



ENVIRONMENTAL
PUBLICATIONS

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VAPOR EXTRACTION MONITORING REPORT

**NESTLE USA, INC.
FORMER CARNATION DAIRY FACILITY
1310 14th STREET
OAKLAND, CALIFORNIA**

FEBRUARY, 1995

NESTLÉ USA, INC.

800 NORTH BRAND BLVD
GLENDALE, CA 91203
TEL (818) 549-6000

Date: 6/1/95

TELEFAX

To: Jennifer Eberle

Telefax No: 510 337 9335

Fr: Binayak Acharya
Environmental Strategy/Planning
Phone: (818) 549-5948 Fax: (818) 549-6157

Number of pages (Including this cover sheet): 2

Comment: Cover letter for the Soil Vapor
extraction Report

NESTLÉ USA, INC.

May 22, 1995

Alameda County Health Agency
Hazardous Material Division
80 Swan Way, Room 200
Oakland, CA 94601

Attn.: Ms. Jennifer Eberle

**Ref: Vapor Extraction Monitoring Report, 1994
Nestle Food Company (Former Carnation Dairy Facility)
1310 14th Street, Oakland, California 94607**

Dear Ms. Eberle:

Enclosed is the annual "Vapor Extraction Report" for the above referenced site. The first quarter groundwater monitoring report of 1995 is under review and will be forwarded to you on or before June 12, 1995. As you requested, the change in free product thickness by wells and amount of products removed over time will be included in this report.

In reference to your letter of April 28, we are sorry for the delay in submitting the quarterly ground water monitoring report. The following is the schedule of sampling and reporting for the next four sampling events and any deviation from such schedule due to any unavoidable circumstances will be reported to you immediately for a reasonable extension.

<u>Quarter</u>	<u>Sampling date</u>	<u>Reporting Date on/before</u>
First	Week of March 13th (Completed)	June 12, 1995
Second	Week of June 5th	August 31, 1995
Third	Week of September 6th	November 30, 1995
Fourth	Week of December 5th	February 28, 1996

Thank you for your co-operation. Should you have any other questions, please contact me at (818) 549-5948.

With Regards,


Binayak P. Acharya

CC: Celeste Miller - 15
Walter Carey - NMF/NUSA
Dick Zipp - Park Environmental

Oakland/vesrep1/5.22.95

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95 JUN -2 PM 2:00
ENVIRONMENTAL
ENVIRONMENTAL STRATEGY/PLANNING

VAPOR EXTRACTION MONITORING REPORT

**NESTLE USA, INC.
FORMER CARNATION DAIRY FACILITY
1310 14th STREET
OAKLAND, CALIFORNIA**

FEBRUARY, 1995

PREPARED FOR:

**DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS DIVISION
80 SWAY WAY, ROOM 200
OAKLAND, CALIFORNIA 94601**

ON BEHALF OF:

**NESTLE USA, INC.
800 N. BRAND BOULEVARD
GLENDALE, CALIFORNIA 91203**

PREPARED BY:

**PARK ENVIRONMENTAL CORPORATION
8084 OLD AUBURN ROAD, SUITE E
CITRUS HEIGHTS, CALIFORNIA 95610**

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INTRODUCTION

Soil and groundwater have been impacted with petroleum hydrocarbons at the former Carnation Dairy facility located at 1310 14th Street, Oakland, California. Nestle USA, Inc., (Nestle) has retained Park Environmental Corporation (Park) to provide environmental services including remediation services at the site. A site location map and plot plan of the impacted area are shown on Figures 1 and 2. A vapor extraction and thermal oxidation unit has been installed to remove and destroy hydrocarbons from the soil and groundwater table at the site. Nestle has authorized Park to prepare this Vapor Extraction Monitoring Report (VEMR) which includes a summary of operations, vapor analytical reports, an estimate of quantities removed and the effect on the plume for 1994. Additional, applicable, remediation technologies are considered for more aggressive remediation.

On November 16, 1993, the Bay Area Air Quality Management District (BAAQMD) issued Authority to Construct (AC) and a conditional Permit to Operate (PO), for application No. 11804 to install and operate a soil vapor extraction (SVE) system and thermal oxidizer at the former Carnation Dairy facility. The system uses a vacuum to remove petroleum hydrocarbons from the soil and free product from the groundwater table. The system abates air emissions by burning the hydrocarbons at an approximate temperature of 1,000 degrees Celsius ($^{\circ}\text{C}$).

SYSTEM INSTALLATION AND OPERATION

An aboveground vapor piping network had been installed in mid October, 1993. The network of 2-inch and 4-inch diameter pipes connect vapor recovery wells was manifolded to a Stealth Industries, Inc. Model 1000 thermal oxidizer. On November 29, 1993, Notice of Intent to operate the system was given to the BAAQMD. Formal start-up began in January, 1994, however, a mechanical failure occurred after six days operation. The Stealth unit was replaced with an Airex 600 cubic foot per minute (cfm) thermal oxidizer.

Following installation of the Airex unit, operation started on February 9, 1994. On February 24, the vapor system was shut down to allow the groundwater to obtain static equilibrium before Park performed quarterly groundwater level monitoring and sampling. After the groundwater work was completed, the system did not restart due to an electrical problem. System restart occurred on March 23, 1994, following repairs by the manufacturer.

The SVE system operated continuously from March 23 through July 13, 1994; 4 additional days in July; 17 days in August and 4 days in September. In September, a power failure at the facility caused the programmable logic controller display module (ZOID) to fail, requiring repair. Also, several system shut downs occurred during the July -September period due to vibration caused failure of a compressor pipe. Compressed air actuates system valves, which close when insufficient pressure is supplied.

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On October 14, the ZOID was returned to service and the compressor vibration problem was removed. The system operated continuously from October 14 to November 11, was restarted on November 17, and operated 10 additional days. The thermal oxidizer heat element coils failed on November 26, causing a general shut down. The electrical system was refurbished, new elements were installed and the system was brought on line again on December 29.

The Airex SVE system operated 194 days or approximately 60 percent of the time since installation in February, 1994. A computer measures and monitors system functions and influent concentrations. Automatic controls shut the system down when operating parameters exceed operation parameter set points. The system is monitored for shutdown and operating parameters via telemetry. Weekly monitoring visits by a technician allows for system adjustments to maintain operating efficiencies..

System operation periods are summarized on the Monthly Summary of Vapor Extraction Remediation (MSVER) forms contained in Appendix A. Hydrocarbon concentrations reported on the MSVER forms are recorded from field measurements using a portable organic vapor meter and from laboratory analytical reports. Air flow rates and calculated values in pounds of hydrocarbons removed per day are also reported. *The MSVER data are summarized in Table 1.*

VAPOR STREAM ANALYSES

Influent and effluent vapor stream samples are collected periodically to evaluate system performance and to ensure BAAQMD permit compliance. The samples are analyzed for total petroleum hydrocarbons in the gasoline range (TPH G; EPA Method 8015 modified) and for benzene, toluene, ethylbenzene and total xylenes (BTEX; EPA Method 8020) to determine vapor stream hydrocarbon and volatile constituent concentrations.

Vapor stream sample collection ports are located downstream of the blower and after the thermal oxidizer unit. Two influent and two effluent samples are collected in 1 liter Tedlar® sample bags and shipped under chain-of-custody (COC) documentation to Sierra Laboratories, Inc. for the TPH G and BTEX analyses. The reported, vapor stream, sample analytical data are summarized in Table 2.

Eighteen sample collection events were conducted during 1994. The influent TPH G and benzene concentrations ranged from low values of 46 and 0.82 parts per million by volume (ppmv) to high values of 3200 and 85 ppmv, respectively. Average monthly concentrations are reported on Table 1. Table 1 indicates the average daily mass of hydrocarbon vapors removed was 160-pounds and the average air flow rate was 425 cfm.

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NESTLE - FORMER CARNATION DAIRY FACILITY
FEBRUARY, 1995**

The calculated total mass of hydrocarbons removed is 32,131-pounds (lbs) or the equivalent of 5,181-gallons of product. Figure 3 graphically shows the cumulative amount of product removed during 1994 and a representative calculation for product removed in January is presented in Appendix B.

AIR EMISSIONS

Air emission data were obtained on a periodic basis. Measured concentrations were assumed to apply throughout a period of operation between sampling events. Measured and interpreted data and calculations of air emissions in pounds per day are summarized in Table 3. The average monthly release of total hydrocarbons and benzene were 5.4-lbs. and 0.1-lbs., respectively.

EFFECTS ON GROUNDWATER AND FREE PRODUCT PLUME

Operation of the SVE system has reduced free product underlying the site. Although changes in groundwater levels affect product thickness measurements, thicknesses collected since start-up of the SVE system in March, 1994 have diminished as shown in Figure 4. In March, 1994 over 3-feet of free product was measured in nine wells within the plume. In December, 1994, water levels were approximately 1-foot lower than the levels measured in March, however, all free product thicknesses measured were less than 2.5-feet. Only five wells had more than 2-feet of product and six wells had between 1 and 2-feet in December.

The total number of wells with product reduced from 30 in March to 26 in December, 1994 and the average product thickness reduced from 1.76-feet in March to 0.82-feet in December.

Operation of the SVE system also has had a positive effect on the dissolved contaminant concentrations reported from the monitoring wells which define the plume limits. Concentrations of TPH G in monitoring wells MW-3 and MW-26 have diminished from 100 µg/L (parts per billion, ppb) and 14,000 ppb in February, 1994 to 3.8 ppb and 5.0 ppb in December, 1994, respectively. Similar reductions in benzene and other volatile constituents have been reported in the groundwater sample analytical data which are contained in the quarterly monitoring reports.

CONCLUSIONS

2. The two SVE systems operated a total of 200 days or approximately 55 percent of the time during 1994. The average flow rate was 425 cfm and the average concentration of petroleum hydrocarbons was 1,164 ppmv.

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NESTLE - FORMER CARNATION DAIRY FACILITY
FEBRUARY, 1995**

An estimate of 32,000-lbs of hydrocarbon vapors have been removed during 1994 using the vapor extraction technology. The estimate is approximately one half of the estimated amount of free product calculated from 1993 data. Hydrocarbon concentrations dissolved in the groundwater and free product thicknesses on the water table have diminished since SVE was installed.

The SVE system removes "light end" hydrocarbons effectively. The impact of SVE on "heavier end" hydrocarbons (weathered gasoline) is less immediate. However, subsurface air movement induced under the SVE vacuum is anticipated to enhance natural biologic hydrocarbon degradation.

RECOMMENDATIONS

Park recommends the following activities for 1995:

- Continued operation of the soil vapor extraction remediation system;
- Continue monitoring/sampling influent and effluent vapor stream concentrations for permit compliance; and
- Install secondary containment of the nominal 400-gallon entrainment separator water holding tank to contain potential overflow spills during periods of rapid accumulation in the wet season.

LIMITATIONS

The monitoring and construction services performed by Park were completed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions.

The data presented in this report are representative of the conditions at the site when monitoring and sampling was performed. The findings presented are based on the current data and past written and/or oral information provided by the regulatory agencies or Nestle.

**VAPOR EXTRACTION MONITORING REPORT
NESTLE - FORMER CARNATION DAIRY FACILITY
FEBRUARY, 1995**

PREPARATION OF REPORT/ SIGNATURES

Firm Preparing Report

Park Environmental Corporation
8084 Old Auburn Road, Suite E
Citrus Heights, California 95610


Report Prepared by:

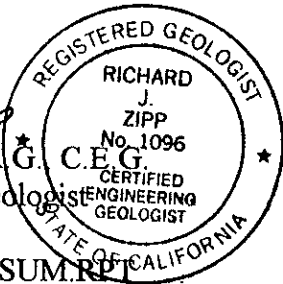
This report was prepared by Park Environmental Corporation (Park). Mr. Richard J. Zipp is the registered professional overseeing this project. This report was written by Mr. Hugh Ashley, Project Manager for Park. The report presents data regarding site remediation.

This report was prepared to assist the property owner to comply with California Code of Regulations, Title 23, Chapter 16, Article 5, Section 2652(d), which requires the submittal of reports to the regulatory agencies at a minimum of three month intervals.

If you have any questions or need additional information please call the undersigned at (916) 723-1776.

Thank You,

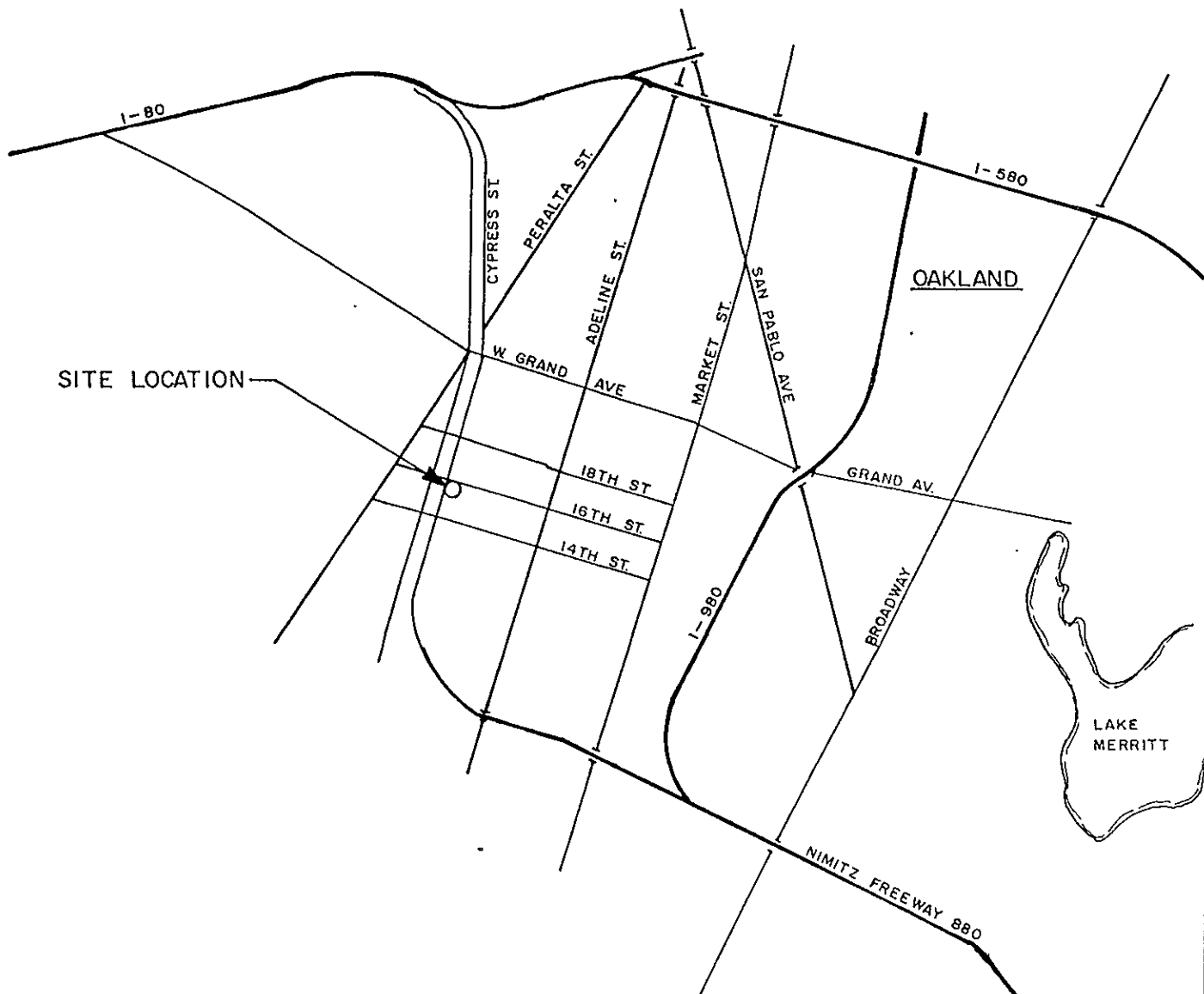

Richard J. Zipp, R.G.
Principal Hydrogeologist



F:\5008J11\94VESUM.RPT

pc Ms. Jennifer Eberle, Alameda County Environmental Health

FIGURES



SITE LOCATION

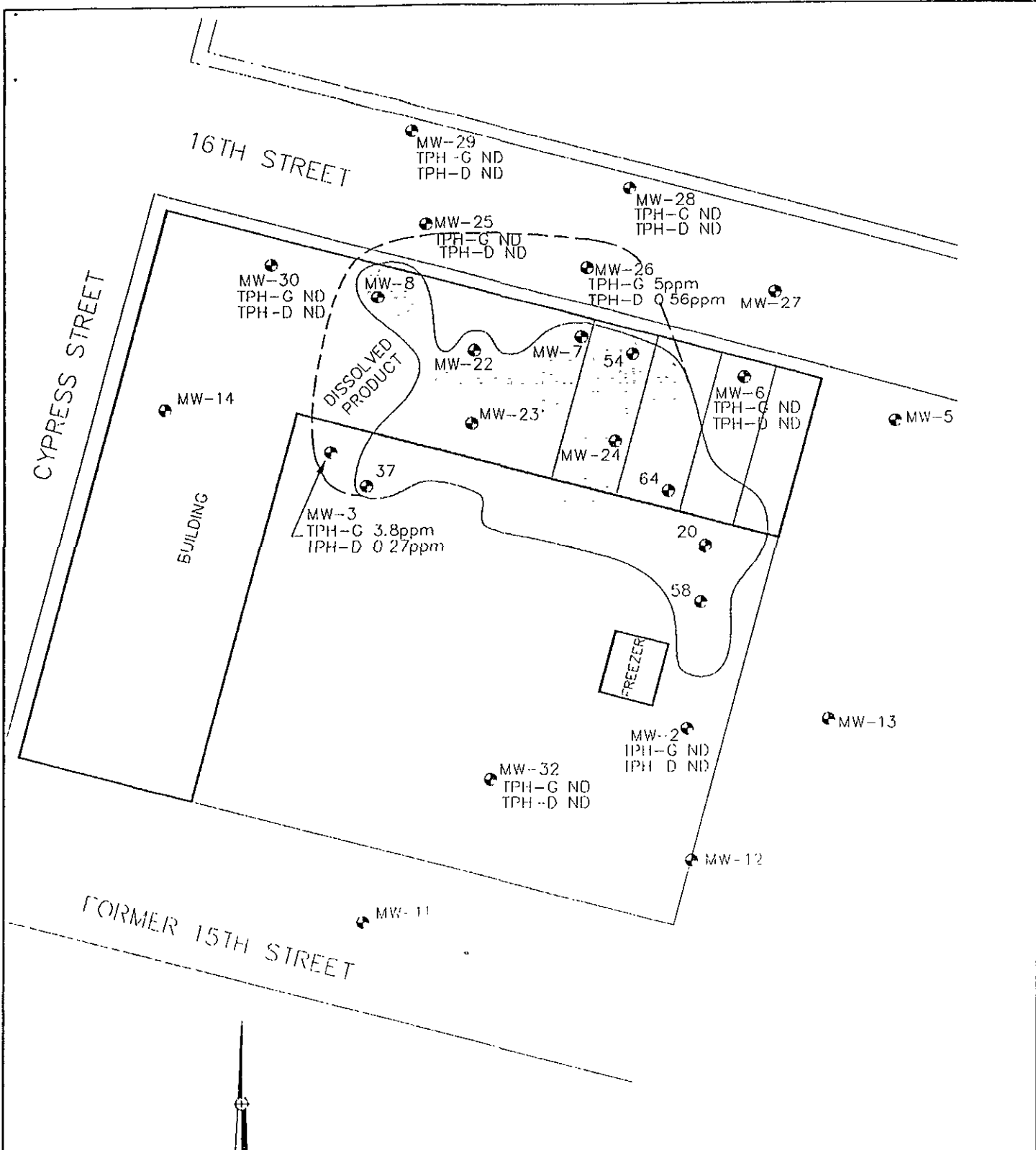
OAKLAND

LAKE MERRITT





SCALE: 1" = 2200'

NESTLE FACILITY OAKLAND, CA SITE LOCATION MAP	
	INITIAL M.A.R.
	DATE 12/21/94
	JOB # 5008
	FIG # 1



SCALE: 1" = 50'

 MONITORING WELL LOCATION
 FREE PRODUCT AREA (DECEMBER 1994)
 TPH-G TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
 TPH-D TOTAL PETROLEUM HYDROCARBONS AS DIESEL
 DECEMBER 1994 DATA
 ND-NOT DETECTED AT LISTED DETECTION LIMIT


NESTLE FACILITY OAKLAND, CA FREE PRODUCT & DISSOLVED CHEMICAL CONSTITUENTS MAP	
 Leaving A Clean Environment	INITIAL
	M.A.R.
	DATE
	1/21/95
JOB #	
5008-J11	
FIG #	
2	



FIGURE 3
NESTLE FACILITY
OAKLAND, CA
CUMULATIVE PRODUCT
REMOVED

NESTLE OAKLAND
OPERATION PERIOD 1994

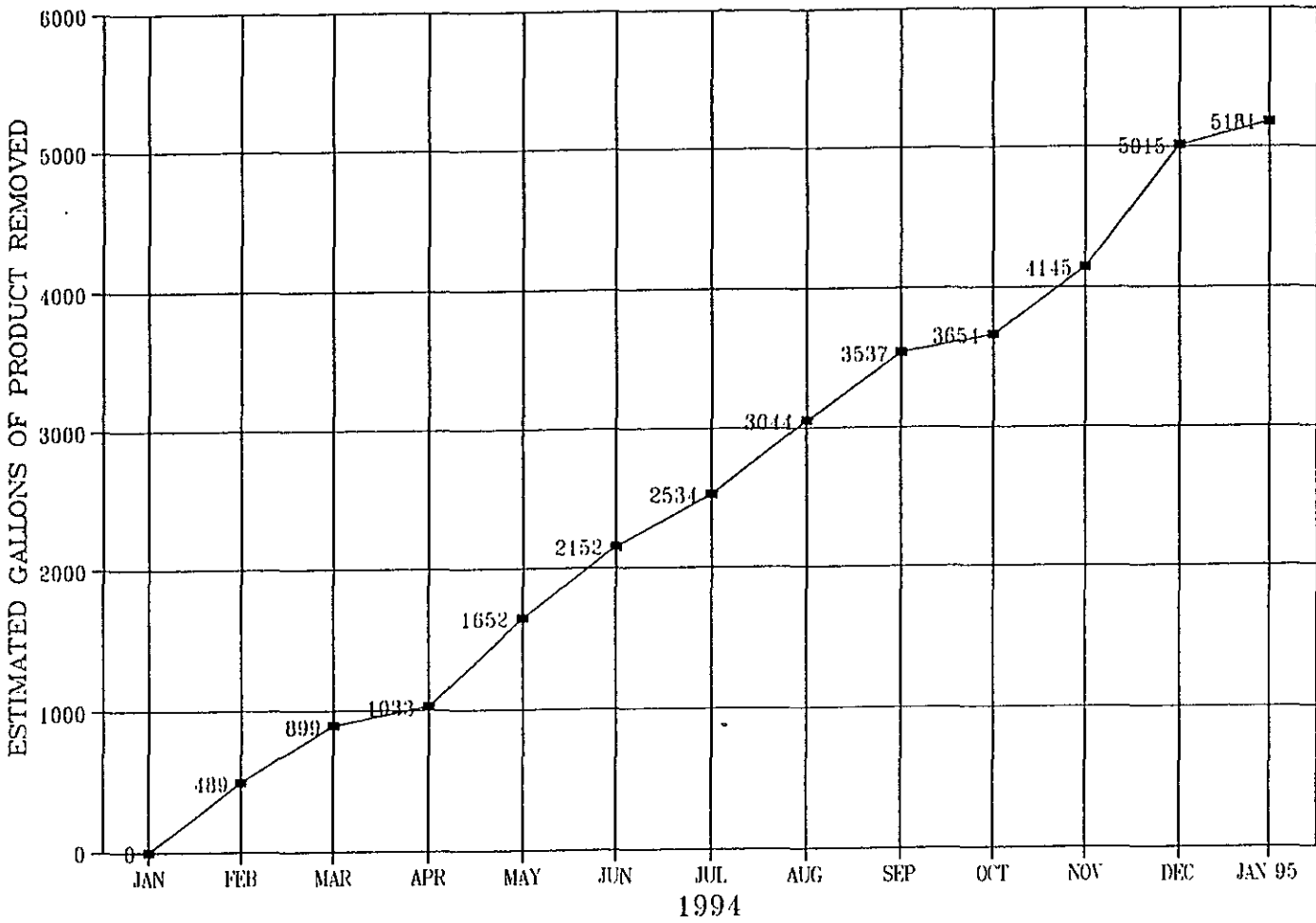
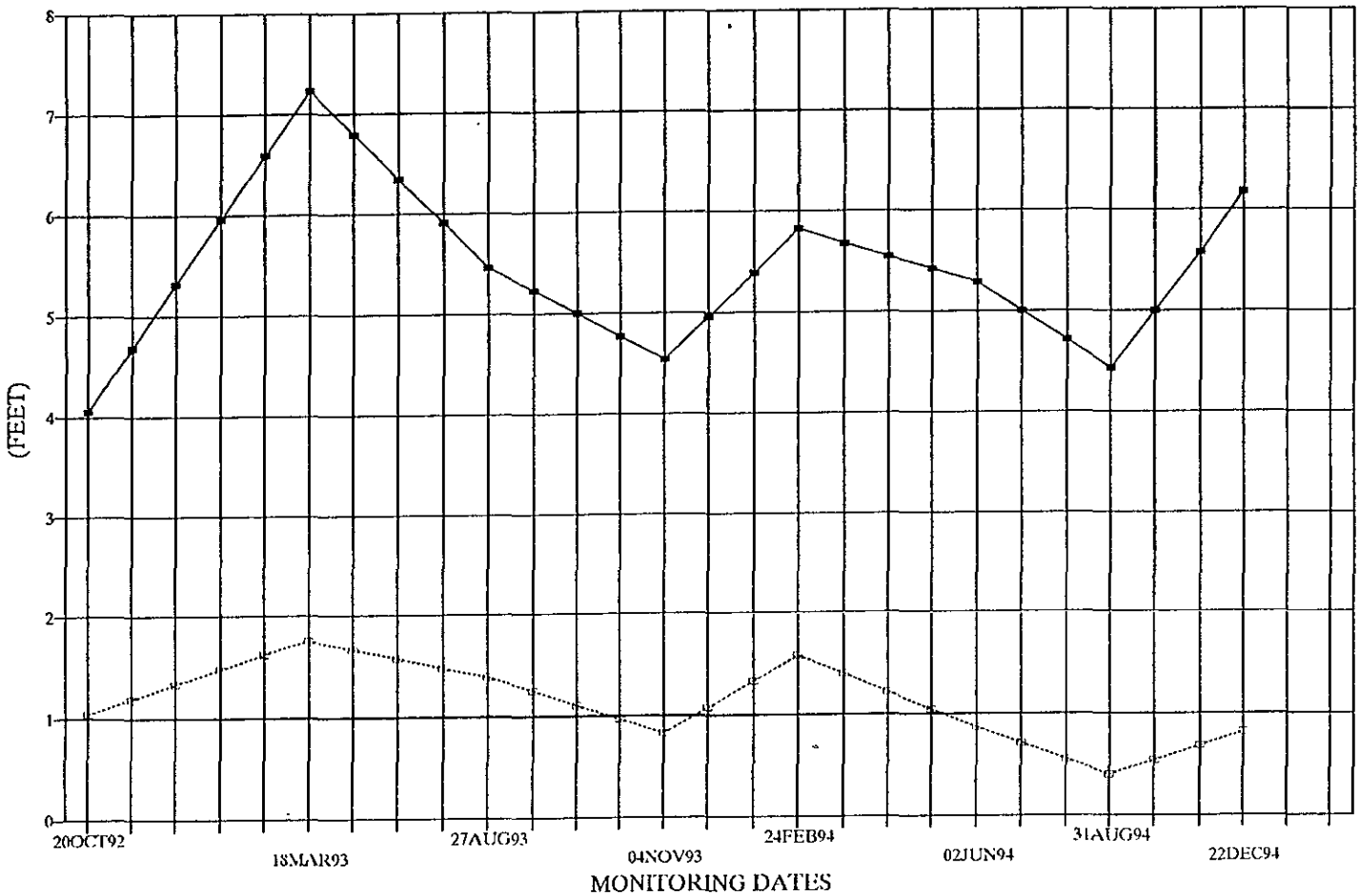




FIGURE 4
NESTLE FACILITY
OAKLAND, CA
GROUNDWATER ELEVATION &
FREE PRODUCT THICKNESS

RELATIONSHIP BETWEEN GROUNDWATER ELEV.
& THICKNESS OF FREE PRODUCT



■ GROUNDWATER ELEV. □ FREE PRODUCT ELEV.

v
avg

TABLES

TABLE 1

VAPOR EXTRACTION REMEDIATION
 INFLUENT HYDROCARBON VAPOR CONCENTRATIONS AND EXTRACTION DATA
 MONTHLY SUMMARY

NESTLÉ - OAKLAND FACILITY

JANUARY - DECEMBER, 1994

Month	Days Operation (days/mo)	Average Concentration (ppmv)	Average Flow Rate (cfm)	Average Mass* (lbs/day)	Monthly Extraction (lbs/mo)	Equivalent Product Removed (gallons)
January	6	3361	466	505	3030	489
February	16	1120	440	159	2544	410
March	7	840	440	119	833	134
April	30	898	441	128	3840	619
May	31	704	440	100	3100	500
June	30	558	440	79	2370	382
July	17	1828	440	259	4403	710
August	17	854	389	107	1819	293
September	4	1400	400	181	724	117
October	18	1257	418	169	3042	491
November	21	1956	408	257	5397	870
December	3	2800	380	343	1029	166
Annual Totals	200	1164	425	160	32131	5181

days/mo Days per month
 ppmv Parts per million by volume
 cfm Cubic feet per minute
 lbs/day Pounds per day
 lbs/mo Pounds per month
 * See Appendix B for an example of mass calculations

TABLE 2

**VAPOR EXTRACTION ANALYTICAL DATA
INFLUENT HYDROCARBON VAPOR CONCENTRATIONS AND EXTRACTION DATA**

+ effluent?

NESTLÉ - OAKLAND FACILITY

EPA METHODS 8015 AND 8020

Sample ID	Date	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylene (ppmv)	TPH G (ppmv)
Inf 1-P Eff 1-P	02-17-94	4.4 2.3	8.0 5.0	1.9 1.2	12 7.6	240 150
Inf 2-P Eff 2-P	04-13-94	23 1.7	34 2.7	5.8 0.51	34 3.0	560 42
Inf 3-P Eff 3-P	04-27-94	52 2	83 2	6 ND	56 2	3100 73
Inf 4-P Eff 4-P	05-05-94	8.5 ND	13 0.50	3.0 ND	19 ND	290 ND
Inf 5-P Eff 5-P	05-17-94	6.0 ND	8.8 0.32	ND ND	12 0.28	220 ND
Inf 6-P Eff 6-P	05-27-94	12 0.44	5.6 0.93	4.4 ND	17 0.45	160 20
Inf 7-P Eff 7-P	06-02-94	5.8 0.23	12 0.43	1.6 ND	7.4 0.32	370 13
Inf 8-P Eff 8-P	06-08-94	6.9 0.38	9.6 0.45	1.8 ND	11 0.42	290 ND
Inf 9-P Eff 9-P	06-15-94	5.0 ND	8.0 0.29	2.2 ND	13 0.34	340 ND
Inf 10-P Eff 10-P	06-22-94	85 2.6	66 2.3	8.1 0.3	44 1.5	1200 37
Inf 11-P Eff 11-P	06-29-94	20 0.17	22 0.35	6.5 ND	23 0.3	1400 27
Inf 12-P Eff 12-P	08-02-94	19 0.26	22 0.80	2.5 ND	13 4.2	1300 90
Inf 13-P Eff 13-P	08-11-94	0.82 ND	11 0.29	1.1 ND	5.3 1.9	370 29
Inf 14-P Eff 14-P	08-25-94	6.9 ND	9.8 ND	0.99 ND	4.4 0.23	46 ND

TPH G
ppmv
ND

Total petroleum hydrocarbons in the gasoline range
Parts per million by volume
Not detected, constituents were below reporting limits

TABLE 2 (Continued)

VAPOR EXTRACTION ANALYTICAL DATA
 INFLUENT HYDROCARBON VAPOR CONCENTRATIONS AND EXTRACTION DATA

NESTLÉ - OAKLAND FACILITY

EPA METHODS 8015 AND 8020

Sample ID	Date	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylene (ppmv)	TPH G (ppmv)
Inf 15-P Eff 15-P	09-01-94	28 0.6	37 0.98	4.4 ND	17 0.67	1800 49
Inf 16-P Eff 16-P	10-26-94	30 0.31	53 0.74	4.4 ND	22 0.74	1700 18
Inf 17-P Eff 17-P	11-03-94	9.4 0.20	13 0.69	1.6 ND	14 1.7	730 22
Inf 18-P Eff 18-P	11-09-94	66 0.82	58 1.1	4.2 ND	19 0.92	3200 34

TPH G Total petroleum hydrocarbons in the gasoline range
 ppmv Parts per million by volume
 ND Not detected, constituents were below reporting limits

TABLE 3

VAPOR EXTRACTION REMEDIATION
EFFLUENT HYDROCARBON VAPOR CONCENTRATIONS AND EMISSIONS DATA
MONTHLY SUMMARY

NESTLÉ - OAKLAND FACILITY

JANUARY - DECEMBER, 1994

Month	Days Operation (days/mo)	Average Concentration (ppmv)		OVA Field Reading (ppmv)	Average Flow Rate (cfm)	Average Mass* Extracted (lbs/day)		Total Pounds	
		TPH	B			TPH	B	TPH	B
January	6	-	-	-	-	-	-	-	-
February	16	150	-	-	440	21.3	0.3	340	5.2
March	7	-	-	-	-	-	-	-	-
April	30	46	1.7	30.3	441	6.56	0.25	197	7.4
May	31	15	0.4	16.3	440	2.13	0.06	66	2
June	30	13	0.7	30.6	440	1.9	0.1	56	3
July	17	71.5	0.23	90	440	10.1	0.03	172	0.6
August	17	40	0.06	42.3	389	5.3	-	89	0.13
September	4	49	0.6	32	400	6.3	0.08	25	0.3
October	18	13.3	0.23	-	418	1.8	0.03	33	0.6
November	21	32.3	0.7	26.3	408	4.3	0.1	91	2
December	3	30	0.7	-	380	3.7	0.09	11	0.3
Annual Totals					425	5.4	0.1	1080	21.53

days/mo Days per month
ppmv Parts per million by volume
TPH Total petroleum hydrocarbons
B Benzene
cfm Cubic feet per minute
lbs/day Pounds per day
lbs/mo Pounds per month
- No data

APPENDIX A

MONTHLY SUMMARY VAPOR EXTRACTION REMEDIATION FORMS

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: January, 1994

DAYS OF OPERATION: 6

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 3,030

EQUIVALENT GALLONS OF GAS REMOVED: 489

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
01/01 - 01/6	3361	466	505

ppmv Parts per million by volume
cfm Cubic feet per minute
lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: February, 1994

DAYS OF OPERATION: 16

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 2,544

EQUIVALENT GALLONS OF GAS REMOVED: 410

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
02/09 - 02/13	2240	440	318
02/14 - 02/20	240	440	34
02/21 - 02/24	1260	440	179

ppmv Parts per million by volume
cfm Cubic feet per minute
lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: March, 1994

DAYS OF OPERATION: 7

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 833

EQUIVALENT GALLONS OF GAS REMOVED: 134

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
03/23 - 03/29	840	440	119

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: April, 1994

DAYS OF OPERATION: 30

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 3,840

EQUIVALENT GALLONS OF GAS REMOVED: 619

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
04/01 - 04/26	560	440	79
04/27 - 04/30	3100	445	445

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: May, 1994

DAYS OF OPERATION: 31

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 3,100

EQUIVALENT GALLONS OF GAS REMOVED: 500

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
05/01 - 05/05	3100	440	439.7
05/06 - 05/17	290	440	41.1
05/18 - 05/27	220	440	31.2
05/28 - 05/31	160	440	22.7

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: June, 1994

DAYS OF OPERATION: 30

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 2,370

EQUIVALENT GALLONS OF GAS REMOVED: 382

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
06/01 - 06/02	160	440	22.7
06/03 - 06/08	370	440	52.5
06/09 - 06/15	290	440	41.1
06/16 - 06/22	340	440	48.2
06/23 - 06/28	1200	440	170.2
06/29 - 06/30	1400	440	198.6

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: July, 1994

DAYS OF OPERATION: 17

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 4,403

EQUIVALENT GALLONS OF GAS REMOVED: 710

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
07/01 - 07/05	1400	440	199
07/06 - 07/13	2240	440	318
07/21 - 07/24	1540	440	219

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: August, 1994

DAYS OF OPERATION: 17

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 1,819

EQUIVALENT GALLONS OF GAS REMOVED: 293

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
08/02 - 08/05	1300	390	163
08/06 - 08/11	370	428	51
08/12 - 08/16	1400	356	161
08/25 - 08/26	46	357	5

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: September, 1994

DAYS OF OPERATION: 4

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 724

EQUIVALENT GALLONS OF GAS REMOVED: 117

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
09/01 - 09/02	1800	400	232
09/07 - 09/08	1000	400	129

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: October, 1994

DAYS OF OPERATION: 18

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 3,042

EQUIVALENT GALLONS OF GAS REMOVED: 491

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
10/14 - 10/20	560	406	73
10/21 - 10/31	1700	426	234

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: November, 1994

DAYS OF OPERATION: 21

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 5,397

EQUIVALENT GALLONS OF GAS REMOVED: 870

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
11/01 - 11/03	730	367	86
11/04 - 11/12	3200	420	433
11/17 - 11/25	1120	410	148

ppmv Parts per million by volume
cfm Cubic feet per minute
lbs/day Pounds per day

MONTHLY SUMMARY OF VAPOR EXTRACTION REMEDIATION

SITE: Nestlé/Carnation 1310 14th Street, Oakland, California

MONTH: December, 1994

DAYS OF OPERATION: 3

ESTIMATED POUNDS OF HYDROCARBONS REMOVED: 1,029

EQUIVALENT GALLONS OF GAS REMOVED: 166

SYSTEM OPERATION DATA

Date	Influent Lab Concentration (ppmv)	Vapor Flow (cfm)	Product Removed (lbs/day)
12/29 - 12/31	2800	380	343

ppmv Parts per million by volume

cfm Cubic feet per minute

lbs/day Pounds per day

APPENDIX B

VAPOR RECOVERY CALCULATIONS

VAPOR EXTRACTION SYSTEM (VES)
Vapor Recovery Calculations

The formula for calculating the vapor recovery rate is given by :

$$V_r \text{ (lb/hr)} = (V_c) (Q) (2.24 \times 10^{-7})$$

Where: V_r = vapor recovery rate (lb/hr)
 V_c = vapor concentration (ppmv as gasoline)
 86.18 = assumed average molecular weight by vapor (lb/lb-mole)
 Q = venting rate in (SCF/hr)

2.24×10^{-7} = $(1.0 / (10^6 \text{ ppmv})) (86.18 \text{ lb/lb-mole}) (1.0 \text{ lb-mole} / 385.36 \text{ SCF})$
 1 lb-mol/385.36 SCF = constant for hexane

Example Calculation (see Table 1, January 1994 data)

Determine: V_r
 Given: V_c = 3361 ppmv
 Q = 466 cfm or 27,960 SCF/hr

$V_{r \text{ (lb/hr)}}$ = $(V_c) (Q) (2.24 \times 10^{-7})$
 $V_{r \text{ (lb/hr)}}$ = $(3361) (27,960) (2.24 \times 10^{-7})$

$V_{r \text{ (lb/hr)}}$ = 21.05 lb/hr or 505 lb/day

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