A Report Prepared for

Carnation Company
800 North Brand Boulevard
Glendale, California 91203

QUARTERLY ACTIVITY REPORT
JANUARY THROUGH MARCH 1992
CARNATION FACILITY
OAKLAND, CALIFORNIA

5-15-92

HLA Job No. 20294,015.02

by

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May 15, 1992

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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 March 1992, 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
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 first quarterly

groundwater chemistry monitoring round for 1992. 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 March 23 and 24, 1992, groundwater samples were collected for chemical analysis from nine onsite and offsite monitoring wells: Wells MW-3, MW-14, 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 Well MW-32 and the field blank were analyzed for chlorinated hydrocarbons by EPA Test Method 8010.

why just BTEX?

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).

copy of permit?

3.0 RESULTS OF INVESTIGATIONS

3.1 Water-Level Elevations

Table 1 contains the groundwater elevation data collected during March 1992. 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 March 1992. 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 west beneath the northern portion of the site (Plate 3). The hydraulic gradient beneath the northern portion of the site is approximately 5.6×10^{-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 2.3×10^{-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 March 1992. Free-product thicknesses were determined using an oil-interface probe. The distribution of free-phase product measured during March is shown on Plate 4. In general, the thickness of free-phase product measured during March is similar to the thicknesses measured in January and February 1992. The apparent product thickness was greatest in Well MW-22 (5.78 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 nine wells were sampled, three on March 23, 1992, and six on March 24, 1992, with a duplicate sample collected from MW-32. 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 the samples from Wells MW-3, MW-26, MW-30, and MW-32. BTEX compounds were not detected above the reporting limit for the samples from Wells MW-14, MW-25, MW-27, MW-28, and MW-29.

3.3.2 Distribution of Chlorinated Hydrocarbons in Groundwater

One chlorinated hydrocarbon, 1,2-dichloroethane (1,2-DCA), was detected in the two samples from onsite Well MW-32. 1,2-DCA was detected in Well MW-32 at a concentration of 2.0 µg/l and from the MW-32 duplicate sample at a concentration of 1.9 µg/l. This well will continue to be sampled and analyzed for chlorinated hydrocarbons.

why is only this well being sampled for Cl HC?

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 March 24, 1992, and transported to the analytical laboratory with the groundwater samples. Toluene was detected at 0.7 µg/l in the field blank.

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. None of the calculated RPDs 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. Additionally, Well 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
	16.49	1/28/92	11.77			4.72
	16.49	2/24/92	10.18			6.31
	16.49	3/23/92	9.33			7.16
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
	15.11	1/28/92	10.43			4.68
	15.11	2/24/92	8.95			6.16
	15.11	3/23/92	8.18			6.93
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
	14.30	1/28/92	9.62			4.68
	14.30	2/24/92	7.84			6.46
	14.30	3/23/92	7.54			6.76
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
	14.42	1/28/92	9.85			4.57
	14.42	2/24/92	8.30			6.12
	14.42	3/23/92	7.58			6.84
MW- 5	14.41	4/16/91	8.48			5.93

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)
	14.41	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
	14.41	1/28/92	9.71			4.70
	14.41	2/24/92	8.11			6.30
	14.41	3/23/92	7.48			6.93
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
	14.12	1928/92	9.27			4.85
	14.12	2/24/92	7.74			6.38
	14.12	3/23/92	7.24			6.88
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
	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
	14.29	1/28/92	11.23	8.40	2.83	5.32
	14.29	2/24/92	10.45	6.74	3.71	6.81
	14.29	3/23/92	10.63	5.97	4.66	7.39
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
	14.20	1/28/92	9.65	9.08	0.57	5.01
	14.20	2/24/92	8.23	7.74	0.49	6.36
	14.20	3/23/92	7.88	7.25	0.63	6.82
MW- 9	14.96	5/24/91	9.31			5.65
	14.96	7/9/91	9.86			5.10

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)
	14.96	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
	14.96	1/28/92	10.32			4.64
	14.96	2/24/92	8.94			6.02
	14.96	3/23/92	8.16			6.80
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
	15.73	1/28/92	11.00			4.73
	15.73	2/24/92	9.66			6.07
	15.73	3/23/92	8.88			6.85
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
	14.55	1/28/92	9.95			4.60
	14.55	2/24/92	8.48			6.07
	14.55	3/23/92	7.60			6.95
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
	15.28	1/28/92	10.58			4.70
	15.28	2/24/92	9.16			6.12
	15.28	3/23/92	8.29			6.99
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)
	14.85	1/28/92	10.17			4.68
	14.85	2/24/92	8.70			6.15
	14.85	3/23/92	7.84			7.01
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			
	14.10	3/23/92	7.46			6.64
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			
	14.17	3/23/92	7.51			6.66
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
	14.11	1/28/92	9.40			4.71
	14.11	2/24/92	8.00			6.11
	14.11	3/23/92	7.59			6.52
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
	14.44	1/28/92	13.28	8.60	4.68	4.90
	14.44	2/24/92	11.91	7.20	4.71	6.30
	14.44	3/23/92	12.24	6.46	5.78	6.82
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
	14.48	1/28/92	10.42	9.45	0.97	4.84
	14.48	2/24/92	8.77	8.12	0.65	6.23
	14.48	3/23/92	8.91	7.25	1.66	6.90

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-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
	14.67	1/28/92	10.52	9.70	0.82	4.81
	14.67	2/24/92	8.59	8.37	0.22	6.26
	14.67	3/23/92	7.95	7.75	0.20	6.88
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
	12.86	1/28/92	7.63			5.23
	12.86	2/24/92	6.35			6.51
	12.86	3/23/92	5.88			6.98
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
	12.71	11/13/91	7.65			5.06
	12.71	12/17/91	7.97			4.74
	12.71	1/28/92	7.73			4.98
	12.71	2/24/92	6.51			6.20
	12.71	3/23/92	5.51			7.20
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
	14.04	1/28/92	8.91			5.13
	14.04	2/24/92	7.63			6.41
	14.04	3/23/92	7.21			6.83
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

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)
	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
	13.45	1/28/92	8.03			5.42
	13.45	2/24/92	6.71			6.74
	13.45	3/23/92	6.06			7.39
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
	12.60	1/28/92	7.29			5.31
	12.60	2/24/92	5.98			6.62
	12.60	3/23/92	5.58			7.02
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
	14.54	1/28/92	9.72			4.82
	14.54	2/24/92	8.38			6.16
	14.54	3/23/92	7.87			6.67
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
	14.92	1/28//92	10.29			4.63
	14.92	2/24/92	9.30			5.62
	14.92	3/23/92	7.96			6.96
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
	14.76	1/28/92	10.11			4.65
	14.76	2/24/92	8.64			6.12
	14.76	3/23/92	7.84			6.92
MW-33	NA	9/17/91	10.17			
	NA	10/16/91	10.33			
	NA	11/13/91	10.33			

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	1/28/92	10.15			
	NA	2/24/92	8.65			
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
	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
	14.36	1/28/92	10.12	9.38	0.74	4.83
	14.36	2/24/92	9.35	8.24	1.11	5.90
	14.36	3/23/92	9.63	6.63	3.00	7.13
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
	14.43	1/28/92	10.41	9.39	1.02	4.84
	14.43	2/24/92	9.75	8.44	1.31	5.73
	14.43	3/23/92	10.00	7.01	2.99	6.82
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			
	NA	1/28/92	9.50			
	NA	2/24/92	8.05			
	NA	3/23/92	7.28			
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
	14.08	2/24/92	7.94			6.14
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

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	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
	14.36	1/28/92	9.35			5.01
	14.36	2/24/92	7.99			6.37
	14.36	3/23/92	6.93			7.43
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	
	NA	1/28/92	7.87	7.16	0.71	
	NA	2/24/92	6.62	5.94	0.68	
	NA	3/23/92	6.70	6.04	0.66	
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			
	NA	12/17/91	6.96			
	NA	1/28/92	9.63			
	NA	2/24/92	8.09			
	NA	3/23/92	7.52			
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	
	NA	1/28/92	9.76	8.58	1.18	
	NA	2/24/92	8.41	7.03	1.38	
	NA	3/23/92	7.93	6.45	1.48	
PR-45	NA	5/24/91	8.93	8.85	0.08	

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	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	
	NA	1/28/92	9.81	9.66	0.15	
	NA	2/24/92	8.61	8.45	0.16	
	NA	3/23/92	7.89	7.59	0.30	
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			
	NA	1/28/92	9.01			
	NA	2/24/92	7.16	7.15	0.01	
	NA	3/23/92	6.58			
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	
	NA	1/28/92	10.29	9.44	0.85	
	NA	3/23/92	9.34	6.94	2.40	
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	
	NA	1/28/92	10.56	9.37	1.19	
	NA	2/24/92	9.19	7.95	1.24	
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	

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	11/13/91	10.94	9.44	1.50	
	NA	12/17/91	11.10	9.56	1.54	
	NA	1/28/92	10.50	9.50	1.00	
	NA	2/24/92	8.62			
	NA	3/23/92	7.66	7.65	0.01	
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	
	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	
	NA	1/28/92	10.68	9.60	1.08	
	NA	2/24/92	10.07	8.10	1.97	
	NA	3/23/92	10.17	7.02	3.15	
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	
	NA	1/28/92	10.43	9.37	1.06	
	NA	2/24/92	8.94	7.96	0.98	
	NA	3/23/92	8.03	7.10	0.93	
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			
	NA	1/28/92	9.46			
	NA	2/24/92	8.00			
	NA	3/23/92	7.14			
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	

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	1/28/92	10.03	9.82	0.21	
	NA	2/24/92	8.52	8.35	0.17	
	NA	3/23/92	7.89	7.64	0.25	
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	
	NA	1/28/92	9.84	9.78	0.06	
	NA	2/24/92	8.38	8.32	0.06	
	NA	3/23/92	7.75	7.70	0.05	
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			
	NA	1/28/92	8.63			
	NA	2/24/92	7.15			
	NA	3/23/92	5.97			
PR-70	NA	4/16/91	8.86	7.46	1.40	
PR-71	NA	4/16/91	8.71			
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			
	NA	1/28/92	9.41			
	NA	2/24/92	8.07			
	NA	3/23/92	7.40			
PR-81	NA	4/16/91	8.35			

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)

* 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
Mar-92

Table 2. Groundwater Analytical Data March 1992

Method 8020 Compounds Concentrations (ug/l)						
Well Number	Sample Number	Benzene	Toluene	Ethyl-Benzene	Xylenes (Total	Method 8010 Compounds Concentrations ~~(mg/l)~~ ug/l
MW-3	92032408	31	0.7	<0.6	2.2	NT
MW-14	92032301	<0.5	<0.5	<0.6	<0.6	NT
MW-25	92032409	<0.5	<0.5	<0.6	<0.6	NT
MW-26	92032411	19,000	24,000	1,600	8,400	NT
MW-27	92032405	<0.5	<0.5	<0.6	<0.6	NT
MW-28	92032404	<0.5	<0.5	<0.6	<0.6	NT
MW-29	92032302	<0.5	<0.5	<0.6	<0.6	NT
MW-30	92032303	<0.5	6.9	<0.6	<0.6	NT
MW-32	92032406	120	1.6	2	2.1	2.0 (1,2-DCA)
MW-32 dup	92032407	110	1.4	2	1.7	1.9 (1,2-DCA)
Field Blank	92032410	<0.5	0.7	<0.6	<0.6	<0.4-<10

Notes: Concentrations reported in micrograms per liter ug/l
<0.5 - Chemical not detected above indicated reporting limit
NT - Not tested

ILLUSTRATIONS

26010

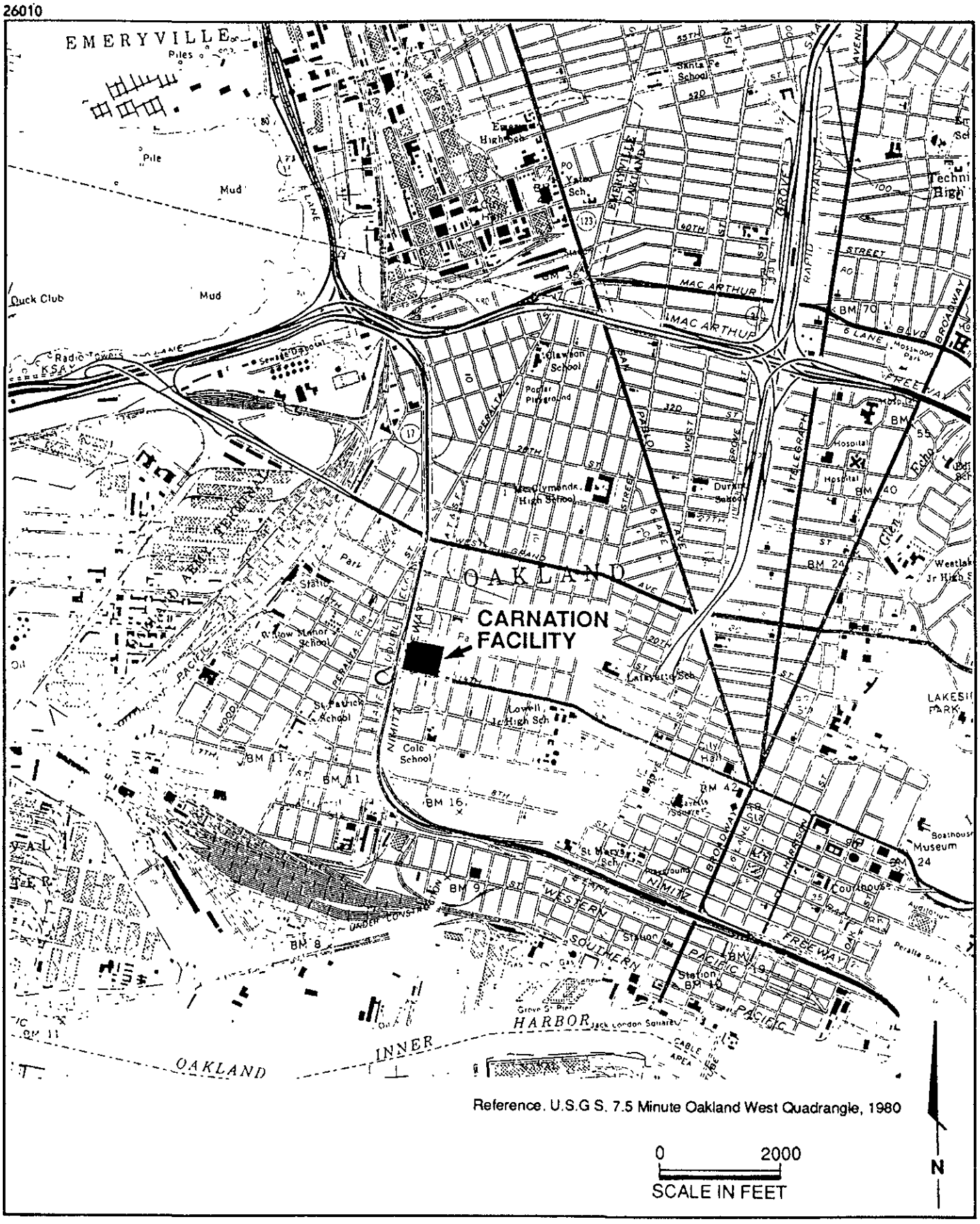

PLATE 1

Harding Lawson Associates
Engineering and Environmental Services

Site Location Map
Carnation Facility
Oakland, California

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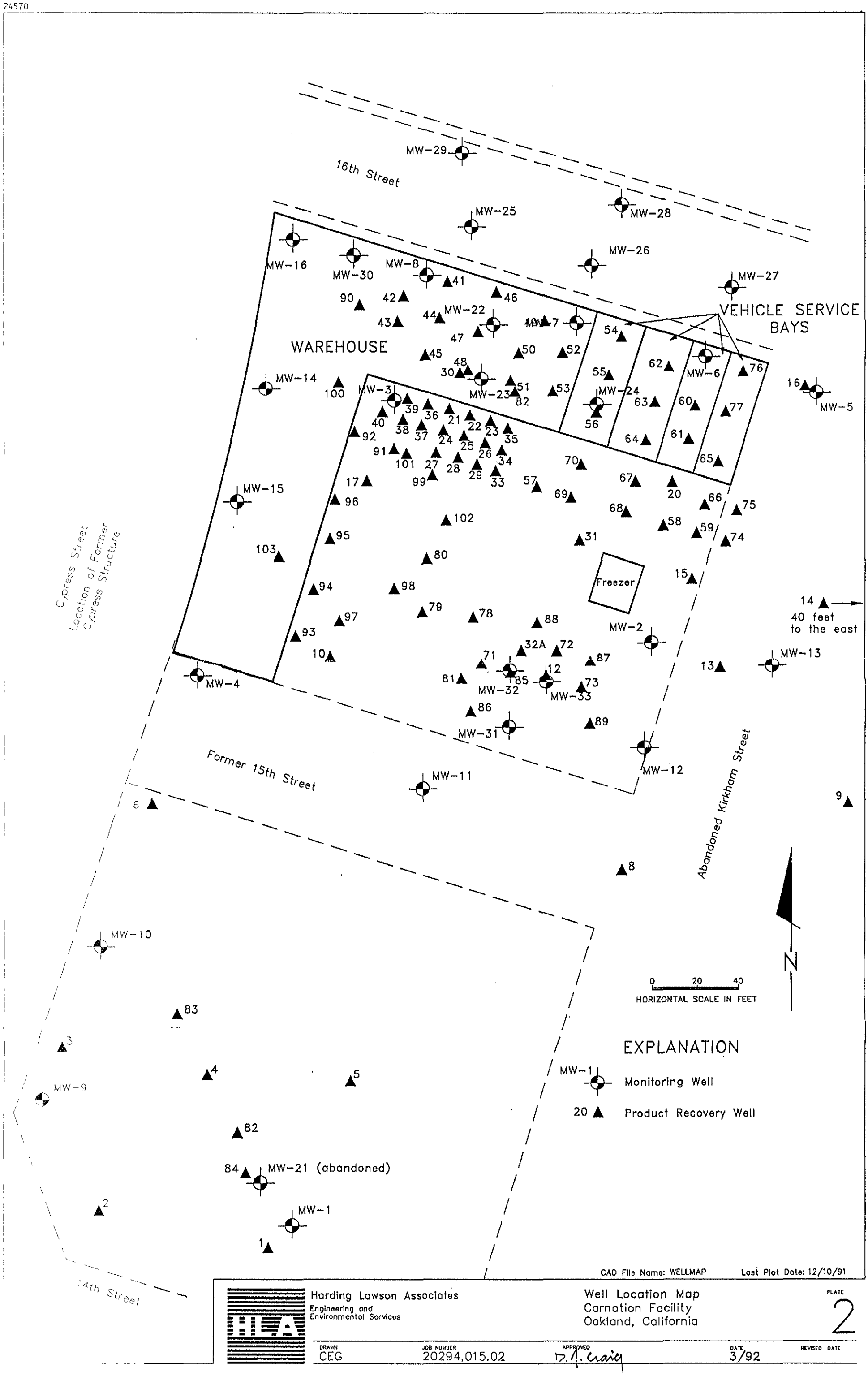
NJB	20294,015.02	D. A. [illegible]	3/92	

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	

N

0 40 80

HORIZONTAL SCALE IN FEET

16th Street

MW-29 7.02

MW-28 7.39

MW-25 6.98

MW-26 7.20

MW-16 6.52

MW-30 6.67

MW-8 6.82*

MW-27 6.83

MW-7 7.39*

MW-22 6.82*

MW-6 6.88

MW-23 6.90*

MW-14 6.64

MW-3 6.76

MW-24 6.88*

MW-5 6.93

MW-15 6.66

Cypress Street

Location of Former Cypress Structure

Freezer

MW-2 6.93

MW-4 6.84

MW-32 6.92

MW-33 NM

MW-13 7.01

MW-31 6.96

MW-12 6.99

Former 15th Street

MW-11 6.95

Abandoned Kirkham Street

MW-10 6.85

MW-9 6.80

MW-21 (abandoned)

MW-1 7.16

14th Street

6.60 6.70 6.80 6.90 7.00 7.10 7.20 7.30

EXPLANATION

- MW-1 — Monitoring Well
- 5.15 — Groundwater Elevation in Feet Above Mean Sea Level
- * — Well Containing Free-Phase Peteroleum Product. Groundwater elevations corrected using assumed petroleum product density of 0.80 g/cc. Data not used in contour mapping.
- NM — Not Measured
- 7.00 — Groundwater Elevation Contour

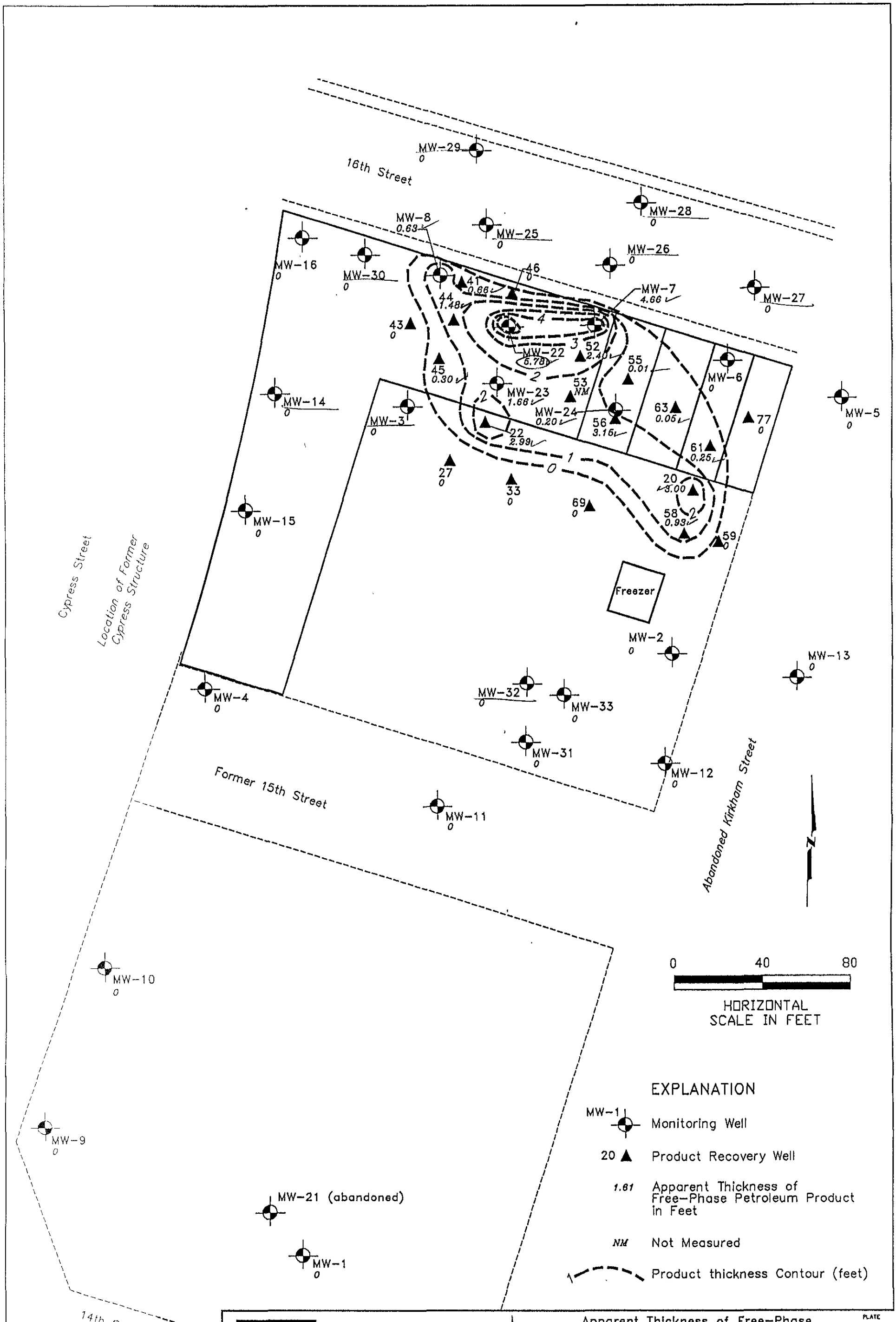
Harding Lawson Associates
Engineering and Environmental Services

Water-Level Elevations
March 1992
Carnation Facility
Oakland, California

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CEG	20294,015.02	RBB	4/92	

20294001 410
19920505 1415



Harding Lawson Associates
Engineering and Environmental Services

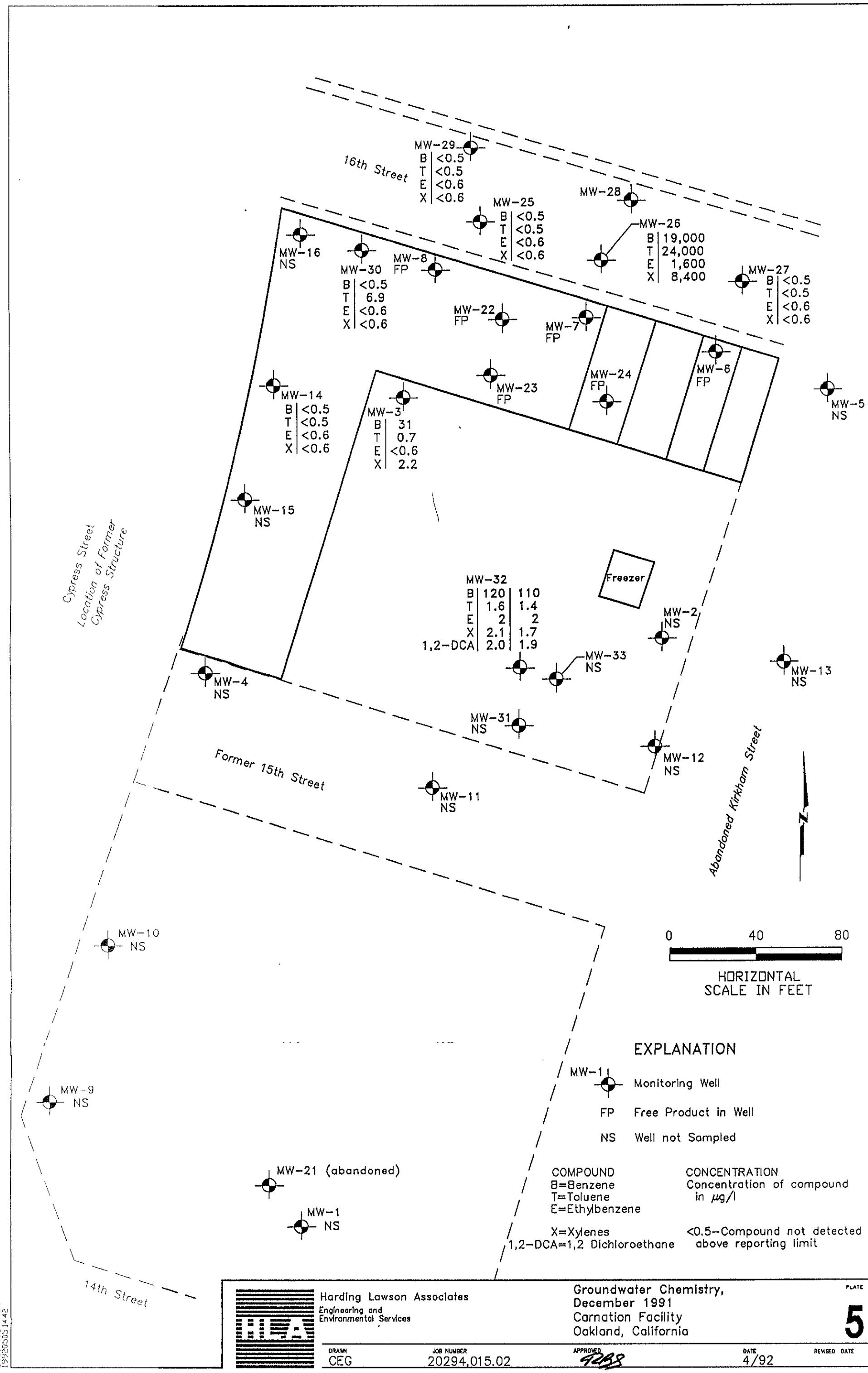
type of HC?

Apparent Thickness of Free-Phase Petroleum Product
March 1992
Carnation Facility
Oakland, California

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CEG	20294.015.02	[illegible]	4/92	

20294G02 4C0
19920505:1434



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		4/92	

20294003 40 0
19920505 1442

Appendix A

GROUNDWATER SAMPLING FORMS

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation
Job Number 20294.015.02
Recorded by David McEwan (Signature)

Well No. MW-3
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 3-24-92 Time 1005
Sampled by DNE (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): 22.7
Water Level Depth (WL in feet BTOC): 7.57
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:

(22.7 TD (feet) - 7.57 WL (feet)) X ~~24~~ 4 D (inches)^2 X 3 # Vols X 0.0408 = 30 Calculated Purge Volume gallons

PURGE TIME

0944 Start 0958 Stop Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

30 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	6.7	1025	19.°	13
10	6.6	1050	14.5	>100
20	6.5	1000	14.5	>100
30				>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	PH3677	EC6075	Tur 3249	

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

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2408	3 40Ams	8020	NONE	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
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation
Job Number 20294.101E.02
Recorded by David M Ennis (Signature)

Well No. NLW-14
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 3-23-92 Time 1445
Sampled by DME (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): 18.5
Water Level Depth (WL in feet BTOC): 7.46
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:

(18.5 (TD feet) - 7.46 (WL feet)) X 2 (D inches)^2 X 3 (# Vols) X 0.0408 = 5.4 gallons (Calculated Purge Volume)

PURGE TIME

1424 Start 1436 Stop Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

5.5 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	6.3	1000	18.0	>100
2	6.7	1000	17.5	>100
4	6.8	1000	17.0	>100
5.4	6.8	1000	17.0	>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	PH 2677	EC 6045	Tur 3249	

Observations During Purging (Well Condition, Turbidity, Color, Odor): Cloudy brown, slight H2S odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other poly tank onsite

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2301	3 VOA	8020	NONE	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
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation
Job Number 20294.015.02
Recorded by David M Greenwood (Signature)

Well No. MW-25
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 3-24-92 Time 1115
Sampled by DNE (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): 19.5
Water Level Depth (WL in feet BTOC): 5.94
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:

(19.5 (TD feet) - 5.94 (WL feet)) X 4 (D inches)^2 X 3 (# Vols) X 0.0408 = 27 gallons (Calculated Purge Volume)

PURGE TIME

1058 Start 1105 Stop Elapsed

PURGE RATE

Initial 2 gpm Final .50 gpm

ACTUAL PURGE VOLUME

Dry @ 21 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	6.0	160	18	>100
10	5.8	160	17.5	>100
20	6.0	170	18.0	>100
27				

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	PH 3677 EC 6015 Tur 3245			

Observations During Purging (Well Condition, Turbidity, Color, Odor): Cloudy grey, very slight odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other poly tank

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2409	3 VOAs	8010/8020	NONE	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples 1110

Type	Sample No.
Field Blank	2410

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation
Job Number 20294.015.02
Recorded by David M Evans (Signature)

Well No. MW-26
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 3-24-92 Time 1155
Sampled by DNE (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): 5.68
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:

$(25' - 5.68) \times 4^2 \times 3 \times 0.0408 = 38$ gallons

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

PURGE TIME

1133 Start 1146 Stop Elapsed

PURGE RATE

Initial 3.0 gpm Final 3.0 gpm

ACTUAL PURGE VOLUME

38 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	5.5	285	21	>100
10	5.5	240	18.5	81
20	5.5	205	18.0	19
30	5.5	210	18.5	↓
38	5.4	205	18.5	↓

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

Meter Nos. PH3677 EC 6095 Tur 3269

Observations During Purging (Well Condition, Turbidity, Color, Odor) cloudy, gray, slight odor @ 10:30 / clear

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☐ Other poly tank

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
24011	3 VOA	8010 / 8020	NONE	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
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation

Job Number 20294,015,02

Recorded by David M Evans (Signature)

Well No. MW-28

Well Type: ☒ Monitor ☐ Extraction ☐ Other

Well Material: ☒ PVC ☐ St. Steel ☐ Other

Date 3-25-92 Time 0740

Sampled by DNE (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): 6.09

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' (TD feet) - 6.09 (WL feet)) X 4 (D inches)^2 X 3 (# Vols) X 0.0408 = 37 gallons (Calculated Purge Volume)

PURGE TIME

0713 Start 0735 Stop Elapsed

PURGE RATE

Initial 5 gpm Final 1.0 gpm

ACTUAL PURGE VOLUME

37 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	6.3	100	15.°	56
10	6.8	105	17.°	
20	7.0	105	17.5	
30	7.1	110	18.°	
37	7.1	110	18.°	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	pH 3677	EC 6095	Turb [illegible]	

Observations During Purging (Well Condition, Turbidity, Color, Odor): Clear odorless

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other poly tank

WELL SAMPLING

SAMPLING METHOD

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

☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2404	3 VOAs	8020	NONE	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
Engineering and Environmental Services

GROUND-WATER SAMPLING FORM

Job Name: Carnation
Job Number: 20294,015,02
Recorded by: [signature] (Signature)

Well No.: MW-25
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date: 3-23-92 Time: 1420
Sampled by: DME (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): 5.58'
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): 10' Screen Interval in Feet (BTOC) from ____ to ____

PURGE VOLUME CALCULATION:

(23' [TD (feet)] - 5.58 [WL (feet)]) X 4 [D (inches)]^2 X 3 [# Vols] X 0.0408 = 34 gallons [Calculated Purge Volume]

PURGE TIME

1503 Start 1517 Stop ____ Elapsed

PURGE RATE

Initial 5 gpm Final 2 gpm

ACTUAL PURGE VOLUME

38 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	7.5	125	17°	93
10	7.4	110	16°	>100
20	7.5	115	16°	>100
34	7.0	115	17.0	>100

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

Meter Nos.: PH 3677 EC 6095 Tur 3249

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

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2302	3VOAs	8020	NONE	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
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation

Job Number 20294,05.02

Recorded by _____ (Signature)

Well No. MW-30

Well Type: ☒ Monitor ☐ Extraction ☐ Other _____

Well Material: ☒ PVC ☐ St. Steel ☐ Other _____

Date 3-23-92 Time 1605

Sampled by DME (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): 7.87

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:

$(21.1 - 7.87) \times 4^2 \times 3 \times 0.0408 = 26$ gallons

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

PURGE TIME

1542 Start 556 Stop _____ Elapsed

PURGE RATE

Initial ~~_____~~ gpm Final _____ gpm

ACTUAL PURGE VOLUME

28 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
Initial	6.4	800	16.5	25
10	6.6	800	17.0	>100
20	6.6	775	17.0	>100
26	6.6	750	17.0	>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other _____
Meter Nos.	PH 3677	EC 6095	Tav 3249	

Observations During Purging (Well Condition, Turbidity, Color, Odor): Clear, odorless

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other poly tank

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: SS

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: _____

☐ Same As Above

☐ Grab - Type: _____

☐ Other - Type: _____

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2303	3 VOAs	8020	NONE	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
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Carnation
Job Number 20294.015.02
Recorded by David M. Evans (Signature)

Well No. MW-32
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 3-24-92 Time 0940
Sampled by DME (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): 7.84
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:

$(23.1 - 7.84) \times 4^2 \times 3 \times 0.0408 = 30$ gallons

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

PURGE TIME

0901 Start 0907 Stop _____ Elapsed

PURGE RATE

Initial 5 gpm Final 5 gpm

ACTUAL PURGE VOLUME

30 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other turb
Initial	6.5	900	19.5	>100
10	6.7	925	19.5	>100
20	6.7	900	19.5	>100
30	6.7	900	19.5	>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	PH3677	E/C 6095	Turb 3245	

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

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9203

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
2406	3 VOAs	8010/8020	NONE	NET	

QUALITY CONTROL SAMPLES

0910 Duplicate Samples 0920

Original Sample No.	Duplicate Sample No.
2406	2407

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

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 Schiebach
Harding Lawson Associates
200 Rush Landing
Novato, CA 94947

Date: 04/13/1992
NET Client Acct No: 28100
NET Pacific Log No: 92.1544
Received: 03/24/1992

Client Reference Information

Carnation, Job No. 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)

NET Pacific, Inc

Client No: 28100 Date: 04/13/1992
Client Name: Harding Lawson Associates
NET Log No: 92.1544 Page: 2

Ref: Carnation, Job No. 20294.015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 92032404 03/24/1992 07:40 117330	 92032405 03/24/1992 08:15 117331	Units
METHOD 8020 (GC,Liquid)					
DATE ANALYZED			04-03-92	04-03-92	
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	ND	ND	ug/L
Ethylbenzene	8020	0.6	ND	ND	ug/L
Toluene	8020	0.5	ND	ND	ug/L
Xylenes (total)	8020	0.6	ND	ND	ug/L
SURROGATE RESULTS			--	--	
1,4-Difluorobenzene			109	113	% Rec.
1,4-Dichlorobutane			110	111	% Rec.

NET Pacific, Inc

Client No: 28100 Date: 04/13/1992
Client Name: Harding Lawson Associates
NET Log No: 92.1544 Page: 3

Ref: Carnation, Job No. 20294.015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 92032406 03/24/1992 09:10 117332	92032407 03/24/1992 09:20 117333	Units
METHOD 8010 & 8020 (GC,Liquid)					
DATE ANALYZED			04-03-92	04-03-92	
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	2.0	1.9	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	0.4	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	0.4	ND	ND	ug/L
Benzene	8020	0.5	120	110	ug/L
Ethylbenzene	8020	0.6	2.0	2.0	ug/L
Toluene	8020	0.5	1.6	1.4	ug/L
Xylenes (total)	8020	0.6	2.1	1.7	ug/L
SURROGATE RESULTS			--	--	
1,4-Difluorobenzene			118	118	% Rec.
1,4-Dichlorobutane			107	107	% Rec.

NET Pacific, Inc

Client No: 28100 Date: 04/13/1992
Client Name: Harding Lawson Associates
NET Log No: 92.1544 Page: 4

Ref: Carnation, Job No. 20294.015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 92032408 03/24/1992 10:05 117334	92032409 03/24/1992 11:15 117335	Units
METHOD 8020 (GC,Liquid)					
DATE ANALYZED			04-03-92	04-03-92	
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	31	ND	ug/L
Ethylbenzene	8020	0.6	ND	ND	ug/L
Toluene	8020	0.5	0.7	ND	ug/L
Xylenes (total)	8020	0.6	2.2	ND	ug/L
SURROGATE RESULTS			--	--	
1,4-Difluorobenzene			114	106	% Rec.
1,4-Dichlorobutane			103	96	% Rec.

NET Pacific, Inc

Client No: 28100 Date: 04/13/1992
Client Name: Harding Lawson Associates
NET Log No: 92.1544 Page: 5

Ref: Carnation, Job No. 20294.015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 92032410 03/24/1992 11:10 117336	Units
METHOD 8010 & 8020 (GC,Liqui				
DATE ANALYZED			04-03-92	
DILUTION FACTOR*			1	
Bromodichloromethane	8010	0.4	ND	ug/L
Bromoform	8010	0.4	ND	ug/L
Bromomethane	8010	0.4	ND	ug/L
Carbon tetrachloride	8010	0.4	ND	ug/L
Chlorobenzene	8020	0.4	ND	ug/L
Chloroethane	8010	0.4	ND	ug/L
2-Chloroethylvinyl ether	8010	1.0	ND	ug/L
Chloroform	8010	0.4	ND	ug/L
Chloromethane	8010	0.4	ND	ug/L
Dibromochloromethane	8010	0.4	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ug/L
Dichlorodifluoromethane	8010	0.4	ND	ug/L
1,1-Dichloroethane	8010	0.4	ND	ug/L
1,2-Dichloroethane	8010	0.4	ND	ug/L
1,1-Dichloroethene	8010	0.4	ND	ug/L
trans-1,2-Dichloroethene	8010	0.4	ND	ug/L
1,2-Dichloropropane	8010	0.4	ND	ug/L
cis-1,3-Dichloropropene	8010	0.4	ND	ug/L
trans-1,3-Dichloropropene	8010	0.4	ND	ug/L
Methylene chloride	8010	10	ND	ug/L
1,1,2,2-Tetrachloroethane	8010	0.4	ND	ug/L
Tetrachloroethene	8010	0.4	ND	ug/L
1,1,1-Trichloroethane	8010	0.4	ND	ug/L
1,1,2-Trichloroethane	8010	0.4	ND	ug/L
Trichloroethene	8010	0.4	ND	ug/L
Trichlorofluoromethane	8010	0.4	ND	ug/L
Vinyl chloride	8010	0.4	ND	ug/L
Benzene	8020	0.5	ND	ug/L
Ethylbenzene	8020	0.6	ND	ug/L
Toluene	8020	0.5	0.7	ug/L
Xylenes (total)	8020	0.6	ND	ug/L
SURROGATE RESULTS			--	
1,4-Difluorobenzene			110	% Rec.
1,4-Dichlorobutane			95	% Rec.

NET Pacific, Inc

Client No: 28100 Date: 04/13/1992
Client Name: Harding Lawson Associates
NET Log No: 92.1544 Page: 6

Ref: Carnation, Job No. 20294.015.02

		Reporting	Descriptor, Lab No. and Results 92032411 03/24/1992 11:55	Units
METHOD 8020 (GC,Liquid)				
DATE ANALYZED			04-03-92	
DILUTION FACTOR*			1	
Chlorobenzene	8020	0.4	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ug/L
Benzene	8020	0.5	19,000	ug/L
Ethylbenzene	8020	0.6	1,600	ug/L
Toluene	8020	0.5	24,000	ug/L
Xylenes (total)	8020	0.6	8,400	ug/L
SURROGATE RESULTS			--	
1,4-Dichlorobutane			112	% Rec.

Ref: Carnation, Job No. 20294.015.02

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Benzene	0.4	ug/L	93	ND	95	93	3.2
Toluene	0.4	ug/L	100	ND	98	96	3.5
Chlorobenzene	0.4	ug/L	89	ND	112	112	< 1
1,1-Dichloroethene	0.4	ug/L	104	ND	99	96	2.6
Trichloroethene	0.4	ug/L	93	ND	120	119	< 1

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, 17th Edition, APHA, 1989.

Harding Lawson Associates
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

4702

Lab: NET Pacific

Samplers: David M Evans

Job Number: 20294.015.02

Name/Location: Carnation

Project Manager: Bruce Schiebach

Recorder: David M Evans (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	# CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	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			92	03	24 04	92	03	24	0740			X				
23	X				3			92	03	24 05	92	03	24	0815			X				
23	X				3			92	03	24 06	92	03	24	0910		X	X				
23	X				3			92	03	24 07	92	03	24	0920		X	X				
23	X				3			92	03	24 08	92	03	24	1005			X				
23	X				3			92	03	24 09	92	03	24	1115			X				
23	X				3			92	03	24 10	92	03	24	1110		X	X				
23	X				3			92	03	24 11	92	03	24	1155			X				

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) David M Evans	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) David M Evans DATE/TIME 3/24/92 1508	RECEIVED FOR LAB BY: (Signature) J. Sorensen DATE/TIME 3/24/92 15:08

METHOD OF SHIPMENT: Hand delivered in cooler on ice

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

6533

NATIONAL
ENVIRONMENTAL
TESTING, INC.

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

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

Date: 04/13/1992
NET Client Acct No: 28100
NET Pacific Log No: 92.1541
Received: 03/24/1992

Client Reference Information

Carnation, Job No. 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, Job No. 20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 92032301 03/23/1992 14:45 117319	92032302 03/23/1992 15:20 117320	Units
METHOD 8020 (GC,Liquid)					
DATE ANALYZED			04-03-92	04-06-92	
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	ND	ND	ug/L
Ethylbenzene	8020	0.6	ND	ND	ug/L
Toluene	8020	0.5	ND	ND	ug/L
Xylenes (total)	8020	0.6	ND	ND	ug/L
SURROGATE RESULTS			--	--	
1,4-Difluorobenzene			100	105	% Rec.
1,4-Dichlorobutane			103	110	% Rec.

Ref: Carnation, Job No. 20294,015.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 92032303 03/23/1992 16:05 117321	Units
METHOD 8020 (GC,Liquid)				
DATE ANALYZED			04-06-92	
DILUTION FACTOR*			1	
Chlorobenzene	8020	0.4	ND	ug/L
1,2-Dichlorobenzene	8020	0.4	ND	ug/L
1,3-Dichlorobenzene	8020	0.4	ND	ug/L
1,4-Dichlorobenzene	8020	0.4	ND	ug/L
Benzene	8020	0.5	ND	ug/L
Ethylbenzene	8020	0.6	ND	ug/L
Toluene	8020	0.5	6.9	ug/L
Xylenes (total)	8020	0.6	ND	ug/L
SURROGATE RESULTS			--	
1,4-Difluorobenzene			112	% Rec.
1,4-Dichlorobutane			117	% Rec.

Ref: Carnation, Job No. 20294,015.02

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Benzene	0.4	ug/L	93	ND	95	93	3.2
Toluene	0.4	ug/L	100	ND	98	96	3.5
Chlorobenzene	0.4	ug/L	89	ND	112	112	< 1
1,1-Dichloroethene	0.4	ug/L	104	ND	99	96	2.6
Trichloroethene	0.4	ug/L	93	ND	120	119	< 1

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, 17th Edition, APHA, 1989.

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CHAIN OF CUSTODY FORM

(4701) Lab: NET Pacific

Samplers: David M Evans

Job Number: 20294.015.02

Name/Location: Carnation

Project Manager: Bruce Schiebach

Recorder: David M Evans (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	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			92	03	230	1	92	03	23	1445		X				
23	X				3			92	03	230	2	92	03	23	1520		X				
23	X				3			92	03	230	3	92	03	23	1605		X				

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) David M Evans	RECEIVED BY: (Signature) A Ford	DATE/TIME 3/24/92 1:15 pm
RELINQUISHED BY: (Signature) A Ford	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 3/24/92 1400
METHOD OF SHIPMENT In cooler ouside		

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

6533

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MARCH 1992
CARNATION FACILITY
OAKLAND, CALIFORNIA
May 15, 1992

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QUALITY CONTROL REVIEWER

David F. Leland

David F. Leland, P.E.
Associate Engineer