.9
	1-Mar-90	4.2	0.92	0.24	0.82	9.2
	11-Apr-90	3.8	1.1	0.82	0.34	10
	18-May-90	5.6	0.75	0.70	0.78	11
	13-Sep-90	1.4	1.2	0.35	1.6	NT
	4-Dec-90	2.1	1.5	0.42	1.6	12
	11-Feb-91	0.45	0.12	0.086	0.21	2.7
	8-Mar-91	0.52	0.057	0.020	0.083	1.4
	10-May-91	0.32	0.088	0.055	0.160	1.8
	6-Jun-91 @	0.38/0.46	0.027/0.038	0.023/0.030	0.092/0.15	3.4/NT
	19-Sep-91	0.21	0.023	0.094	0.15	3.5
	20-Dec-91	1.0	0.24	0.5	1.2	9.6
	27-Mar-92	0.34	0.13	0.12	0.34	3.6
	25-Jun-92	1.1 - 1,100	0.38 380	0.53	1.6	10 - 10,000
MW-20	15-Dec-89	ND	ND	ND	ND	ND
	3-Jan-90	0.0004	0.0004	ND	0.0008	ND
	1-Feb-90	ND	0.0014	ND	0.0005	ND
	28-Feb-90	ND	ND	ND	0.0005	ND
	11-Apr-90	0.0028	0.0110	0.0011	0.0066	ND
	18-May-90	ND	ND	ND	ND	ND
	12-Sep-90	ND	ND	ND	ND	NT
	3-Dec-90	ND	0.0002 † .2	ND	ND	ND
	8-Mar-91	ND	ND	ND	ND	ND
	6-Jun-91	ND	ND	ND	ND a	NT
MW-21	27-Aug-90	ND	ND	ND	ND	NT
	12-Sep-90	ND	ND	ND	ND	NT
	3-Dec-90	ND	0.0005 † .5	ND	0.0011 † 1	ND
	8-Mar-91	ND	ND	ND	ND	ND
	6-Jun-91	ND	ND	ND	ND a	NT

Table 2. RESULTS OF ORGANIC CHEMICAL ANALYSES OF GROUNDWATER SAMPLES FROM MONITORING WELLS CHINATOWN REDEVELOPMENT PROJECT AREA

Purgeable Aromatics (EPA Method 8020)
Petroleum Hydrocarbons (EPA Method 8015)

WELL	DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES, TOTAL	TPH AS GASOLINE
		LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.0005/0.0002 *	LOD (mg/l) 0.25/0.05 * *
MW-22	27-Aug-90	ND	ND	ND	ND	NT
	13-Sep-90	ND	ND	ND	ND	NT
	4-Dec-90	ND	0.0002 †	ND	0.0002 †	ND
	8-Mar-91	ND	ND	ND	ND	ND
	6-Jun-91	ND	ND	ND	ND a	NT
MW-23	27-Aug-90	ND	ND	ND	ND	NT
	13-Sep-90	ND	ND	ND	ND	NT
	4-Dec-90	ND	0.0002 †	ND	ND	ND
	8-Mar-91	ND	ND	ND	ND	ND 295
	6-Jun-91	ND	0.0004	ND	ND a	NT
	20-Dec-91	ND	ND	ND b	ND b	NT
	27-Mar-92	0.0056	0.0064	0.0016	0.0082	NT
	25-Jun-92	ND/ND b	ND/ND b	ND/ND b	ND/ND b	NT/NT
BLANK	5-Apr-89	0.5	ND	ND	ND	ND
	1-May-89	ND	ND	ND	ND	ND
	6-Jun-89 @	ND/ND	ND/ND	ND/ND	ND/ND	ND/ND
	1-Aug-89	ND	ND	ND	ND	ND
	2-Aug-89	ND	ND	ND	ND	ND
	3-Aug-89	ND	ND	ND	ND	ND
	6-Sep-89	ND	ND	ND	ND	ND
	7-Sep-89	ND	ND	ND	ND	ND
	4-Oct-89	ND	ND	ND	ND	ND
	2-Nov-89	ND	ND	ND	ND	ND
	5-Dec-89	ND	ND	ND	ND	ND
	3-Jan-90	ND	0.0006	ND	0.0017	ND
	13-Sep-90	ND	ND	ND	ND	NT
	11-Feb-91	ND	ND	ND	ND	NT
	8-Mar-91	ND	ND	ND	ND	ND
	19-Sep-91	ND b	ND b	ND b	ND b	ND
	20-Dec-91	ND	ND	ND b	ND b	NT
	27-Mar-92	ND b	ND b	ND b	ND b	NT
	25-Jun-92	ND b	ND b	ND b	ND b	NT

NOTES:

Results reported in milligrams per liter (mg/l); equivalent to parts per million.
Analyses performed by PACE Laboratories, Inc., Novato, California.
Specific limits of detection for compounds detected in June 1992 groundwater samples are presented in the appendix of this report.
LOD: Limit of Detection.
ND: Not detected at or above LOD.
NT: Not tested.
(0.4): Numbers in parentheses are limits of detection.
*: LOD Changed to 0.0002 on 01-May-89, unless otherwise noted.
**: LOD Changed to 0.05 on 01-May-89, unless otherwise noted.
†: PACE laboratory reported toluene and total xylenes in the method blanks analyzed along with the samples.
@: Two values indicate results of duplicate analyses.
LT: Less than the concentration indicated.
a: Method detection limit is 0.0004 mg/l.
b: Method detection limit is 0.0005 mg/l.

Appendix

RESULTS OF LABORATORY ANALYSIS OF GROUNDWATER SAMPLES FROM MONITORING WELLS

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

July 08, 1992

Mr. Marc Egbert
Harding Lawson Associates
200 Rush Landing
Novato, CA 94948

RE: PACE Project No. 420625.500
Client Reference: 10874.040

Dear Mr. Egbert:

Enclosed is the report of laboratory analyses for samples received June 25, 1992.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Carol Reid

Carol Reid
Project Manager

Enclosures

11 Digital Drive
Novato, CA 94949
TEL: 415-883-6100
FAX: 415-883-2673

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Harding Lawson Associates
200 Rush Landing
Novato, CA 94948

July 08, 1992
PACE Project Number: 420625500

Attn: Mr. Marc Egbert

MW-19

Client Reference: 10874.040

PACE Sample Number:			70 0170257	
Date Collected:			06/25/92	
Date Received:			06/25/92	
Client Sample ID:			92062501	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	06/30/92
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	1000	10000	06/30/92
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	06/30/92
Benzene	ug/L	10	1100	06/30/92
Toluene	ug/L	10	380	06/30/92
Ethylbenzene	ug/L	10	530	06/30/92
Xylenes, Total	ug/L	10	1600	06/30/92

MDL Method Detection Limit

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
Page 2

July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

MW-23

PACE Sample Number:			70 0170265	
Date Collected:			06/25/92	
Date Received:			06/25/92	
Client Sample ID:			92062502	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE AROMATIC COMPOUNDS, EPA 8020				
Benzene	ug/L	0.5	ND	07/06/92
Toluene	ug/L	0.5	ND	07/06/92
Ethylbenzene	ug/L	0.5	ND	07/06/92
Xylenes, Total	ug/L	0.5	ND	07/06/92

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
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July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

PACE Sample Number:			70 0170273	MW-23 dup
Date Collected:			06/25/92	
Date Received:			06/25/92	
Client Sample ID:			92062503	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE AROMATIC COMPOUNDS, EPA 8020				
Benzene	ug/L	0.5	ND	07/06/92
Toluene	ug/L	0.5	ND	07/06/92
Ethylbenzene	ug/L	0.5	ND	07/06/92
Xylenes, Total	ug/L	0.5	ND	07/06/92

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
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July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

MW-18

PACE Sample Number:			70 0170281	
Date Collected:			06/25/92	
Date Received:			06/25/92	
Client Sample ID:			92062504	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE AROMATIC COMPOUNDS, EPA 8020				
Benzene	ug/L	0.5	0.8	07/06/92
Toluene	ug/L	0.5	ND	07/06/92
Ethylbenzene	ug/L	0.5	ND	07/06/92
Xylenes, Total	ug/L	0.5	0.7	07/06/92

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
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July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

Field Blank

PACE Sample Number:			70 0170290	
Date Collected:			06/25/92	
Date Received:			06/25/92	
Client Sample ID:			92062505	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE AROMATIC COMPOUNDS, EPA 8020				
Benzene	ug/L	0.5	ND	07/06/92
Toluene	ug/L	0.5	ND	07/06/92
Ethylbenzene	ug/L	0.5	ND	07/06/92
Xylenes, Total	ug/L	0.5	ND	07/06/92

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
Page 6

July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

MW-7

Parameter	Units	MDL		DATE ANALYZED
PACE Sample Number:			70 0170303	
Date Collected:			06/25/92	
Date Received:			06/25/92	
Client Sample ID:			92062506	
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	07/02/92
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	140	07/02/92
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	07/02/92
Benzene	ug/L	0.5	ND	07/02/92
Toluene	ug/L	0.5	0.9	07/02/92
Ethylbenzene	ug/L	0.5	1.7	07/02/92
Xylenes, Total	ug/L	0.5	3.5	07/02/92

MDL Method Detection Limit
ND Not detected at or above the MDL.

These data have been reviewed and are approved for release.

Darrell Cain for
Mark A. Valentini, Ph.D.
Regional Director

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Novato, CA 94949
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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
Page 7

QUALITY CONTROL DATA

July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

TPH GASOLINE/BTEX
Batch: 70 13668
Samples: 70 0170257

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-
Benzene	ug/L	0.5	0.7
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	304	115%	107%	7%
Benzene	ug/L	0.5	40.0	102%	96%	6%
Toluene	ug/L	0.5	40.0	109%	102%	6%
Ethylbenzene	ug/L	0.5	40.0	112%	103%	8%
Xylenes, Total	ug/L	0.5	80.0	118%	108%	8%

MDL Method Detection Limit
RPD Relative Percent Difference

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
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QUALITY CONTROL DATA

July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

TPH GASOLINE/BTEX
Batch: 70 13784
Samples: 70 0170303

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	0.6
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	266	116%	114%	1%
Benzene	ug/L	0.5	40.0	102%	104%	1%
Toluene	ug/L	0.5	40.0	106%	108%	1%
Ethylbenzene	ug/L	0.5	40.0	108%	110%	1%
Xylenes, Total	ug/L	0.5	80.0	110%	111%	0%

MDL Method Detection Limit
RPD Relative Percent Difference

REPORT OF LABORATORY ANALYSIS

Mr. Marc Egbert
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QUALITY CONTROL DATA

July 08, 1992
PACE Project Number: 420625500

Client Reference: 10874.040

TPH GASOLINE/BTEX
Batch: 70 13794
Samples: 70 0170265, 70 0170273, 70 0170281

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	428	94%	96%	2%
Benzene	ug/L	0.5	40.0	98%	105%	6%
Toluene	ug/L	0.5	40.0	99%	105%	5%
Ethylbenzene	ug/L	0.5	40.0	100%	107%	6%
Xylenes, Total	ug/L	0.5	80.0	101%	107%	5%

MDL Method Detection Limit
RPD Relative Percent Difference

Client Reference: 10874.040

TPH GASOLINE/BTEX
Batch: 70 13807
Samples: 70 0170290

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015)	ug/L	50	303	99%	98%	1%
Benzene	ug/L	0.5	40.0	91%	110%	18%
Toluene	ug/L	0.5	40.0	95%	107%	11%
Ethylbenzene	ug/L	0.5	40.0	97%	115%	16%
Xylenes, Total	ug/L	0.5	80.0	102%	120%	16%

MDL Method Detection Limit
RPD Relative Percent Difference

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7655 Redwood Boulevard
P.O. Box 578
Novato, California 94948
415/892-0821
Telecopy: General: 415/892-0831
Accounting: 415/898-1052

CHAIN OF CUSTODY FORM

Lab: Pace

Samplers: Rick Erdman, Steve Korbay

Job Number: 10834.040

Name/Location: PRP - Oakland

Project Manager: Mark Egbert

Recorder: Rick Erdman (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCl	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	ICP METALS	EPA 8015M/TPH-gas	BTEX
23	X							3	92062501	92062509	17025.7						X	X
23	X							3	92062502	92062505	26.5							X
23	X							3	92062503	92062506	27.3 → head space							X
23	X							3	92062504	92062506	28.1 in 1 of 3							X
23	X							3	92062505	92062506	29.0 VOA's (3O)						X	X
23	X							3	92062506	92062506	30.3						X	X

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Rick Erdman	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature) DATE/TIME	7-5
METHOD OF SHIPMENT Rick Erdman		

10/11

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• Samples received @ 8.8°C

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JUNE 1992
CHINATOWN REDEVELOPMENT PROJECT AREA
OAKLAND, CALIFORNIA
September 9, 1992

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QUALITY CONTROL REVIEWER

R. Bruce Scheibach
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