A Report Prepared for

Carnation Company
800 North Brand Boulevard
Glendale, California 91203

QUARTERLY ACTIVITY REPORT
OCTOBER THROUGH DECEMBER 1991
CARNATION FACILITY
OAKLAND, CALIFORNIA

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HLA Job No. 20294,015.02

by

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

Attention: Mr. Dennis J. Byrne
Senior Hazardous Materials Specialist

Ladies and Gentlemen:

Quarterly Monitoring Report
Carnation Facility
Oakland, California

Enclosed is Harding Lawson Associates' (HLA) Quarterly Monitoring Report for the Carnation Dairy Facility at 1310 14th Street in Oakland, California. This report describes the results of monitoring groundwater quality in December 1991, and measurement of groundwater elevations and product thickness at the facility.

If you have any questions, please contact me at (415) 899-7319.

Yours very truly,

HARDING LAWSON ASSOCIATES

R. Bruce Scheibach

R. Bruce Scheibach
Principal Hydrogeologist

Enclosure: Quarterly Monitoring Report

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1.0 INTRODUCTION

From 1929 to 1991, Carnation Company operated a dairy production facility at 1310 14th Street, Oakland, California (Plate 1). The facility was used for dairy product processing and for vehicle maintenance. An "L" shaped building consisting of a warehouse with four vehicle service bays occupies the northern and western sides of the site (Plate 2). In January 1989, Carnation excavated an underground waste oil tank, two underground gasoline tanks, and two underground diesel storage tanks, which were located beneath and south of the warehouse building. During removal of the tanks, gasoline and diesel were observed to be present as a separate phase floating in the excavations. Carnation investigated the extent of the hydrocarbons and implemented several interim remedial measures. The chemicals detected, which included free-phase gasoline, diesel, waste oil, and their dissolved chemical components, are believed to have been released from the leaking underground waste oil tank and from piping connected to the four underground fuel storage tanks. In addition to the petroleum hydrocarbons, polychlorinated biphenyls (PCBs) were detected in oil floating on the groundwater table at one location. Animal fats were also reported to have been found floating on the groundwater table beneath the facility.

In April 1991, Carnation retained Harding Lawson Associates (HLA) to conduct additional site investigations and to perform an engineering analysis of remediation alternatives. A Work Plan for the quarterly monitoring and other site investigation work was submitted to the Alameda County Department of Environmental Health and the California Regional Water Quality Control Board in May 1991 (*HLA, 1991a*). All field work was conducted in accordance with the Quality Assurance/Quality Control (QA/QC) Plan contained in the Work Plan. This report presents the results of the third quarterly

groundwater chemistry monitoring round for 1991. A more comprehensive analysis of soil and groundwater chemistry at the facility is presented in the Site Characterization Report (*HLA, 1991b*).

2.0 WATER-LEVEL ELEVATION AND FREE-PHASE PETROLEUM PRODUCT MEASUREMENTS AND GROUNDWATER CHEMISTRY MONITORING

2.1 Water-Level Elevation and Free-Phase Petroleum Product Measurements

HLA measures water-level elevations and free-phase petroleum product thicknesses monthly, as part of the monitoring program. Accessible monitoring wells and selected product recovery wells are measured during each monitoring event. Water-level and free-phase product measurements are taken with an electrical oil-water interface probe calibrated with a steel tape. Measurement procedures are described in detail in the QA/QC Plan (*HLA, 1991a*).

2.2 Groundwater Chemistry Monitoring

On December 16 and 17, 1991, groundwater samples were collected for chemical analysis from eight onsite and offsite monitoring wells: Wells MW-3, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, and MW-32 (Plate 2). QA/QC procedures followed during sampling are described in detail in the QA/QC Plan (*HLA, 1991a*). As described in the QA/QC Plan, one field blank and one duplicate water sample (from Well MW-32) were collected.

Chemical analyses of the groundwater samples were performed by National Environmental Testing, Inc. (NET), a California-certified laboratory in Santa Rosa, California. All groundwater samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Test Method 8020. Samples from two wells (MW-26 and MW-32) and the field blank were analyzed for chlorinated hydrocarbons by EPA Test Method 8010.

The groundwater generated during the sampling was contained onsite and will be discharged to the sanitary sewer under permit from the East Bay Municipal Utility District (EBMUD).

3.0 RESULTS OF INVESTIGATIONS

3.1 Water-Level Elevations

Table 1 contains the groundwater elevation data collected during December 1991. Accessible monitoring wells and selected product recovery wells were used to monitor groundwater elevations and free-phase petroleum product thicknesses.

Plate 3 presents a groundwater elevation contour map using data collected during December 1991. Note that in Table 1, corrected groundwater elevations for wells containing free-phase petroleum product were calculated using an assumed product density of 0.80 grams per cubic centimeter. These calculated groundwater elevation data were not used in contouring.

The groundwater elevation data collected each month indicate groundwater flow is to the northwest beneath the southern portion of the site and is to the south and southwest beneath the northern portion of the site (Plate 3). The hydraulic gradient beneath the northern portion of the site is approximately 3.8×10^{-3} to 8.0×10^{-3} foot/foot (ft/ft) in a southwest direction from 16th Street onto the site. The hydraulic gradient beneath the southern portion of the site is approximately 4.6×10^{-4} to 2.0×10^{-3} ft/ft in a northwest direction. This convergent flow appears to result in a net westerly flow direction in the chemical-bearing area (Plate 3).

3.2 Distribution of Free Product

Table 1 contains the free-product thickness data collected in December 1991. Free-product thicknesses were determined using an oil-interface probe. The distribution of free-phase product measured during December is shown on Plate 4. In general, the thickness of free-phase product measured during December is similar to the thicknesses measured in October and November 1991. The apparent product thickness was greatest in Well MW-22 (5.12 feet), near the northern wall of the warehouse

building (Plate 4). However, product was not and has not been observed in the five offsite wells (MW-25 through MW-29), all of which are located relatively close to the Carnation warehouse. The consistent lack of free-phase petroleum product in the offsite wells and the wells on the west side of the property (MW-3, MW-14, MW-15, and MW-16) suggests that the product continues to be restricted to the onsite area and has not migrated offsite.

3.3 Results of Groundwater Chemistry Monitoring

A total of eight wells were sampled, four on December 16, 1991, and four on December 17, 1991, with a duplicate sample collected from MW-32. Well MW-14 was not sampled during this sampling round because the well was inaccessible. Chemical results for the groundwater samples are summarized in Table 2 and presented on Plate 5. Groundwater sampling forms are contained in Appendix A. Laboratory data sheets are contained in Appendix B.

3.3.1 Distribution of Petroleum Hydrocarbons in Groundwater

At least one dissolved BTEX compound was found in all of the samples. Plate 5 shows the dissolved BTEX results.

3.3.2 Distribution of Chlorinated Hydrocarbons in Groundwater

One chlorinated hydrocarbon, 1,2-dichloroethane (1,2-DCA), was detected in samples from two wells. 1,2-DCA was detected in offsite Well MW-26 (at a concentration of 79 μg/l) and onsite Well MW-32 (at a concentration of 4.2 μg/l). These two wells will continue to be sampled and analyzed for chlorinated hydrocarbons.

but MW26 was dropped from sample matrix!

3.3.3 Groundwater QA/QC Data

Field quality control samples consisted of one field blank and one duplicate sample. Analytical results are presented in Table 2, and the certified laboratory data sheets are presented in Appendix B.

Field blanks consist of organic-free deionized water that is poured into sample containers under field conditions. Field blanks are prepared and analyzed to check for potential contamination during sample collection in the field. The field blank was poured on September 16, 1991, and transported to the analytical laboratory with the groundwater samples. No analytes were detected at or above the reported detection limits in the field blank. ✓good

A duplicate sample was collected from Well MW-32 and was analyzed using EPA Test Method 8020. The purpose of duplicate samples is to evaluate analytical laboratory precision. Precision is assessed by calculating the relative percent difference (RPD) between the initial sample results (X_1) and the duplicate sample results (X_2); a low RPD indicates high precision. The equation used to calculate RPD is:

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100$$

RPDs were calculated for four data pairs where analytes were detected above the reporting limit in the duplicate samples. Two of the calculated RPDs for toluene and xylenes (from Well MW-32) exceeded the quality assurance goal specified in the QA/QC Plan (*HLA, 1991a*). The laboratory has been contacted concerning these analytical data. Laboratory quality control data included surrogate recoveries and blank spike recoveries.

4.0 GROUNDWATER MONITORING PLAN

Carnation will continue to monitor groundwater elevations and free-phase petroleum product thicknesses monthly and will monitor groundwater chemistry quarterly. The nine wells on the quarterly sampling list are: Wells MW-3, MW-14, MW-25, MW-26, MW-27, MW-28, MW-29, MW-30, and MW-32. These wells will continue to be sampled for aromatic hydrocarbons using EPA Test Method 8020. BTEX. Additionally, samples from Wells MW-26 and MW-32 will continue to be analyzed for chlorinated hydrocarbons using EPA Test Method 8010. Quality assurance/quality control samples will be collected in accordance with the QA/QC Plan (*HLA, 1991a*).

5.0 REFERENCES

Harding Lawson Associates, 1991a. *Work Plan, Carnation Facility, Oakland, California.* May.

_____, 1991b. *Site Characterization Report, Carnation Facility, Oakland, California.* September.

TABLES

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
MW- 1	16.49	4/16/91	10.27			6.22
	16.49	5/24/91	10.66			5.83
	16.49	7/9/91	11.25			5.24
	16.49	8/15/91	11.61			4.88
	16.49	9/17/91	11.79			4.70
	16.49	10/16/91	12.00			4.49
	16.49	11/13/91	12.01			4.48
	16.49	12/17/91	12.20			4.29
MW- 2	15.11	4/16/91	9.15			5.96
	15.11	5/24/91	9.48			5.63
	15.11	7/9/91	10.02			5.09
	15.11	8/15/91	10.33			4.78
	15.11	9/17/91	10.49			4.62
	15.11	10/16/91	10.67			4.44
	15.11	11/13/91	10.66			4.45
	15.11	12/17/91	10.85			4.26
MW- 3	14.30	4/16/91	8.44			5.86
	14.30	5/24/91	8.75			5.55
	14.30	7/9/91	9.26			5.04
	14.30	8/15/91	9.57			4.73
	14.30	9/17/91	9.70			4.60
	14.30	10/16/91	9.84			4.46
	14.30	11/13/91	9.65			4.65
	14.30	12/17/91	10.00			4.30
MW- 4	14.42	4/16/91	8.46			5.96
	14.42	5/24/91	Dry			
	14.42	7/9/91	9.38			5.04
	14.42	8/15/91	9.71			4.71
	14.42	9/17/91	9.89			4.53
	14.42	10/16/91	Dry			
	14.42	11/13/91	10.04			4.38
	14.42	12/17/91	10.34			4.08
MW- 5	14.41	4/16/91	8.48			5.93
	14.41	5/24/91	8.81			5.60
	14.41	7/9/91	9.32			5.09
	14.41	8/15/91	9.60			4.81
	14.41	9/17/91	9.72			4.69
	14.41	10/16/91	9.87			4.54
	14.41	11/13/91	9.83			4.58
	14.41	12/17/91	10.10			4.31
MW- 6	14.12	4/16/91	8.15			5.97
	14.12	5/24/91	8.46			5.66
	14.12	7/9/91	8.95			5.17
	14.12	8/15/91	9.21			4.91
	14.12	9/17/91	9.28			4.84
	14.12	10/16/91	9.45			4.67
	14.12	11/13/91	9.41			4.71
	14.12	12/17/91	9.63			4.49
MW- 7	14.29	4/16/91	11.22	8.32	2.90	5.39
	14.29	5/24/91	10.79	7.72	3.07	5.96

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
	14.29	7/9/91	10.30	8.33	1.97	5.57
	14.29	8/15/91	11.04	8.40	2.64	5.36
	14.29	9/17/91	10.45	8.45	2.00	5.44
	14.29	10/16/91	11.43 est.	8.54	2.89	5.17
	14.29	11/13/91	11.40	8.50	2.90	5.21
	14.29	12/17/91	11.77	8.84	2.93	4.86
MW- 8	14.20	4/16/91	8.15			6.05
	14.20	5/24/91	8.83	8.40	0.43	5.71
	14.20	7/9/91	9.43	8.85	0.58	5.23
	14.20	8/15/91	9.68	9.12	0.56	4.97
	14.20	9/17/91	9.71	9.21	0.50	4.89
	14.20	10/16/91	9.79	9.30	0.49	4.80
	14.20	11/13/91	9.76	9.25	0.51	4.85
	14.20	12/17/91	10.96	9.44	1.52	4.46
MW- 9	14.96	5/24/91	9.31			5.65
	14.96	7/9/91	9.86			5.10
	14.96	8/15/91	10.19			4.77
	14.96	9/17/91	10.36			4.60
	14.96	10/16/91	10.55			4.41
	14.96	11/13/91	10.57			4.39
	14.96	12/17/91	10.76			4.20
MW-10	15.73	4/16/91	9.71			6.02
	15.73	5/24/91	10.06			5.67
	15.73	7/9/91	10.62			5.11
	15.73	8/15/91	10.78			4.95
	15.73	9/17/91	11.12			4.61
	15.73	10/16/91	11.32			4.41
	15.73	11/13/91	11.20			4.53
	15.73	12/17/91	11.48			4.25
MW-11	14.55	5/24/91	8.85			5.70
	14.55	7/9/91	9.43			5.12
	14.55	8/15/91	9.74			4.81
	14.55	9/17/91	9.92			4.63
	14.55	10/16/91	10.09			4.46
	14.55	11/13/91	10.09			4.46
	14.55	12/17/91	10.27			4.28
MW-12	15.28	4/16/91	9.24			6.04
	15.28	5/24/91	9.59			5.69
	15.28	7/9/91	10.14			5.14
	15.28	8/15/91	10.42			4.86
	15.28	9/17/91	10.61			4.67
	15.28	10/16/91	10.81			4.47
	15.28	11/13/91	10.80			4.48
	15.28	12/17/91	11.01			4.27
MW-13	14.85	4/16/91	8.84			6.01
	14.85	5/24/91	9.19			5.66
	14.85	7/9/91	9.73			5.12
	14.85	8/15/91	10.12			4.73
	14.85	11/13/91	10.38			4.47

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
MW-14	14.10	7/9/91	9.16			4.94
	14.10	8/15/91	9.45			4.65
	14.10	10/16/91	Dry			
MW-15	14.17	7/9/91	9.24			4.93
	14.17	8/15/91	9.53			4.64
	14.17	10/16/91	Dry			
MW-16	14.11	4/16/91	8.76			5.35
	14.11	5/24/91	8.61			5.50
	14.11	7/9/91	9.14			4.97
	14.11	8/15/91	9.40			4.71
	14.11	9/17/91	9.50			4.61
	14.11	10/16/91	9.67			4.44
	14.11	11/13/91	9.62			4.49
	14.11	12/17/91	9.89			4.22
MW-22	14.44	4/16/91	12.58	7.52	5.06	5.91
	14.44	5/24/91	13.05	7.77	5.28	5.61
	14.44	7/9/91	13.43	8.27	5.16	5.14
	14.44	8/15/91	13.69	8.53	5.16	4.88
	14.44	9/17/91	13.77 est.	8.61	5.16	4.80
	14.44	10/16/91	13.92	8.71	5.21	4.69
	14.44	11/13/91	13.78	8.68	5.10	4.74
	14.44	12/17/91	13.98	8.86	5.12	4.56
MW-23	14.48	5/24/91	9.97	8.53	1.44	5.66
	14.48	7/9/91	10.67	8.93	1.74	5.20
	14.48	8/15/91	10.91	9.26	1.65	4.89
	14.48	9/17/91	10.74	9.29	1.45	4.90
	14.48	10/16/91	10.99	9.53	1.46	4.66
	14.48	11/13/91	10.82	9.54	1.28	4.68
	14.48	12/17/91	10.93	9.79	1.14	4.46
MW-24	14.67	4/16/91	8.75			5.92
	14.67	5/24/91	9.76	8.83	0.93	5.65
	14.67	8/15/91	11.24	9.44	1.80	4.87
	14.67	9/17/91	11.20	9.61	1.59	4.74
	14.67	10/16/91	11.38	9.67	1.71	4.66
	14.67	11/13/91	11.23	9.71	1.52	4.66
	14.67	12/17/91	11.44	9.93	1.51	4.44
MW-25	12.86	4/17/91	7.79			5.07
	12.86	5/24/91	7.70			5.16
	12.86	7/9/91	7.42			5.44
	12.86	8/15/91	7.72			5.14
	12.86	9/17/91	7.81			5.05
	12.86	10/16/91	7.81			5.05
	12.86	12/17/91	8.02			4.84
MW-26	12.71	4/17/91	6.93			5.78
	12.71	5/24/91	6.95			5.76
	12.71	7/9/91	7.40			5.31
	12.71	8/15/91	7.53			5.18
	12.71	9/17/91	7.91			4.80
	12.71	10/16/91	7.67			5.04

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
	12.71	11/13/91	7.65			5.06
	12.71	12/17/91	7.97			4.74
MW-27	14.04	4/17/91	9.01			5.03
	14.04	5/24/91	8.23			5.81
	14.04	7/9/91	8.71			5.33
	14.04	8/15/91	8.75			5.29
	14.04	9/17/91	8.89			5.15
	14.04	10/16/91	9.03			5.01
	14.04	12/17/91	9.34			4.70
MW-28	13.45	4/17/91	7.55			5.90
	13.45	5/24/91	7.67			5.78
	13.45	7/9/91	8.08			5.37
	13.45	8/15/91	8.22			5.23
	13.45	9/17/91	8.29			5.16
	13.45	10/16/91	8.35			5.10
	13.45	11/13/91	8.33			5.12
	13.45	12/17/91	8.65			4.80
MW-29	12.60	4/17/91	7.04			5.56
	12.60	5/24/91	6.90			5.70
	12.60	7/9/91	7.24			5.36
	12.60	8/15/91	7.42			5.18
	12.60	9/17/91	7.53			5.07
	12.60	10/16/91	7.56			5.04
	12.60	11/13/91	7.52			5.08
	12.60	12/17/91	7.71			4.89
MW-30	14.54	8/15/91	9.75			4.79
	14.54	10/16/91	9.98			4.56
	14.54	11/13/91	9.90			4.64
	14.54	12/17/91	10.10			4.44
MW-31	14.92	8/15/91	10.14			4.78
	14.92	9/17/91	10.29			4.63
	14.92	10/16/91	10.47			4.45
	14.92	11/13/91	10.46			4.46
	14.92	12/17/91	10.20			4.72
MW-32	14.76	8/15/91	10.02			4.74
	14.76	9/17/91	10.08			4.68
	14.76	10/16/91	10.31			4.45
	14.76	11/13/91	10.31			4.45
	14.76	12/17/91	10.48			4.28
MW-33	NA	9/17/91	10.17			
	NA	10/16/91	10.33			
	NA	11/13/91	10.33			
PR-20	14.36	4/16/91	9.06	7.90	1.16	6.23
	14.36	5/24/91	9.94	8.10	1.84	5.89
	14.36	7/9/91	10.07	8.74	1.33	5.35
	14.36	8/15/91	10.32	9.03	1.29	5.07
	14.36	9/17/91	10.38	9.18	1.20	4.94
	14.36	10/16/91	10.45	9.97	0.48	4.29

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
	14.36	11/13/91	10.43	9.46	0.97	4.71
	14.36	12/17/91	10.69	9.82	0.87	4.37
PR-22	14.43	4/16/91	9.68	8.01	1.67	6.09
	14.43	5/24/91	10.20	8.30	1.90	5.75
	14.43	7/9/91	10.44	8.83	1.61	5.28
	14.43	8/15/91	10.61	9.01	1.60	5.10
	14.43	9/17/91	10.60	9.30	1.30	4.87
	14.43	10/16/91	10.63	9.37	1.26	4.81
	14.43	11/13/91	10.58	9.35	1.23	4.83
	14.43	12/17/91	9.68			4.75
PR-24	14.32	4/16/91	8.40			5.92
PR-27	NA	5/24/91	8.58			
	NA	7/9/91	9.10			
	NA	8/15/91	9.36			
	NA	9/17/91	9.53			
	NA	10/16/91	9.72			
	NA	11/13/91	9.62			
	NA	12/17/91	9.95			
PR-31	14.08	4/16/91	7.92			6.16
	14.08	9/17/91	8.36	8.35	0.01	5.73
	14.08	11/13/91	8.60			5.48
PR-33	14.36	4/16/91	7.78			6.58
	14.36	5/24/91	8.30			6.06
	14.36	7/9/91	8.78			5.58
	14.36	8/15/91	9.07			5.29
	14.36	9/17/91	9.25			5.11
	14.36	10/16/91	9.49			4.87
	14.36	11/13/91	9.44			4.92
	14.36	12/17/91	9.68			4.68
PR-35	14.55	4/16/91	8.98	8.26	0.72	6.15
	14.55	9/17/91	10.80	9.31	1.49	4.94
PR-38	14.47	4/16/91	8.58			5.89
PR-40	NA	4/16/91	8.58			
PR-41	NA	5/24/91	7.13	6.67	0.46	
	NA	7/9/91	7.76	7.13	0.63	
	NA	8/15/91	9.11	7.40	1.71	
	NA	9/17/91	9.54 est.	7.54	2.00	
	NA	10/16/91	8.39	7.69	0.70	
	NA	11/13/91	8.36	7.62	0.74	
	NA	12/17/91	8.67	7.85	0.82	
PR-43	NA	5/24/91	8.85			
	NA	7/9/91	9.20			
	NA	8/15/91	9.87			
	NA	9/17/91	9.63	9.62	0.01	
	NA	10/16/91	9.79			
	NA	11/13/91	9.76			

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
	NA	12/17/91	6.96			
PR-44	NA	5/24/91	8.26	6.69	1.57	
	NA	7/9/91	9.10	7.69	1.41	
	NA	8/15/91	10.56	8.22	2.34	
	NA	9/17/91	9.98	8.48	1.50	
	NA	10/16/91	9.78	8.61	1.17	
	NA	11/13/91	9.83	9.65	0.18	
	NA	12/17/91	9.97	8.82	1.15	
PR-45	NA	5/24/91	8.93	8.85	0.08	
	NA	7/9/91	9.50	9.30	0.20	
	NA	8/15/91	9.72	9.53	0.19	
	NA	9/17/91	9.83	9.68	0.15	
	NA	10/16/91	9.92	9.85	0.07	
	NA	11/13/91	9.94	9.88	0.06	
	NA	12/17/91	10.11	9.83	0.28	
PR-46	NA	7/9/91	8.60			
	NA	8/15/91	8.95			
	NA	9/17/91	9.09			
	NA	10/16/91	9.16			
	NA	11/13/91	9.13			
	NA	12/17/91	9.36			
PR-48	NA	4/16/91	8.75	8.65	0.10	
PR-49	NA	5/24/91	7.62			
PR-52	NA	5/24/91	9.26	8.76	0.50	
	NA	7/9/91	9.74	9.17	0.57	
	NA	8/15/91	10.03	9.38	0.65	
	NA	9/17/91	10.44	9.54	0.90	
	NA	10/16/91	10.26	9.66	0.60	
	NA	11/13/91	10.30	9.67	0.63	
	NA	12/17/91	10.51	9.83	0.68	
PR-53	NA	5/24/91	10.45	8.25	2.20	
	NA	7/9/91	10.57	8.85	1.72	
	NA	8/15/91	10.73	9.20	1.53	
	NA	9/17/91	10.23	9.53	0.70	
	NA	10/16/91	10.86	9.41	1.45	
	NA	11/13/91	10.89	9.39	1.50	
	NA	12/17/91	10.96	9.63	1.33	
PR-55	NA	5/24/91	9.51	8.59	0.92	
	NA	7/9/91	10.26	8.82	1.44	
	NA	8/15/91	10.58	9.07	1.51	
	NA	9/17/91	10.35	9.18	1.17	
	NA	10/16/91	10.98	9.31	1.67	
	NA	11/13/91	10.94	9.44	1.50	
	NA	12/17/91	11.10	9.56	1.54	
PR-56	NA	7/9/91	10.86	9.02	1.84	
	NA	8/15/91	10.93	9.33	1.60	
	NA	9/17/91	10.08	9.68	0.40	

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
	NA	10/16/91	11.00	9.58	1.42	
	NA	11/13/91	10.62	9.64	0.98	
	NA	12/17/91	11.06	9.83	1.23	
PR-57	NA	4/16/91	7.69			
PR-58	NA	4/16/91	8.99	8.03	0.96	
	NA	5/24/91	9.39	8.39	1.00	
	NA	7/9/91	10.03	8.86	1.17	
	NA	8/15/91	10.37	9.13	1.24	
	NA	9/17/91	10.59	9.36	1.23	
	NA	10/16/91	10.69	9.48	1.21	
	NA	11/13/91	10.68	9.51	1.17	
	NA	12/17/91	10.85	9.75	1.10	
PR-59	NA	4/16/91	8.09			
	NA	5/24/91	8.41			
	NA	7/9/91	9.03			
	NA	8/15/91	8.83			
	NA	9/17/91	9.42			
	NA	10/16/91	9.67			
	NA	11/13/91	9.25			
	NA	12/17/91	9.84			
PR-61	NA	5/24/91	9.06	8.94	0.12	
	NA	7/9/91	9.55	9.43	0.12	
	NA	8/15/91	9.89	9.71	0.18	
	NA	9/17/91	10.02	9.88	0.14	
	NA	10/16/91	10.14	9.97	0.17	
	NA	11/13/91	10.16	9.99	0.17	
	NA	12/17/91	10.36	10.17	0.19	
PR-63	NA	5/24/91	8.98	8.96	0.02	
	NA	7/9/91	9.46	9.45	0.01	
	NA	8/15/91	9.77	9.75	0.02	
	NA	9/17/91	9.84	9.83	0.01	
	NA	10/16/91	10.05	9.94	0.11	
	NA	11/13/91	10.05	9.95	0.10	
	NA	12/17/91	11.21	9.86	1.35	
PR-65	NA	5/24/91	8.76	8.68	0.08	
PR-67	NA	4/16/91	8.77	8.03	0.74	
PR-69	NA	4/16/91	7.08			
	NA	5/24/91	7.47			
	NA	7/9/91	8.13			
	NA	8/15/91	8.04			
	NA	9/17/91	8.44			
	NA	10/16/91	8.61			
	NA	11/13/91	8.76			
	NA	12/17/91	9.26			
PR-70	NA	4/16/91	8.86	7.46	1.40	
PR-71	NA	4/16/91	8.71			

Harding Lawson Associates

Table 1. Groundwater Elevations and Free-Phase Petroleum Product Thicknesses

Well Number	Measuring Point Elevation (ft AMSL)	Date	Depth to Water (ft BGS)	Depth to Product (ft BGS)	Product Thickness (ft)	Water Level Elevation* (ft AMSL)
PR-72	NA	4/16/91	9.03			
PR-77	NA	5/24/91	8.65			
	NA	7/9/91	9.18			
	NA	8/15/91	9.38			
	NA	9/17/91	9.54			
	NA	10/16/91	9.74			
	NA	11/13/91	8.99			
	NA	12/17/91	9.91			
PR-81	NA	4/16/91	8.35			

* When product is present the equivalent water level elevation is calculated by adding 0.8 times the product thickness to the product/water interface elevation.

AMSL = Elevation Above Mean Sea Level
BGS = Below Ground Surface
NA = Data Not Available
est. = estimated value

Carnation.wt
Feb-92

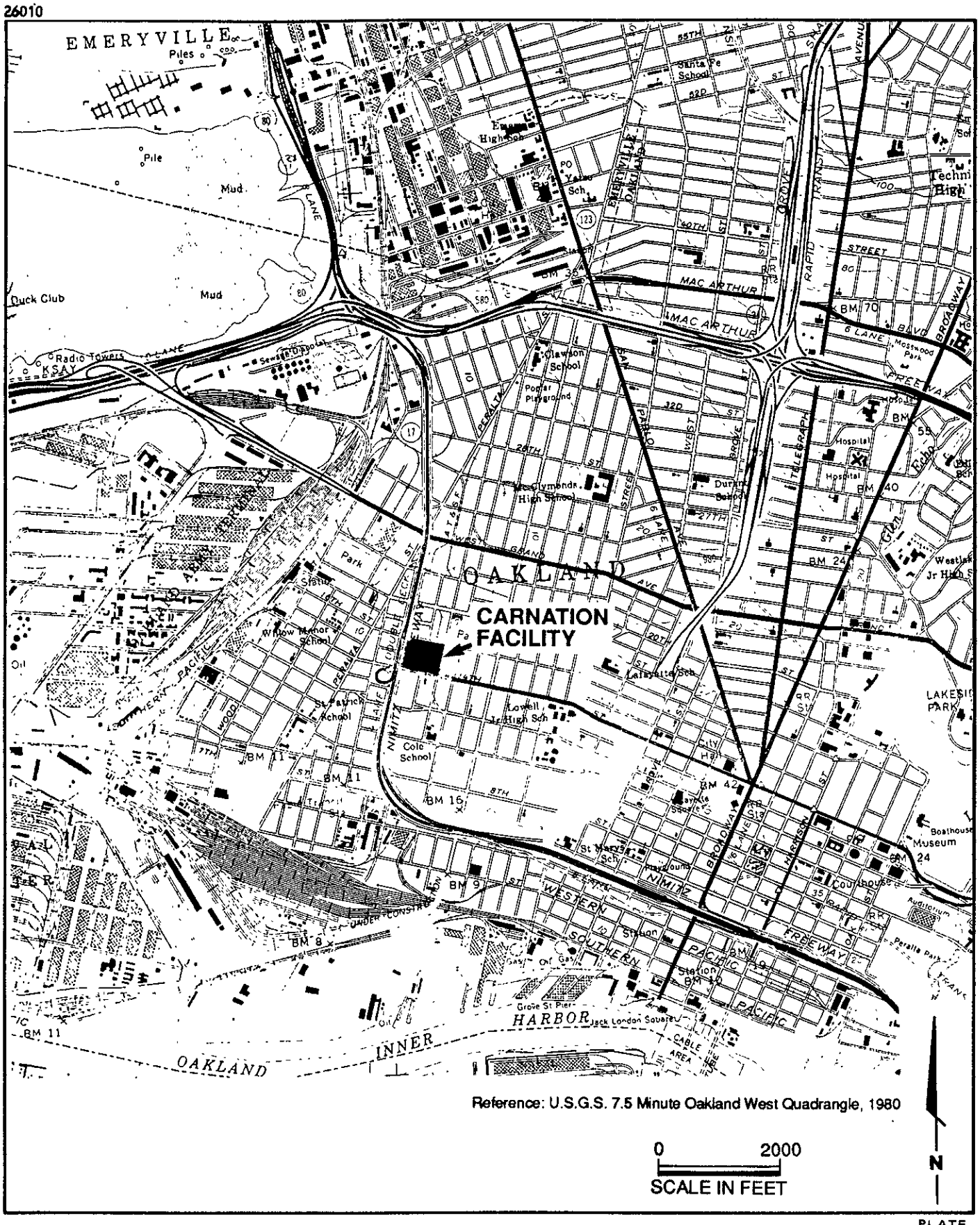
Table 2. Groundwater Analytical Data

Method 8020 Compounds Concentrations (μg/l)						Method 8010 Compounds Concentrations (μg/l)
Well Number	Sample Number	Benzene	Toluene	Ethyl-Benzene	Xylenes (Total)	
MW-3	91121601	100	8.1	2.9	5.9	NT
MW-25	91121701	2.2	12	12	55	NT
MW-26	91121702	5,300	4,500	450	1,600	79 (1,2-DCA)
MW-27	91121704	11	17	2.1	11	NT
MW-28	91121705	0.69	3.5	<0.6	18	NT
MW-29	91121706	<0.5	0.62	<0.6	<0.6	NT
MW-30	91121602	<0.5	<0.5	<0.6	1.1	NT
MW-32	91121603	64	0.92	1.5	1.7	4.2 (1,2-DCA)
MW-32 dup	91121604	63	11	1.9	8.7	4.0 (1,2-DCA)
Field Blank	91121703	<0.5	<0.5	<0.6	<0.6	<0.4-<10

Notes:
<0.5 - Chemical not detected above indicated reporting limit
NT - Not tested

ILLUSTRATIONS

26010



Reference: U.S.G.S. 7.5 Minute Oakland West Quadrangle, 1980

0 2000
SCALE IN FEET

N

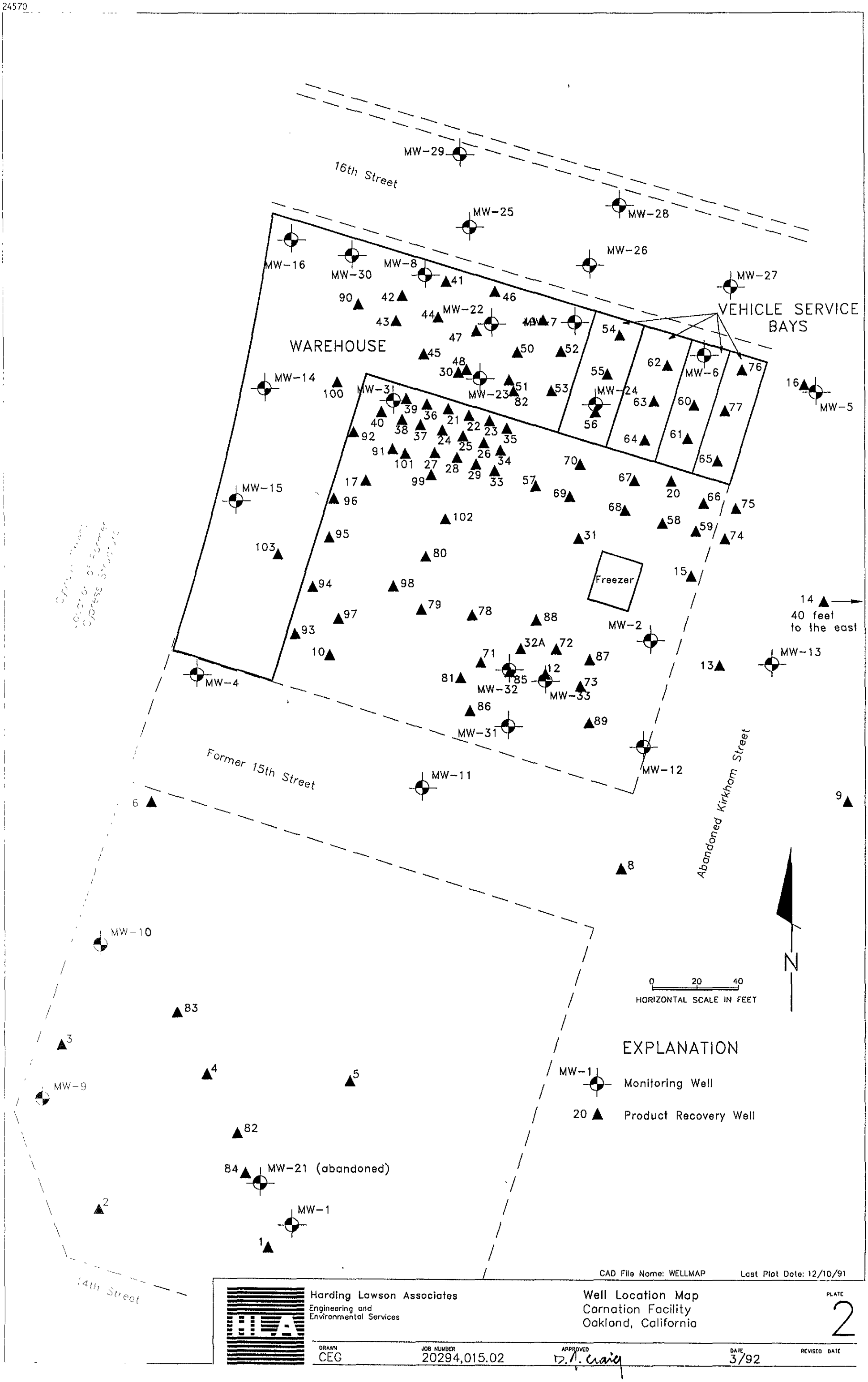
PLATE
1

Harding Lawson Associates
Engineering and
Environmental Services

Site Location Map
Carnation Facility
Oakland, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
NJB	20294,015.02	D. J. Craig	3/92	

24570



CAD File Name: WELLMAP Last Plot Date: 12/10/91

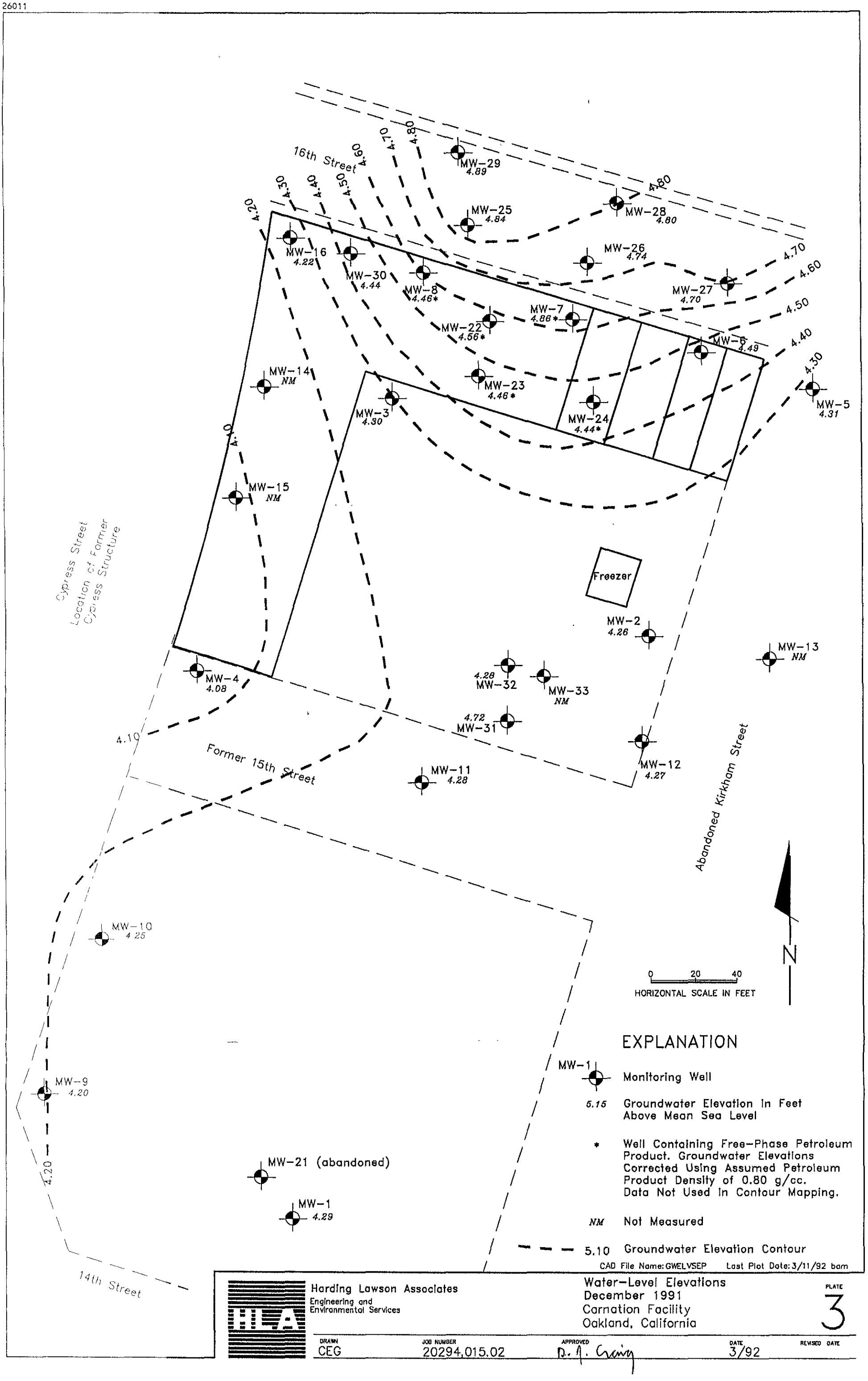
Harding Lawson Associates
Engineering and Environmental Services

Well Location Map
Carnation Facility
Oakland, California

PLATE 2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CEG	20294,015.02	R.A. Craig	3/92	

26011



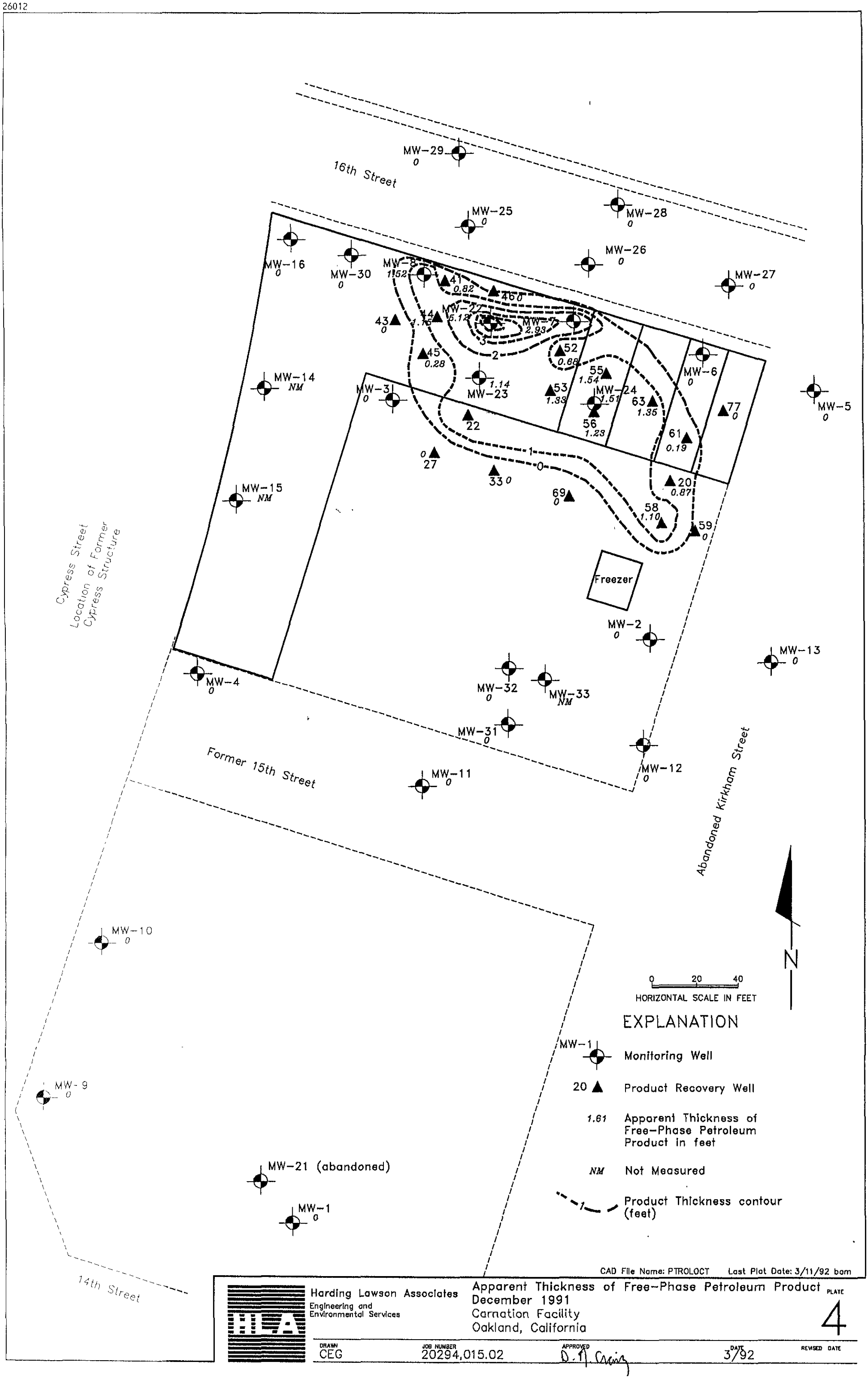
Harding Lawson Associates
Engineering and Environmental Services

Water-Level Elevations
December 1991
Carnation Facility
Oakland, California

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CEG	20294,015.02	D. A. Craig	3/92	

26012



CAD File Name: PTROLOCT Last Plot Date: 3/11/92 bam

Harding Lawson Associates
Engineering and Environmental Services

Apparent Thickness of Free-Phase Petroleum Product
December 1991
Carnation Facility
Oakland, California

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CEG	20294,015.02	D.A. Craig	3/92	

26013

16th Street

MW-29
B | <0.5
T | 0.62
E | <0.6
X | <0.6

MW-25
B | 2.2
T | 12
E | 12
X | 55

MW-28
B | 5,300
T | 4,500
E | 450
X | 1,600
1,2-DCA | 79
B | 0.69
T | 3.5
E | <0.6
X | 18

MW-26

MW-27
B | 11
T | 17
E | 2.1
X | 11

MW-16
NS

MW-30
B | <0.5
T | <0.5
E | <0.6
X | 1.1

MW-8
FP

MW-22
FP

MW-7
FP

MW-6
FP

MW-14
NS

MW-3
B | 100
T | 8.1
E | 2.9
X | 5.9

MW-23
FP

MW-24
FP

MW-5
NS

MW-15
NS

Cypress Street
Location of Former
Cypress Structure

Freezer

B | 64
T | 0.92
E | 1.5
X | 1.7
1,2-DCA | 4.0

MW-2
NS

MW-13
NS

MW-4
NS

MW-32

MW-33
NS

MW-31
NS

MW-12
NS

Former 15th Street

MW-11
NS

Abandoned Kirkham Street

MW-10
NS

N

0 20 40
HORIZONTAL SCALE IN FEET

MW-9
NS

EXPLANATION

MW-1 — Monitoring Well

FP — Free Product in Well

NS — Well not Sampled

MW-21 (abandoned)

MW-1
NS

COMPOUND
B=Benzene
T=Toluene
E=Ethylbenzene
X=Xylenes
CB=Chlorobenzene
1,2-DCA=1,2 Dichloroethane

CONCENTRATION
Concentration of Compound in ug/l

<0.5–Compound not Detected Above Reporting Limit

14th Street

CAD File Name: CHEMSEP Last Plot Date: 3/11/92 bam

Harding Lawson Associates
Engineering and Environmental Services

Groundwater Chemistry,
December 1991
Carnation Facility
Oakland, California

PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CEG	20294,015.02	D. A. Craig	3/92	

Appendix A

GROUNDWATER SAMPLING FORMS

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-3
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Job Name Carnation
Job Number 20294.015.02
Date 12-16-91 Time 1354
Recorded by Rick Erikson (Signature)
Sampled by RWE (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 22.3
Water Level Depth (WL in feet BTOC): 10.03
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☑ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☑ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

$(22.3 \text{ TD (feet)} - 10.03 \text{ WL (feet)}) \times 4^2 \text{ D (inches)} \times 3 \text{ \# Vols} \times 0.0408 = 25 \text{ Calculated Purge Volume}$ gallons

PURGE TIME

1340 Start 1344 Stop 4 min Elapsed

PURGE RATE

Initial 3 gpm Final — gpm dry @ 12

ACTUAL PURGE VOLUME

gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other
initial	7.1	900	15.0	
12 gals	7.2	1050	15.5	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): turbid slight HC odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☑ Bailer - Type: S.S.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1601	3 VOA	8020	HCl	Net	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Job Name Carnation
Job Number 20294.015.02
Recorded by Rick Erdman (Signature)

Well No. MW-30
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Date 12-16-91 Time 1448
Sampled by RWE (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 21.1
Water Level Depth (WL in feet BTOC): 10.16
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☑ Bailer - Type: PVC
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☐ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): ____ Screen Interval in feet (BTOC): from ____ to ____

PURGE VOLUME CALCULATION

$$\left(\frac{21.1}{\text{TD (feet)}} - \frac{10.16}{\text{WL (feet)}}\right) \times \frac{4^2}{\text{D (inches)}} \times \frac{3}{\text{\# Vols}} \times 0.0408 = \frac{21}{\text{Calculated Purge Volume}} \text{ gallons}$$

PURGE TIME

1419 Start 1441 Stop 21-min Elapsed

PURGE RATE

Initial ____ gpm Final ____ gpm

ACTUAL PURGE VOLUME

21 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other
initial	7.0	700	16.5	
12-gals	6.9	750	17.0	
21-"	6.8	750	17.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): clear → silty brown
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☑ Bailer - Type: S.S.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1602	3 VOA	8020	HCl	Net	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Sheet 1 of 1

Project: SARVATIONAL Job No.: 20294.015.03
Subject: FIELD INVESTIGATION DAILY REPORT Date: 12-17-91
Equipment Rental: _____ Company: _____ To: DC
Equipment Hours: _____ F.E. Time from: _____ to: _____ By: RWE

(outside service and expense record must be attached for any outside costs)

0700 - @ OFFICE, A.U. INTERPHASE PROBE & FRESH BLUE ICE
0835 - ON SITE, DECON 5-SETS PURGE-SAMPLE EQUIP., CALIBRATE METERS.
0928 - @ MW-25 WL = 8.02' TD = 19.1' 4" Φ 3-VOLS. = 21-GALS
0943 - PUMPED DRY @ 8-GALS SILTY BROWN
0953 - SAMPLED MW-25 # 91121701 8020
1000 - @ MW-26 WL = 3.93' TD = 25' 4" Φ 3-VOLS. = 33-GALS.
1025 - PUMPED 33-GALS CLEAR W/ H/S ODOR
1030 - SAMPLED MW-26 # 91121702 8010-8020 FIELD BLANK # 91121703
1041 - @ MW-27 WL = 9.34' TD = 23.9' 4" Φ 3-VOLS. = 29-GALS.
1110 - PUMPED 30-GALS TURBID WATER
1115 - SAMPLED MW-27 # 91121704 8020
1120 - @ MW-28 WL = 8.65' TD = 25' 4" Φ 3-VOLS. = 32-GALS.
1139 - PUMPED 33-GALS TURBID WATER
1142 - SAMPLED MW-28 # 91121705 8020
1146 - @ MW-29 WL = 3.71' TD = 23' 4" Φ 3-VOLS. = 30-GALS.
1203 - PUMPED 30-GALS TURBID WATER
1213 - SAMPLED MW-29 # 91121706 8020
TRANSFER DISCHARGE TO POLY TANK - MEASURE DTP-DTW SELECTED WELLS
1600 - RETURN TO HOUSTON - OFF JOB

Attachments:

Initial RWE

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-29
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Job Name Carnation
Job Number 20254.015.02
Date 12-17-91 Time 1213
Recorded by Rick Carlson (Signature)
Sampled by RWE (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 23
Water Level Depth (WL in feet BTOC): 7.71
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☑ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☑ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

$(23 - 7.71) \times 4^2 \times 3 \times 0.0408 = 30$ gallons

(TD (feet) − WL (feet)) × D (inches)² × # Vols × 0.0408 = Calculated Purge Volume

PURGE TIME

1152 Start 1302 Stop 10 min Elapsed

PURGE RATE

Initial 3 gpm Final 3 gpm

ACTUAL PURGE VOLUME

30 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other
initial	6.8	400	17.0	
15-gals	6.7	380	18.0	
30 "	6.6	380	18.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): silty brown
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☑ Bailer - Type: S.S.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1706	3 VOA	8020	HCl	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

RL004

OFFICE COPY

0746

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-28
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Job Name Carnation
Job Number 20294.015.02
Date 12-13-91 Time 1142
Recorded by Riel Erlson (Signature)
Sampled by RWE (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 25
Water Level Depth (WL in feet BTOC): 8.65
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☑ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☑ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): _____ Screen Interval in feet (BTOC): from _____ to _____

PURGE VOLUME CALCULATION

$$\left(\underset{\text{TD (feet)}}{25} - \underset{\text{WL (feet)}}{8.65}\right) \times \underset{\text{D (inches)}}{4}^{2} \times \underset{\text{\# Vols}}{3} \times 0.0408 = \underset{\text{Calculated Purge Volume}}{32} \text{ gallons}$$

PURGE TIME

1128 Start 1139 Stop 11 min Elapsed

PURGE RATE

Initial 3 gpm Final 3 gpm

ACTUAL PURGE VOLUME

33 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other
initial	6.6	350	12.0	
15 gals	6.6	330	12.5	
33 "	6.6	330	12.5	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): turbid
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☐ Same As Above
☑ Bailer - Type: S.S.
☐ Grab - Type:
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1705	3 VOA	8020	HCl	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-23
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Date 12-17-91 Time 1115
Sampled by RWE (Initials)

Job Name Carnation
Job Number 20294.015.02
Recorded by Rick Fisher (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 23.9
Water Level Depth (WL in feet BTOC): 9.34
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☑ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☑ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

$$\left(\frac{23.9}{\text{TD (feet)}} - \frac{\quad}{\text{WL (feet)}}\right) \times \frac{4}{\text{D (inches)}}^2 \times \frac{3}{\text{\# Vols}} \times 0.0408 = \frac{29}{\text{Calculated Purge Volume}} \text{ gallons}$$

PURGE TIME

1048 Start 1110 Stop 26-min Elapsed

PURGE RATE

Initial 3 gpm Final ~1 gpm

ACTUAL PURGE VOLUME

30 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other
initial	6.6	200	13.0	
15-gals	6.4	200	13.5	
30 "	6.5	180	18.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): turbid
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☑ Bailer - Type: S.S.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1704	3 VOA	8020	HCl	Net	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-26
Well Type: ☑ Monitor ☐ Extraction ☐ Other ____
Well Material: ☑ PVC ☐ St. Steel ☐ Other ____
Date 12-13-91 Time 1030
Sampled by ____ (Initials)

Job Name Carnation
Job Number 20294.015.02
Recorded by Rick Evaluna (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other ____
Total Depth of Casing (TD in feet BTOC): 25
Water Level Depth (WL in feet BTOC): 7.92
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____

PURGE METHOD

☐ Bailer - Type: ____
☐ Submersible ☑ Centrifugal ☐ Bladder; Pump No.: ____
☐ Other - Type: ____

PUMP INTAKE SETTING

☑ Near Bottom ☐ Near Top ☐ Other ____
Depth in feet (BTOC): ____ Screen Interval in feet (BTOC): from ____ to ____

PURGE VOLUME CALCULATION

$(25 \text{ (TD)} - 7.92 \text{ (WL)}) \times 4^2 \text{ (D)} \times 3 \text{ (\# Vols)} \times 0.0408 = 33$ gallons (Calculated Purge Volume)

PURGE TIME

1014 Start 1025 Stop 11 min Elapsed

PURGE RATE

Initial 3 gpm Final 3 gpm

ACTUAL PURGE VOLUME

33 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other ____
initial	6.5	400	16.0	
16 gals	6.4	370	16.5	
33 "	6.4	360	17.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other ____
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): silty brown H/C odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other soil stock

WELL SAMPLING

SAMPLING METHOD

☑ Bailer - Type: S.S.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: ____
☐ Same As Above
☐ Grab - Type: ____
☐ Other - Type: ____

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1202	3 VOA	8010-8020	HCl	Net	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.
Field	1903

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Job Name: Carnation
Job Number: 20294.015.02
Recorded by: Rick Evalue (Signature)

Well No.: MW-25
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date: 12-17-91 Time: 0953
Sampled by: RWE (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other

Total Depth of Casing (TD in feet BTOC): 19.1
Water Level Depth (WL in feet BTOC): 8.02
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

(19.1 TD (feet) − 8.02 WL (feet)) X 4² D (inches) X 3 # Vols X 0.0408 = 21 gallons Calculated Purge Volume

PURGE TIME

0940 Start 0943 Stop 3-min Elapsed

PURGE RATE

Initial 3 gpm Final — gpm

ACTUAL PURGE VOLUME

dry @ 8 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒°C ☐°F	Other
initial	6.9	350	15.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐°C ☐°F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): silty brown
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: S.S.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1701	3 VOA	8020	HCL	Net	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Sheet 1 of 1

Project: CARNATION Job No.: 20294.015.02
Subject: FIELD INVESTIGATION DAILY REPORT Date: 12-16-91
Equipment Rental: _____ Company: _____ To: DC
Equipment Hours: _____ F.E. Time from: _____ to: _____ By: RWE

(outside service and expense record must be attached for any outside costs)

0800 - @ OFFICE, REVIEW INSTRUCTIONS, COLLECT EQUIP. & SUPPLIES, NO OIL-WATER INTERPHASE PROBE IN WAREHOUSE → NOTIFY RAH.
1028 - ON SITE, MEET W/ ROY (EBMUD) DISCUSS S.S. LOCATIONS & PROTOCOL. COLLECT pH - 7.3. BEGIN DIGGING TO APPROVED MH @ S-CARN. GAUGE TD OF S.S.M.H NEAR CORNER OF 16TH & DRIVEWAY @ 7' - NO WATER. SECOND MH ON MAP HAS BEEN ABANDONED - SET UP DECON AREA NEAR WASH RACK - WASH 4 SETS PURGE - SAMPLE EQUIP, CALIBRATE METERS. TRY TO ACCESS MW-14 - WAREHOUSE LOCKED, KEY GIVEN TO US DOESN'T WORK? PEOPLE ON SITE CLAIM S.O.L. FOR WAREHOUSE ACCESS...
1322 - @ MW-3 WL = 10.03' TD = 22.7' 4" ϕ 3-VOLS. = 25-GALS.
1344 - PUMPED DRY @ 12-GALS. TURBID H/C ODOR.
1354 - SAMPLED MW-3 - B020 #9112 1601 NET PACIFIC.
1402 - @ MW-30 WL = 10.16' TD = 21.1' 4" ϕ 3-VOLS. = 21-GALS.
1441 - BAILED 21-GALS SILTY BROWN WATER
1448 - SAMPLED MW-30 #9112 1602
1502 - @ MW-32 WL = 10.51' TD = 23.1' 4" ϕ 3-VOLS. = 25-GALS.
1522 - PUMPED DRY @ 19-GALS SILTY BROWN
1532 - COLLECT SAMPLE #9112 1603 & MP #9112 1604 B010-B020
TRANSFER DISCHARGE TO POLY TANK, CLEAN UP, RETURN TO NOVATO
1630 - OFF JOB

Attachments:

Initial RWE

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-32
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Job Name Carnation
Job Number 20294.015.02
Date 12-16-91 Time 1532
Recorded by Rick Erickson (Signature)
Sampled by RWE (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☑ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 23.1
Water Level Depth (WL in feet BTOC): 10.51
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☑ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☑ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): ____ Screen Interval in feet (BTOC): from ____ to ____

PURGE VOLUME CALCULATION

$(23.1 - 10.51) \times 4^2 \times 3 \times 0.0408 = 25$ gallons

(TD (feet) − WL (feet)) × D (inches)² × # Vols × 0.0408 = Calculated Purge Volume

PURGE TIME

1518 Start 1532 Stop 4-min Elapsed

PURGE RATE

Initial ____ gpm Final ____ gpm

ACTUAL PURGE VOLUME

dry @ 14 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other
initial	6.7	800	13.0	
12-gals	6.9	900	13.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): silty brown
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☐ Same As Above
☑ Bailer - Type: S.S.
☐ Grab - Type:
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9112

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1603	3 VOA	8010, 8020	HCl	Net	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.
1603	1604

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

RL004

OFFICE COPY

0746

Appendix B

GROUNDWATER CHEMISTRY LABORATORY RESULTS AND CHAIN OF CUSTODY FORMS

NATIONAL
ENVIRONMENTAL
TESTING, INC.

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

Bruce Sheibach
Harding Lawson Associates
200 Rush Landing
Novato, CA 94947

Date: 01/09/1992
NET Client Acct No: 28100
NET Pacific Log No: 91.1390
Received: 12/17/1991

Client Reference Information

Carnation Oakland, Job:20294,015.02

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

Ref: Carnation Oakland, Job:20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 91121601 12/16/1991 13:30 108574	 91121602 12/16/1991 14:30 108575	Units
METHOD 8020 (GC,Liquid)					
DATE ANALYZED			12-29-91	12-29-91	
DILUTION FACTOR*			1	1	
Chlorobenzene	8020	0.4	ND	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ND	ug/L
Benzene	8020	0.5	100	ND	ug/L
Ethylbenzene	8020	0.6	2.9	ND	ug/L
Toluene	8020	0.5	8.1	ND	ug/L
Xylenes (total)	8020	0.6	5.9	1.1	ug/L

NET Pacific, Inc

Client No: 28100
Client Name: Harding Lawson Associates
NET Log No: 91.1390

Date: 01/09/1992
Page: 3

Ref: Carnation Oakland, Job:20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 91121701 12/17/1991 10:00 108576	 91121704 12/17/1991 11:00 108577	Units
METHOD 8020 (GC,Liquid)					
DATE ANALYZED			12-29-91	12-29-91	
DILUTION FACTOR*			1	1	
Chlorobenzene	8020	0.4	ND	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ND	ug/L
Benzene	8020	0.5	2.2	11	ug/L
Ethylbenzene	8020	0.6	12	2.1	ug/L
Toluene	8020	0.5	12	17	ug/L
Xylenes (total)	8020	0.6	55	11	ug/L

NET Pacific, Inc

Client No: 28100 Date: 01/09/1992
Client Name: Harding Lawson Associates
NET Log No: 91.1390 Page: 4

Ref: Carnation Oakland, Job:20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 91121705 12/17/1991 11:30 108578	 91121706 12/17/1991 12:00 108579	Units
METHOD 8020 (GC,Liquid)					
DATE ANALYZED			12-29-91	12-29-91	
DILUTION FACTOR*			1	1	
Chlorobenzene	8020	0.4	ND	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ND	ug/L
Benzene	8020	0.5	0.69	ND	ug/L
Ethylbenzene	8020	0.6	ND	ND	ug/L
Toluene	8020	0.5	3.5	0.62	ug/L
Xylenes (total)	8020	0.6	18	ND	ug/L

Ref: Carnation Oakland, Job:20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 91121603 12/16/1991 15:30 108580	 91121604 12/16/1991 16:00 108581	Units
METHOD 8010 & 8020 (GC,Liquid)					
DATE ANALYZED			12-29-91	12-29-91	
DILUTION FACTOR*			1	1	
Bromodichloromethane	8010	0.4	ND	ND	ug/L
Bromoform	8010	0.4	ND	ND	ug/L
Bromomethane	8010	0.4	ND	ND	ug/L
Carbon tetrachloride	8010	0.4	ND	ND	ug/L
Chlorobenzene	8020	0.4	ND	ND	ug/L
Chloroethane	8010	0.4	ND	ND	ug/L
2-Chloroethylvinyl ether	8010	1.0	ND	ND	ug/L
Chloroform	8010	0.4	ND	ND	ug/L
Chloromethane	8010	0.4	ND	ND	ug/L
Dibromochloromethane	8010	0.4	ND	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ND	ug/L
Dichlorodifluoromethane	8010	0.4	ND	ND	ug/L
1,1-Dichloroethane	8010	0.4	ND	ND	ug/L
1,2-Dichloroethane	8010	0.4	4.2	4.0	ug/L
1,1-Dichloroethene	8010	0.4	ND	ND	ug/L
trans-1,2-Dichloroethene	8010	0.4	ND	ND	ug/L
1,2-Dichloropropane	8010	0.4	ND	ND	ug/L
cis-1,3-Dichloropropene	8010	0.4	ND	ND	ug/L
trans-1,3-Dichloropropene	8010	0.4	ND	ND	ug/L
Methylene chloride	8010	10	ND	ND	ug/L
1,1,2,2-Tetrachloroethane	8010	0.4	ND	ND	ug/L
Tetrachloroethene	8010	0.4	ND	ND	ug/L
1,1,1-Trichloroethane	8010	2.0	ND	ND	ug/L
1,1,2-Trichloroethane	8010	0.4	ND	ND	ug/L
Trichloroethene	8010	0.4	ND	ND	ug/L
Trichlorofluoromethane	8010	0.4	ND	ND	ug/L
Vinyl chloride	8010	2.0	ND	ND	ug/L
Benzene	8020	0.5	64	63	ug/L
Ethylbenzene	8020	0.6	1.5	1.9	ug/L
Toluene	8020	0.5	0.92	11	ug/L
Xylenes (total)	8020	0.6	1.7	8.7	ug/L

NET Pacific, Inc

Client No: 28100
Client Name: Harding Lawson Associates
NET Log No: 91.1390

Date: 01/09/1992
Page: 6

Ref: Carnation Oakland, Job:20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 91121702 12/17/1991 10:15 108582	 91121703 12/17/1991 10:30 108583	Units
METHOD 8010 & 8020 (GC,Liquid)					
DATE ANALYZED			12-29-91	12-29-91	
DILUTION FACTOR*			1	1	
Bromodichloromethane	8010	0.4	ND	ND	ug/L
Bromoform	8010	0.4	ND	ND	ug/L
Bromomethane	8010	0.4	ND	ND	ug/L
Carbon tetrachloride	8010	0.4	ND	ND	ug/L
Chlorobenzene	8020	0.4	ND	ND	ug/L
Chloroethane	8010	0.4	ND	ND	ug/L
2-Chloroethylvinyl ether	8010	1.0	ND	ND	ug/L
Chloroform	8010	0.4	ND	ND	ug/L
Chloromethane	8010	0.4	ND	ND	ug/L
Dibromochloromethane	8010	0.4	ND	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ND	ug/L
Dichlorodifluoromethane	8010	0.4	ND	ND	ug/L
1,1-Dichloroethane	8010	0.4	ND	ND	ug/L
1,2-Dichloroethane	8010	0.4	79	ND	ug/L
1,1-Dichloroethene	8010	0.4	ND	ND	ug/L
trans-1,2-Dichloroethene	8010	0.4	ND	ND	ug/L
1,2-Dichloropropane	8010	0.4	ND	ND	ug/L
cis-1,3-Dichloropropene	8010	0.4	ND	ND	ug/L
trans-1,3-Dichloropropene	8010	0.4	ND	ND	ug/L
Methylene chloride	8010	10	ND	ND	ug/L
1,1,2,2-Tetrachloroethane	8010	0.4	ND	ND	ug/L
Tetrachloroethene	8010	0.4	ND	ND	ug/L
1,1,1-Trichloroethane	8010	2.0	ND	ND	ug/L
1,1,2-Trichloroethane	8010	0.4	ND	ND	ug/L
Trichloroethene	8010	0.4	ND	ND	ug/L
Trichlorofluoromethane	8010	0.4	ND	ND	ug/L
Vinyl chloride	8010	2.0	ND	ND	ug/L
Benzene	8020	0.5	5,300	ND	ug/L
Ethylbenzene	8020	0.6	450	ND	ug/L
Toluene	8020	0.5	4,500	ND	ug/L
Xylenes (total)	8020	0.6	1,600	ND	ug/L

Ref: Carnation Oakland, Job:20294,015.02

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Chlorobenzene	0.4	ug/L	94	ND	86	96	10
1,1-Dichloroethene	0.4	ug/L	100	ND	65	75	13
Trichloroethene	0.4	ug/L	110	ND	99	108	9.2

COMMENT: Blank Results were ND on other analytes tested.

NET Pacific, Inc

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
*	:	Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
ICVS	:	Initial Calibration Verification Standard (External Standard).
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

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

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

SM: see "Standard Methods for the Examination of Water & Wastewater, 16th Edition, APHA, 1985.

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CHAIN OF CUSTODY FORM

Lab: Met Pacific 2784

Samplers: Rick Erdman

Job Number: 20294.015.03

Name/Location: Carnation - Oakland

Project Manager: Bruce Shaiback

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
23	X						3		91	12	1601	91	12	16	1330			X				
	"						"				1602				1420			X				
											1603				1530		X	X				
											1604				1600		X	X				
											1701			17	1000			X				
											1702				1015		X	X				
											1703				1030		X	X				
											1704				1100			X				
											1705				1130			X				
	"						"		"		1706	"		"	1200			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 12/17/91 1630
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 12-17-91 1725	RECEIVED FOR LAB BY: (Signature)	DATE/TIME 12/17/91 1725
METHOD OF SHIPMENT		

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QUALITY CONTROL REVIEWER

David F. Leland, P.E.
Associate Engineer