ANANIA GEOLOGIC ENGINEERING

REMEDIAL ACTION PLAN
FOR THE
CARNATION OAKLAND DAIRY FACILITY
LOCATED AT 1310 14TH STREET
OAKLAND, CALIFORNIA
ALAMEDA COUNTY

APRIL 3, 1989

AGE PROJECT No. 004-88-059

AGE 11330 SUNRISE PARK DR., SUITE C • RANCHO CORDOVA, CA 95742
P.O. BOX 161148 • SACRAMENTO, CA 95816 • PHONE (916) 631-0154 FAX (916) 631-0528

April 14, 1989

Ms. Katherine Chesick
Alameda County Health Agency
Division of Hazardous Materials
Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

Re: Transmittal of Remedial Action Plan and Preliminary Site Characterization for the Carnation Dairy Facility in Oakland, CA

AGE Project No: 004-88-059

Dear Ms. Chesick:

Enclosed for your review are one copy of each of the following reports; Remedial Action Plan for Carnation's Oakland Dairy Facility and the Preliminary Site Characterization.

If there are any questions, please contact me at 916/631-0154.

Sincerely,

Mary L. Scruggs
Senior Project Manager

enclosures

cc: Mr. Howard Schmuckler (w/o enclosures)
Mr. Don Dalke, RWQCB (w/ reports)

MLS:gab

REMEDIAL ACTION PLAN
FOR THE
CARNATION OAKLAND DAIRY FACILITY
LOCATED AT 1310 14TH STREET
OAKLAND, CALIFORNIA
ALAMEDA COUNTY

APRIL 3, 1989

ERRATA SHEET

One Plate 1 and 2, 14th Street and 16th Streets are reversed. 16th Street should be the northern site boundary and 14th Street the southern site boundary.

AGE 11330 SUNRISE PARK DR., SUITE C • RANCHO CORDOVA, CA 95742
P.O. BOX 161148 • SACRAMENTO, CA 95816 • PHONE (916) 631-0154 FAX (916) 631-0528

REMEDIAL ACTION PLAN
FOR THE
CARNATION OAKLAND DAIRY FACILITY
LOCATED AT 1310 14th STREET
OAKLAND, CALIFORNIA
ALAMEDA COUNTY
APRIL 3, 1989

TABLE OF CONTENTS

ILLUSTRATIONS

TABLES

PLATES (Located in pockets behind the text)

APPENDICES

REMEDIAL ACTION PLAN
FOR THE
CARNATION OAKLAND DAIRY FACILITY
LOCATED AT 1310 14TH STREET
OAKLAND, CALIFORNIA
ALAMEDA COUNTY

APRIL 3, 1989

AGE PROJECT No. 004-88-059

1.0 INTRODUCTION

Carnation's Corporate Counsel, Howard R. Shmuckler, authorized Karl J. Anania, a California Registered Geologist of Anania Geologic Engineering (AGE), to prepare a Remedial Action Plan (RAP) for Carnation's Oakland Dairy Facility (Facility). This RAP addresses the cleanup/remediation of on-site gasoline and diesel that leaked from the Facility's former underground fuel storage and dispensing system. Gasoline and diesel are present as free product in the soil and are floating on the groundwater. In addition, dairy fat and detergent have been found in the soil and groundwater.

Lead too

Local, state, and federal environmental laws and regulations require cleanup of the gasoline and diesel, dairy fat, and detergent. Cleanup is being performed under the emergency spill containment provisions in Title 22 of the California Code of Regulations (CCR). The San Francisco Bay Regional Water Quality Control Board (Board) has designated the Alameda County Hazardous Materials Department (County), represented by Katherine Chesick, as the lead regulatory agency.

1.1 PURPOSE

The purposes and objectives of this RAP are to:

1) Document completed remedial activities;

2) Describe ongoing cleanup procedures;

3) Specify planned remedial actions; and

4) Establish criteria to determine when remediation is complete.

1.2 SCOPE OF WORK

The scope of work described in this RAP is divided into three sections: completed remedial activities, ongoing remedial activities, and planned remedial activities. Each section is summarized below.

1.2.1 COMPLETED REMEDIAL ACTIVITIES

1) Removal of the source of gasoline and diesel contamination; four underground fuel storage tanks, its associated dispensing system, and one waste oil tank;

2) Excavation of contaminated soil under and adjacent to, the tanks and fuel dispensing system;

3) Determination that the floating constituents (gasoline, diesel, detergent, and animal fat) in the soil and groundwater can be bioremediated with specific microorganisms;

4) Selection of formulations of microorganism(s) that adequately bioremediate the soil and groundwater contamination;

5) Evaluation of a clarification system used to remove gasoline, diesel, and lead constituents from groundwater pumped to the surface.

6) Installation of two 12-inch recovery wells, RW-1 and RW-2, in the main tank and waste oil tank excavation areas and forty 2-inch product recovery probes throughout the site to:

   a) Recover gasoline and diesel floating on the groundwater;

   b) Inoculate microorganisms into the groundwater to bioremediate the gasoline, diesel, dairy fat, and detergent;

c) Introduce air into the groundwater to increase the activity of the microorganisms and enhance bioremediation;

d) Measure the thickness of gasoline, diesel, and dairy fat floating on the groundwater to evaluate the effectiveness of different formulations of microorganisms;

7) Installation of a vented 8,000 gallon above ground storage tank to contain the gasoline and diesel skimmed from the groundwater surface.

1.2.2 ONGOING REMEDIAL ACTIVITIES

1) Recovering gasoline and diesel floating on the groundwater in the vicinity of recovery wells RW-1 and RW-2 and selected recovery probes;

2) Bioremediating on-site contaminated soil excavated during the removal of the underground tanks and associated piping;

3) Inoculating microorganism(s) into the groundwater through the recovery wells and selected probes to bioremediate gasoline, diesel, detergent, and dairy fat;

4) Injecting air into the groundwater to increase the concentration of oxygen essential for rapid bioremediation;

5) Measuring the thickness of gasoline and diesel floating on the groundwater in recovery wells and probes.

1.2.3 PLANNED REMEDIAL ACTIONS

1) Designing and implementing an on-site soil and groundwater cleanup system which may encompass:

a) Installing additional product recovery probes and wells to skim floating gasoline and diesel; to inject oxygen, microorganisms, and nutrients for bioremediation; and to lower the water table to contain the gasoline and diesel plume on-site;

b) Storing the gasoline and diesel skimmed from the groundwater surface in a vented storage tank for later disposal or recycling.

c) Bioremediating and clarifying groundwater pumped to the surface;

d) Sampling the treated groundwater to verify its purity; and

e) Injecting the treated water into the aquifer to alter the groundwater direction and increase the rate of groundwater flow towards the product recovery wells and probes.

2) Preparing necessary documents and permits, including:

a) Updated site safety plans;

b) Contingency plans describing operation and maintenance of remediation equipment, and procedures to be implemented in emergency situations;

c) Updates to the Unauthorized Release Report and other documents that detail the activity and progress of on-site remediation;

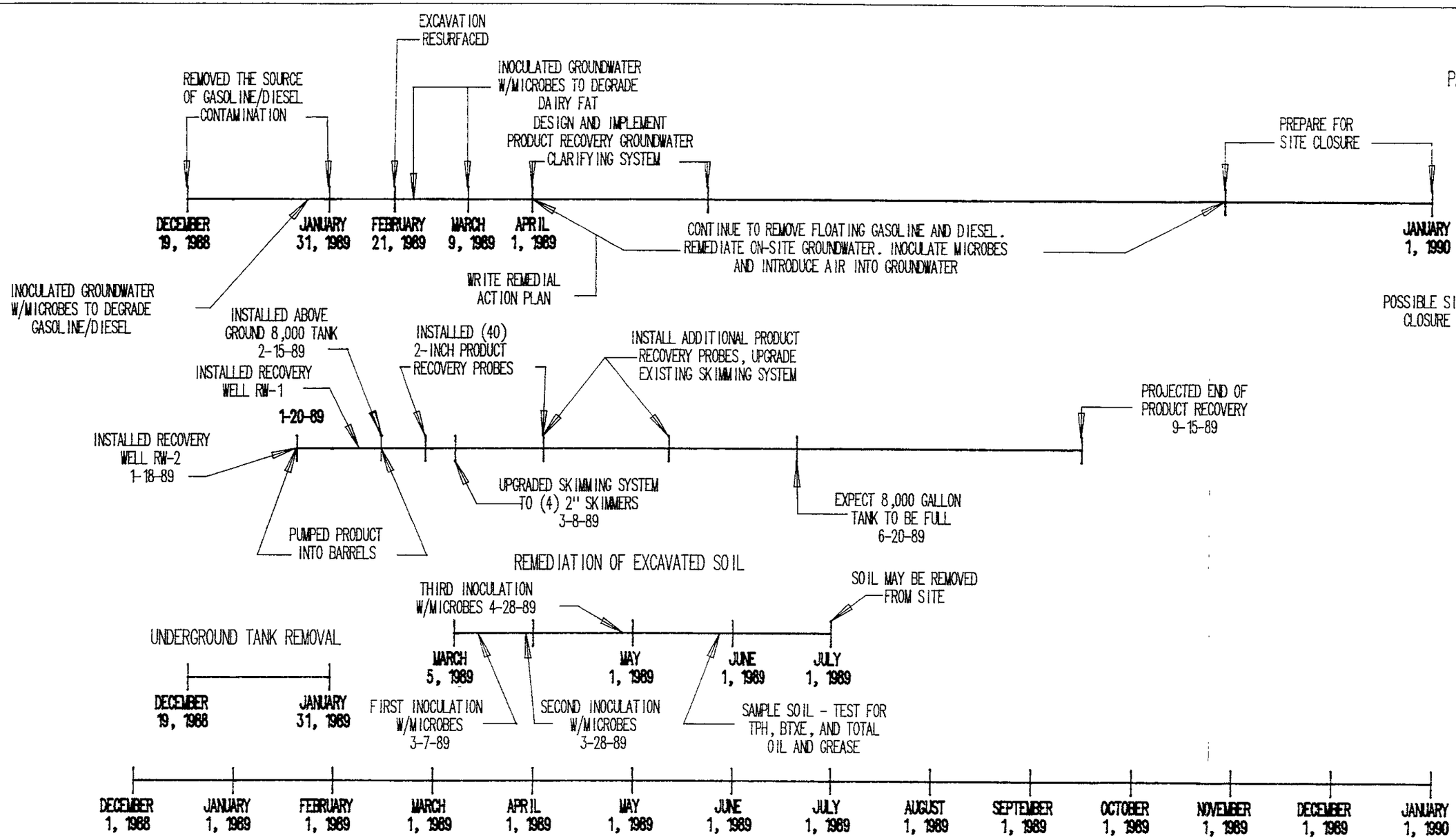
d) Authorities to construct and operate remedial actions at this facility from the Bay Area Air Quality Management Board; and

e) NPDES permits required by local, state, and federal regulatory agencies.

3) Collecting groundwater samples at least quarterly from on-site monitoring wells (Plate 1) to monitor remedial activities.

1.3 SCHEDULE

A work schedule for this RAP is presented in Figure 1. By July 1989, the soil excavated during removal of underground fuel storage tanks, should be remediated to levels acceptable at a Class III landfill. Barring unforseen problems, it may be possible to recover the on-site floating gasoline and diesel by mid-September 1989. On-site remedial activities may be completed by January 1990. These guideline dates for cleanup of soil and groundwater for closure at the Facility are dependent on criteria established and accepted by AGE and Alameda County.



AGE

ANANIA GEOLOGIC ENGINEERING

TITLE: REMEDIATION SCHEDULE, CARNATION DAIRY FACILITY.					
PROJECT NAME: CARNATION-OAKLAND				PROJECT NO:	104-88-039
SITE LOCATION: 1310 14TH. OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	3-29-89	CHRIS			

2.0 BACKGROUND

Carnation's Dairy Facility is located at 1310 14th Street in the City of Oakland, Alameda County, California. Figure 2 shows the site location and surrounding vicinity.

2.1 FACILITY DESCRIPTION

The Facility was formerly an active ice cream and milk production plant with associated packaging, storage, and distribution operations. It had seven underground fuel storage tanks, but five were removed in early January, 1989. Two fuel oil tanks are still present at the site. Of the five tanks removed in January 1989, two 10,000 gallon tanks and one 1000 gallon waste oil tank were installed in 1955, one 13,000 gallon tank in 1966, and one 12,000 gallon tank in 1977.

During the tank removal operations, AGE noted two possible areas of leaks in the fueling system. From examination of contaminated soil, there appeared to be a leak in a fuel transfer line that ran between the tanks and the above ground pumps and another leak south of the four underground fuel storage tanks. Because there is no documentation indicating a possible source of contamination south of the main excavation, floating gasoline and diesel found there may be the result of tank overfilling.

2.2 FACILITY HISTORY

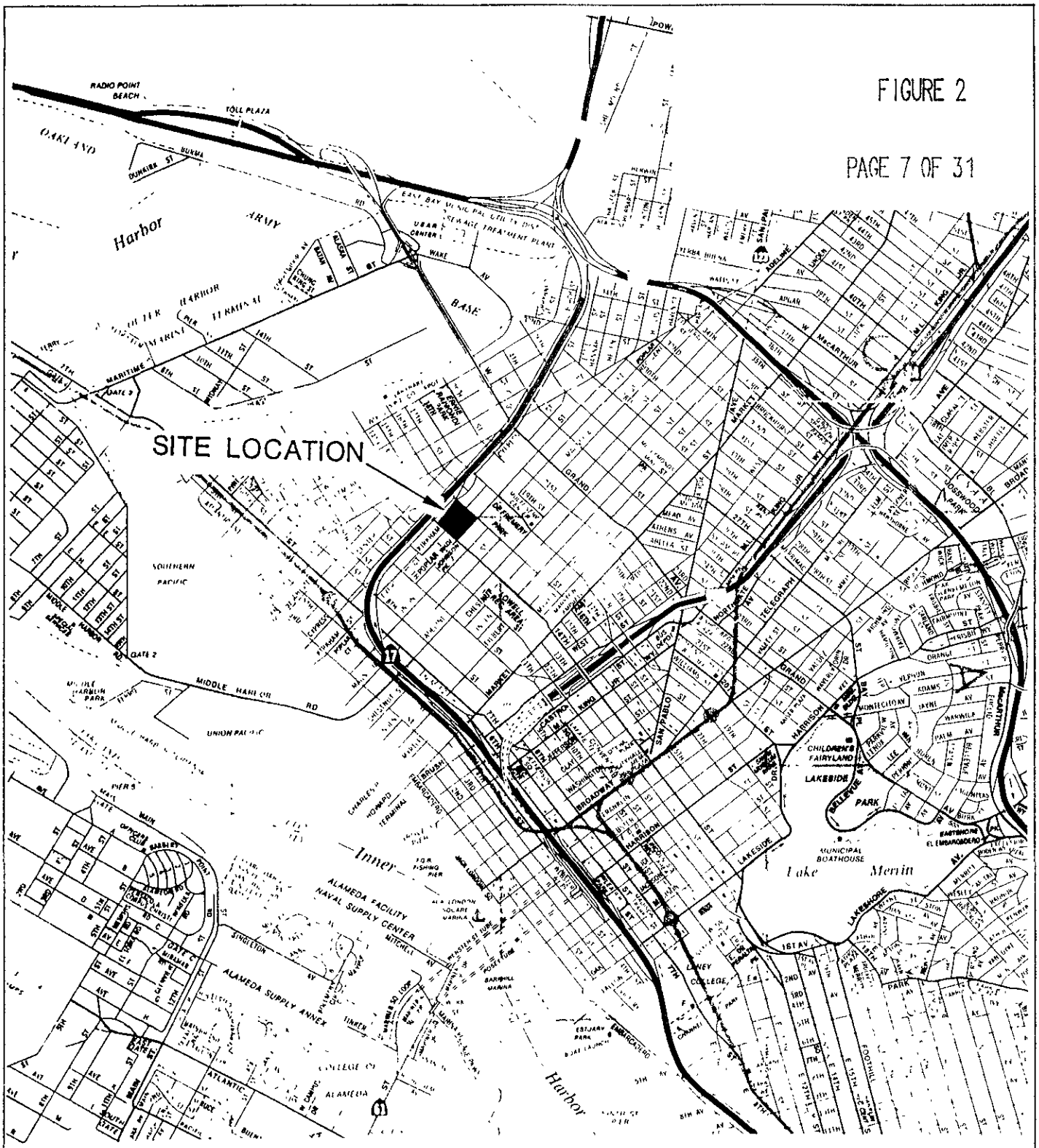
The Dairy Facility was originally constructed by American Creamery in 1915. Carnation purchased the Facility in 1929. Several additions and improvements to the buildings were made between 1946 and 1973. Historical aerial photographs taken in 1953, 1959, 1969, and 1989 document construction changes and are presented in Appendix A. Carnation is currently negotiating the sale of the property to Foster Farms.

2.3 APPARENT PRODUCT VOLUME

The volume of on-site floating gasoline and diesel was calculated using the following equation:

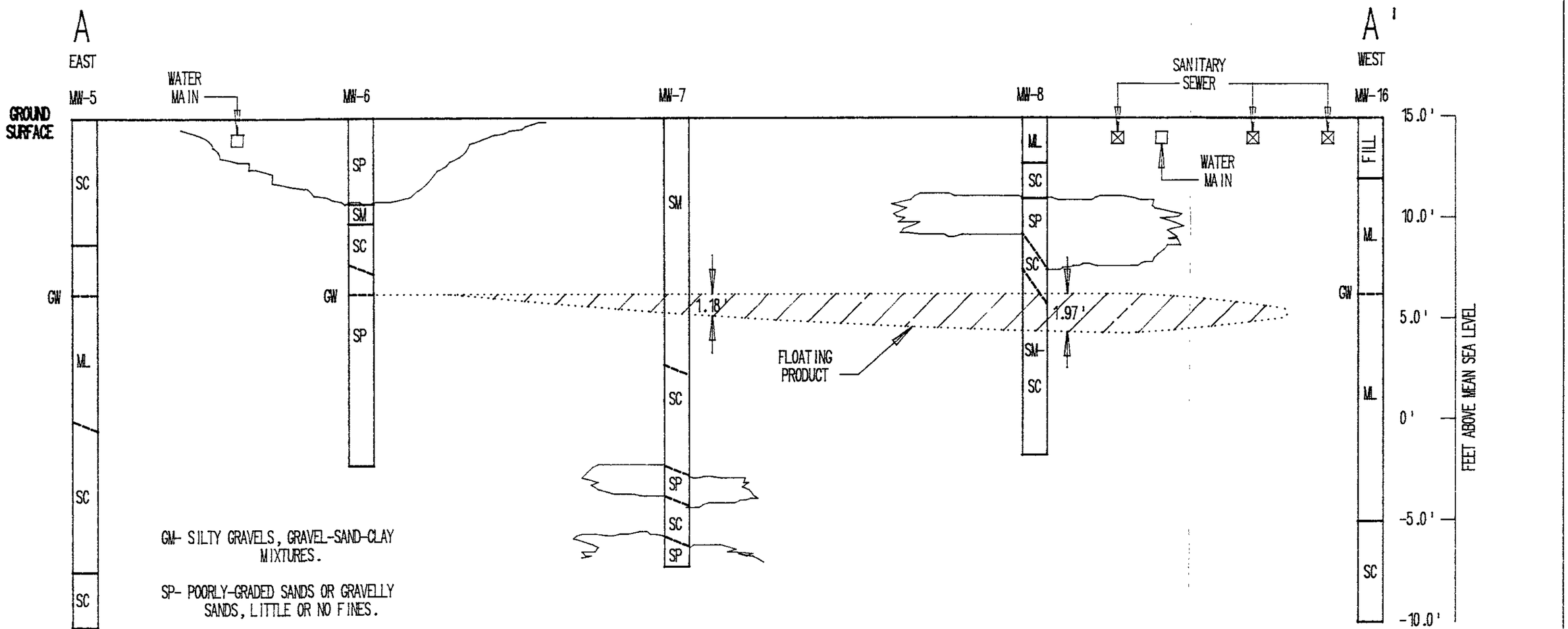
Product Volume = Plume area x average apparent product thickness x soil porosity

In the main plume under the shop building, 60,000 gallons may be floating on the groundwater (Plate 2 and Figure 3). Estimates for the main plume of gasoline are an area of 20,000 square feet, an average depth of one foot of product, and a porosity of 40%.



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: SITE LOCATION MAP					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO: 004-88-059	
SITE LOCATION: 1310 14th ST. AT POPLAR ST. OAKLAND					
FIG. NO.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
2	4-4-89	CHRIS DIDIO			NONE



GM- SILTY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.

SP- POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.

SM- SILTY SANDS, SAND-SILT MIXTURES.

SC- CLAYEY SANDS, SAND-CLAY MIXTURES.

ML- INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.

GW- GROUNDWATER LEVEL.

HORIZONTAL SCALE IN FEET
0 20

VERTICAL SCALE IN FEET
0 5

NOTE: DEPTHS OF WATER MAINS AND SANITARY SEWERS ARE INFERRED.

AGE
ANAVIA GEOLOGIC ENGINEERING

TITLE: CROSS-SECTION OF PRODUCT PLUME (FROM MW-5 TO MW-16)					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO:	004-88-059
SITE LOCATION: 1310 14TH. OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	3-29-89	CHRIS DIDIC			1" = 20'

Although floating product measurements are as high as three feet, as shown in Plate 2, professional experience has shown that actual product thickness may often be less than field measurements indicate.

A second plume possibly caused by overfill is located south of the main excavation. This plume may contain as much as 15,000 gallons. This estimate is made assuming an area of 5,000 square feet, an average product depth of one foot, and a porosity of 40% (Plate 2).

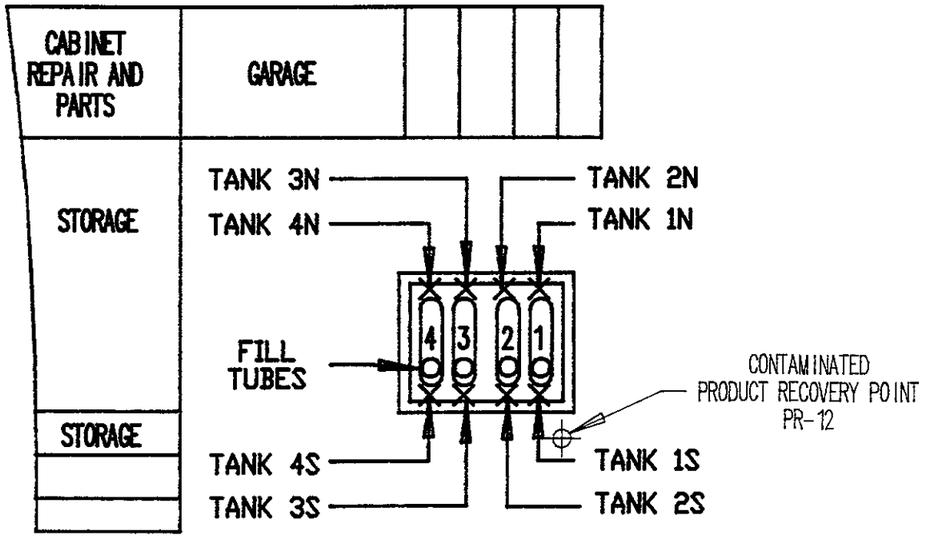
2.4 SOURCE OF CONTAMINATION

Gasoline and Diesel

While removing the four underground fuel storage tanks and associated dispensing system, soil and groundwater contaminated with what appeared to be gasoline and diesel was discovered. However, in agreement with Lawrence Seto of the Alameda County Health Department, all the tanks were intact. The tanks had no visible holes.

Gasoline and diesel may have leaked from two sources. As the Amendment to the Unauthorized Release Report (Appendix B) indicates, streaks of contamination were found below a main transfer line near the surface drain. In addition, soil adjacent to the south side of the excavated tanks appeared heavily contaminated, especially near tanks 2 and 4. Assuming a source north of the underground tanks and a groundwater gradient northward as established in the Preliminary Site Characterization Report (Appendix D, bound separately) soil contaminated south of the tanks may have originated from a completely different source. That source may have been overfill during tank refueling. Significant amounts of fuel may be lost when tanks are refilled, accounting for major soil and groundwater contamination.

Analytical results from soil sampled during the excavation also suggest that there may have been two individual sources of gasoline and diesel (Figure 4). Soil samples taken beneath the main transfer line, were contaminated with gasoline and diesel constituents. Of equal importance, samples taken near the south end of tanks 2 and 4 had significantly higher levels of contamination. Although tanks 1 and 3 showed heavier contamination on the north end, this may be explained by the apparent leaky fuel line.



SAMPLE NO.	THP GASOLINE	THP DIESEL	BENZENE	ETHYL-BENZENE	TOLUENE	XYLENE	TOTAL ORGANIC LEAD
TANK 1N	17,000	280	200	130	660	580	BRL
TANK 1S	570	36	40	54	190	260	BRL
TANK 2N	12,000	BRL*	50	44	190	200	BRL
TANK 2S	26,000	570	200	BRL**	740	690	BRL
TANK 3N	31,000	BRL*	300	BRL**	940	840	BRL
TANK 3S	9,700	BRL*	20	36	110	50	BRL
TANK 4N	18,000	BRL*	100	BRL	520	520	BRL
TANK 4S	38,000	BRL*	200	200	910	850	BRL

BRL = BELOW REPORTING LIMIT
* = REPORTING LIMIT 1000 ppm
** = REPORTING LIMIT 200 ppm

AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: TANK SAMPLE LOCATIONS AND CONCENTRATIONS						
PROJECT NAME: CARNATION/OAKLAND			PROJECT NO. 004-88-059			
SITE LOC: 1310 14TH ST. AT POPLAR OAKLAND, CA.						
REV.	DATE	DESCRIPTION	DWG BY	CHK BY	APP BY	SCALE:
0	3-30-89		C.DIDIO			NONE

Dairy Fat

The origin of dairy fat is unknown; however, Carnation once used the sewer beneath abandoned Kirkham Street (Plate 1) to discharge creamery effluent. Given a groundwater flow direction of north to northwest, as established in the Preliminary Site Characterization Report included in Appendix D (bound separately), soil and groundwater in the excavation area should contain gasoline and diesel.

3.0 REMEDIAL ACTION PLAN

On-site Floating Gasoline and Diesel

Main Plume

The probable physical dimensions of the main plume beneath the shop building can be seen in Figure 4. This plume may contain 60,000 gallons of floating gasoline and diesel. Probes adjacent and down gradient from the waste oil excavation pit appear to contain not only gasoline, but diesel, oil, and grease as well. This includes probes PR-30, PR-33, PR-34, PR-35, PR-22, PR-23, RW-1, and RW-2. Recovery probes PR-31 and PR-32 in the main excavation appear to have both diesel and gasoline. Monitoring wells MW-7 and MW-8 also appear to have significant amounts of diesel, oil, and grease. In contrast, probes PR-20, and those west of PR-34 appear to have more gasoline than diesel.

It appears the main plume also extends laterally beyond the north wall of the shop building. Monitoring well MW-8 has approximately two feet of floating gasoline and diesel. The northern extent of the plume is yet to be established.

Overfill Plume

The probable physical dimensions of a second plume located south of the main excavation is also shown on Plate 2. This second plume may contain as much as 15,000 gallons of floating gasoline and diesel. PR-12, the only probe with floating gasoline and diesel south of the main excavation, appears to have more diesel than gasoline. More product recovery probes should be installed around PR-12 to recover floating gasoline and diesel.

Proposed Remediation

Work described in this document pertains to the cleanup of on-site contaminated soil and groundwater and is being performed under the emergency spill containment provisions in Title 22 of the California Code of Regulations (CCR). To remediate the contaminated soil and groundwater at this Facility AGE plans to:

1) remove on-site gasoline, diesel, and dairy fat floating on the groundwater;

2) clarify on-site polluted groundwater;

3) remediate soil above the groundwater;

4) and clean the excavated soil.

AGE is currently characterizing the soil and groundwater chemistry, lithology, and hydrogeology at the site. A Preliminary Site Characterization Report is presented in Appendix D (separately bound).

3.1 REMEDIAL ACTIONS COMPLETED

3.1.1 SOURCE REMOVAL

The Amendment to the Unauthorized Release Report describes the tank removal procedures in detail. This document is presented in Appendix B. The following is a summary of this report.

Gasoline and Diesel Tanks

On December 19, 1988, AGE began excavating four underground fuel storage tanks. While removing the tanks, approximately a half-inch of gasoline and diesel floating on the groundwater was discovered. The tanks were intact with no visible holes.

Two possible sources of gasoline and diesel were noted. Fuel may have leaked from a product fuel line running from the tanks to the above ground pumps. When the product fuel lines were removed, streaks of gasoline and diesel were visible in the soil below a coupling in the main transfer line. In addition, soil samples collected below the apparent leak confirmed the presence of gasoline and diesel (Figure 4).

Gasoline and diesel may have also been introduced by overfill during tank refueling. As shown by Figure 4, soil adjacent to

tanks 2 and 4 had higher concentrations of gasoline and diesel on the south end. This suggests a separate source of contamination. Product recovery probe PR-12 located southeast of the main excavation is also contaminated with floating gasoline and diesel (Plate 2).

In light of the contamination discovered, AGE immediately began remedial actions. A french drain trench was installed in the main excavation to drain floating contaminants to a 12-inch recovery well (Figure 5). A Clean Environmental Engineers SOS skimmer was placed in the recovery well (RW-1), and recovered product was pumped into drums at the surface.

Waste Oil Tank

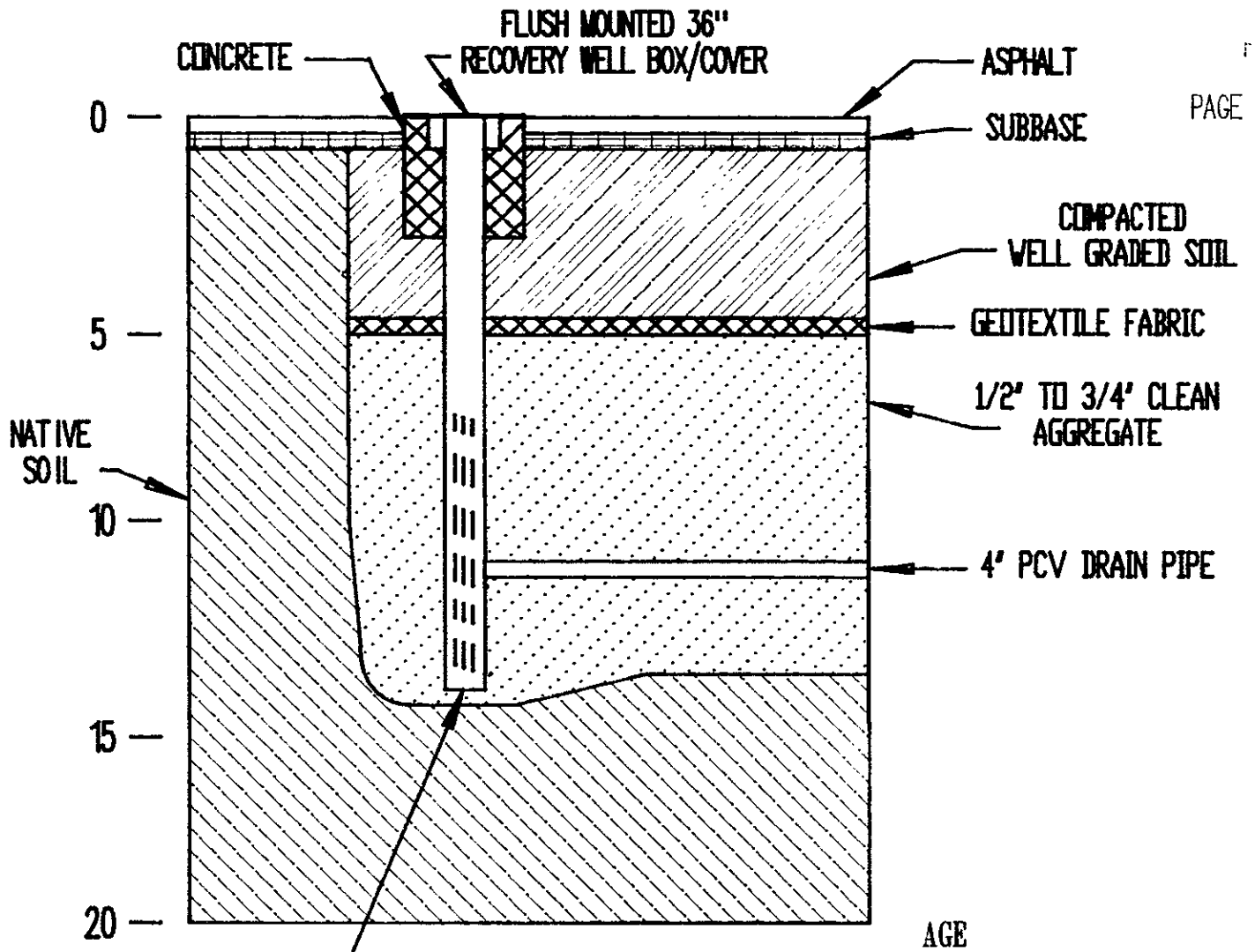
On January 12, 1989, a 1000 gallon waste oil tank was removed. Katherine Chesick of the Alameda County Health Department was on-site to observe the tank pull. Soil was found to be contaminated just below ground surface and holes were evident in the tank.

Groundwater was not encountered; however, rainwater pooling in the excavation appeared to have gasoline and diesel floating on it. Soil samples were collected and analyzed for TPH, volatile organics, semivolatile organics, and cadmium, lead, zinc and chromium. Analytical results presented in the Amendment to the Unauthorized Release Report in Appendix B, indicates the presence of gasoline and diesel constituents, chromium and zinc.

A french drain trench was also installed in the waste oil tank excavation with a 12-inch recovery well (RW-2). The well was not pumped immediately to allow the well to recharge in order to record an accurate depth of floating gasoline and diesel.

3.1.2 BIOREMEDIATION OF EXCAVATED SOIL

The contaminated soil adjacent to the underground tanks was excavated and spread on plastic sheets above the asphalt and then covered with plastic. To determine if microbes could break down the gasoline and diesel in soil, a representative soil sample was sent to Solmar Corporation in Orange, California. Test results showed that microorganisms can break down the dairy fat, the gasoline and diesel in soil, and the gasoline and diesel in water. Material Safety Data Sheets on the microbes used at this site are included with in Appendix C.



ANANIA GEOLOGIC ENGINEERING AGE

TITLE: FRENCH DRAIN SCHEMATIC					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO: 004-88-059	
SITE LOCATION: 1310 14TH ST. OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	3-30-89	CHRIS DIDIO			NONE

3.1.3 GROUNDWATER SAMPLING

On February 23, 1989, a groundwater sample was collected from RW-1 to evaluate on-site groundwater hydrocarbon concentrations. The sample was put in a cooler and sent to Precision Analytical under Chain of Custody to be analyzed for TPH, oil and grease, volatile aromatic hydrocarbons, and total lead. Analytical results and the Chain of Custody forms are included in Appendix C. The sample was obtained to aid remediation. Remedial techniques are chosen on a site specific basis in reference to soils, degree of contamination, types of contaminants, and many other factors. Monitoring wells have been installed on-site for site characterization. Analytical results from the initial sample round can be found in the accompanying Preliminary Site Characterization Report (Appendix D, bound separately).

3.1.4 GROUNDWATER CLARIFIER SYSTEM

In situ groundwater or groundwater removed from the aquifer at this facility must be remediated. On March 9, 1989, a composite groundwater sample was collected from RW-1 and RW-2 and sent to Baryon Environmental in Ceres, California under Chain of Custody to test their clarifying system. Two samples were collected from the Baryon system. Clarifier effluent samples were collected to test the removal efficiency of the clarifier. Additional samples were collected after the clarified water was passed through carbon scrubbers to remove more impurities. All samples were collected and sent to Precision Analytical under Chain of Custody to be analyzed for TPH, benzene, toluene, ethylbenzene, xylene, and total lead. Analytical results and Chain of Custody forms are included in Appendix C.

As the results indicate, the clarifier will remove 99.99% of the total lead in groundwater at this site. However, hydrocarbons were not effectively removed solely by clarification.

There are several alternatives to remediate groundwater at this site.

Alternative A -- not remove groundwater and treat in situ.

Alternative B -- Clarify the groundwater to remove the lead and bioremediate the effluent to recover hydrocarbon impurities.

Alternative C -- Clarify and carbon scrub the groundwater and provide minimal bioremediation to remove hydrocarbon constituents.

Although in situ treatment may remediate the groundwater, to effectively remediate this site, groundwater should be removed. As discussed in the Conclusions and Recommendations section of this report, to diligently remediate this site, the plume of gasoline should be contained on site. This would require removing groundwater.

Alternative B provides the most cost effective means to remediate groundwater to levels acceptable for reintroduction into the groundwater aquifer (Table 1). The additional removal efficiency

from carbon scrubbing will not offset the cost of the carbon scrubbing system. Microorganisms are inexpensive and can remove the hydrocarbons in the clarified water to concentrations acceptable for reinjection back into the groundwater.

3.1.5 SOIL SAMPLING

During the recovery probe installation, two soil samples were collected from PR-5 at five and ten feet and PR-9 at 10 feet. The samples were collected to obtain information on total petroleum hydrocarbons, aromatic volatile hydrocarbons, and total lead. The samples were collected using a California modified split-spoon sampler, capped, sealed, placed in a cooler, and transported to Precision Analytical under Chain of Custody. Analytical results and Chain of Custody forms are presented in Appendix C.

3.1.6 INSTALLATION OF PRODUCT RECOVERY PROBES

During the week of February 21 to February 24, 1989, AGE installed forty product recovery probes. A typical product recovery probe schematic is presented in Figure 6 and their locations are shown on Plate 1. The probes were installed on-site in areas thought to have floating gasoline and diesel. Without knowing the groundwater directional flow, probes were installed surrounding the excavation, along the property boundary and across the site. More probes were drilled in areas with floating gasoline and diesel.

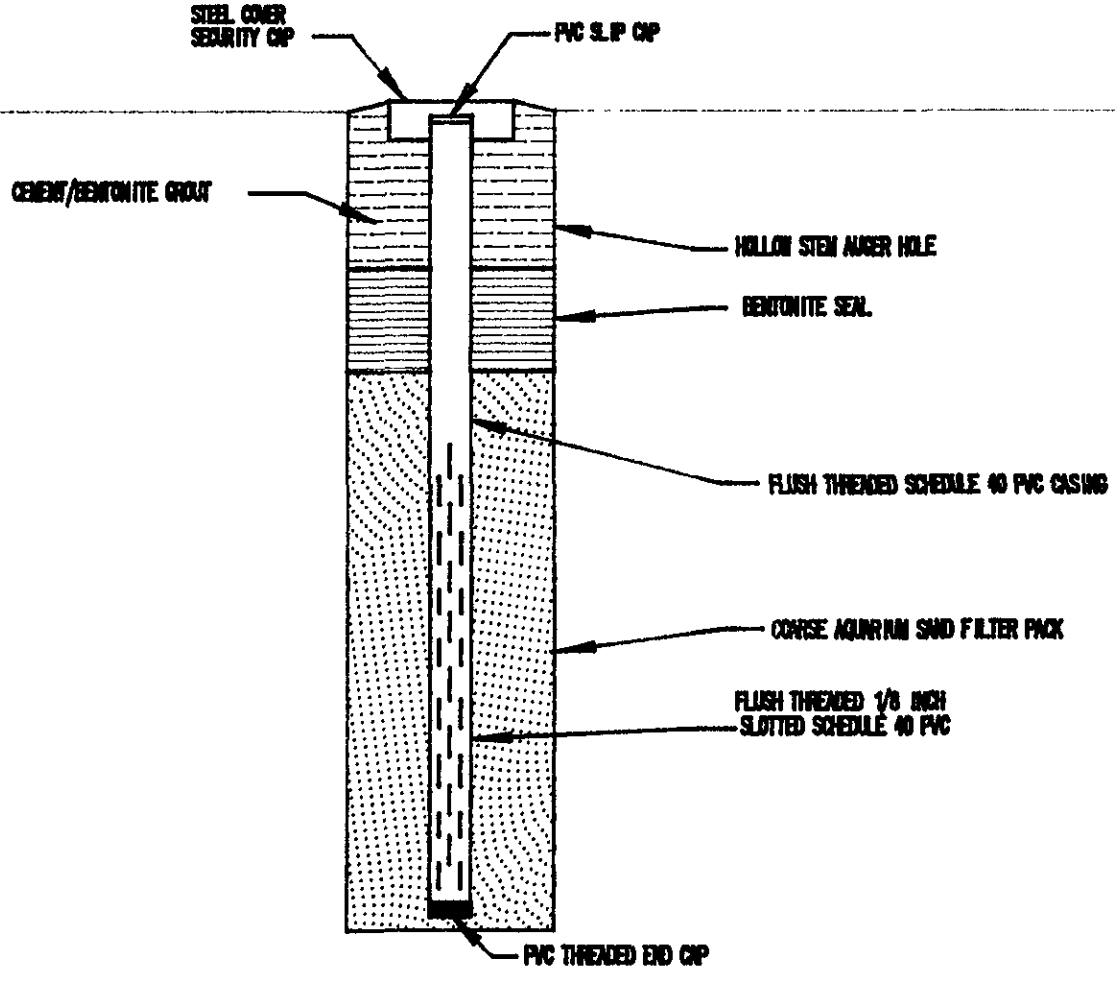
The product recovery probes were installed by first drilling a fifteen foot boring into the native material using a 6 3/4-inch outside diameter hollow-stem auger. Soil samples were collected and logged every five feet to assess the geology and change in lithology.

Once the boring was completed, 2-inch diameter schedule 40 PVC well screen and blank screen were installed in each boring. AGE constructed the screening by cutting 1/8-inch vertical slots in the blank pipe. The one-foot long slots were staggered to ensure maximum product recovery.

Table 1: Cost Comparison on Alternatives to Clarify Groundwater

Alternative	Total Removal Cost
B	33,274*
C	51,480**

NOTES
*Calculated assuming 500 pounds of microoganisms.
**Calculated assuming 250 pounds of microoganisms.
- Total costs include a bioremediation tank.
- Piping costs are not included.



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: PRODUCT RECOVERY EXTRACTION POINT					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO: 004-88-059	
SITE LOCATION: 1310 14th ST. AT POPLAR ST. OAKLAND					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	3-30-89	CHRIS DIDIO			NONE

Slotted PVC extended from 15 to 7 feet below ground surface. A threaded end cap was put at the base of the casing. A seven foot blank PVC section was threaded from the top of the screen to the surface. Approximately two 100 pound bags of "coarse aquarium" sand were used as filter pack in each probe. The hollow stem auger was used as a tremie pipe in setting the filter pack. The filter pack was extended 1-1/2 to 2 feet above the top of the screening.

A two-foot bentonite seal was placed above the filter pack and each probe was grouted approximately a foot below ground surface. For security, diversified well covers were installed on each probe.

Product recovery probes were installed to:

a) Recover gasoline and diesel floating on the groundwater surface;

b) Inoculate microorganisms into the groundwater to degrade the gasoline, diesel, and dairy fat;

c) Introduce air into the groundwater to increase the number of microorganisms and their activity;

d) Provide information on the thickness of floating contaminants;

3.2 ONGOING REMEDIAL ACTIVITIES

3.2.1 PRODUCT RECOVERY

Approximately 1,800 gallons of floating gasoline and diesel have been removed. A product recovery log is included in Table 2. From January 20 to February 8, 1989, contaminants were skimmed off the groundwater and pumped into 55-gallon drums using a Clean Environment Engineers SOS skimmer. On February 15, 1989, an 8,000 gallon storage tank was brought on site and free product was pumped directly into the tank.

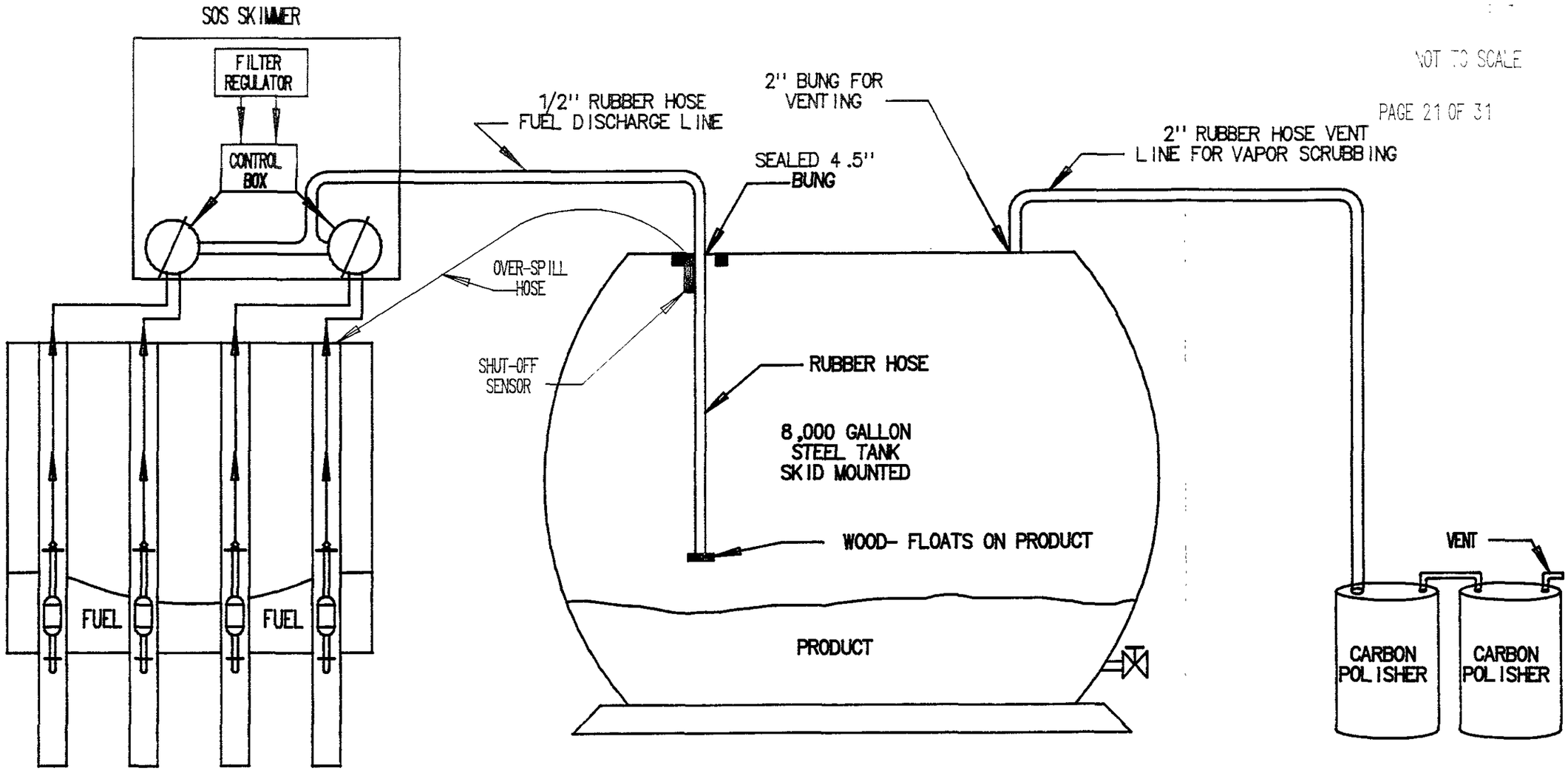
The product removal system has been modified several times. On March 5, 1989, the system was modified so that the SOS skimmer could discharge into the above ground tank. More skimmers have been added to the unit, and now the system can pump floating gasoline and diesel from four individual wells simultaneously as shown in Figure 7.

Table 2: Product Recovery Log

Date/Time	Logged By	Well Location(s)	Product Removed	Cumulative Product Removed	Tank Reading (Inches)
01/20/89 to 02/08/89	CNC	RW-1	200	200	--
02/09/89, 10:15	CNC	RW-2	50	250	--
02/15/89, 11:45	CNC	RW-2	200	450	9-3/4
02/21/89, 13:20	CNC	RW-2	50	500	10-1/2
02/23/89, 17:00	CNC	RW-2	50	550	11-1/4
02/24/89, 15:40	CNC	RW-2	10	560	11-3/8
02/25/89, 12:30	CNC	RW-2	10	520	11-1/2
02/27/89, 13:20	CNC	RW-2	0	520	11-1/2
03/06/89, 14:20	CNC	PR-23, RW-2	75	645	12-1/2
03/11/89, 16:00	CNC	PR-35, PR-22, PR-36, PR-20	35	680	13
03/14/89, 10:50	CNC	PR-35, PR-22, PR-36, PR-20	186	866	15-3/8
03/16/89, 16:40	CNC	PR-35, PR-22, PR-36, PR-20	92	958	16-1/2
03/20/89, 09:50	CNC	PR-35, PR-22, PR-36, PR-20	162	1,120	18-3/8
03/21/89, 16:15	CNC	PR-34, PR-22, PR-24, PR-36	74	1,194	19-1/4
03/23/89, 13:00	CNC	PR-34, PR-22, PR-24, PR-36	56	1,250	19-3/4
03/24/89, 11:00	CNC	PR-34, PR-22, PR-24, PR-36	11	1,260	20
03/27/89, 11:00	CNC	PR-20, PR-30, PR-23, PR-21	376	1,636	24

NOTES
- On 02/15/89, an 8,000 gallon above ground tank was brought on site.
- On 02/23/89, the skimmer was modified to pump directly into the 8,000 gallon tank.
- From 02/24/89 to 02/27/89, recharge to well RW-2 to slow to skim product.
- On 03/11/89, skimmer modified with (4) 2-inch recovery probes.

NOT TO SCALE



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: PRODUCT RECOVERY SYSTEM						
PROJECT NAME: CARNATION/OAKLAND			PROJECT NO. 004-88-059			
SITE LOC: 1310 14th ST. AT POPLAR ST. OAKLAND						
REV.	DATE	DESCRIPTION	DRAWING BY	CHK BY	APP BY	SCALE
0	3-30-89		CHRIS DIDIO			

If the skimming pump is set properly in a probe, the skimmer removes only floating product and not groundwater. A float sliding freely on the pump sinks only in oily substances, and floats in water. The product is drawn in at the top of the float and as the product level drops, the float slides down. When the float hits groundwater it no longer sinks and continues pumping 12 inches above the water table.

The skimmer, however, is not maintenance free. Care must be taken in how low the skimmer is set in the recovery probe to ensure groundwater is not removed. The float can slide about two feet vertically as groundwater levels fluctuate. If groundwater were to rise more than two feet, the skimming probe might pump water. Groundwater fluctuations possibly caused by tidal actions were noted during February in recovery probes RW-1 and RW-2. Groundwater fluctuated approximately 7 to 8 inches. The fluctuations are taken into account when the skimming pumps are set.

The skimmer can be set to pump for a time and rested for a time to mimic the recharge rate of the groundwater aquifer. The silty sand aquifer at this site has a relatively high rate of recharge. Recharge tests were performed in product recovery probes RW-2 and PR-23. The results are presented in Table 3.

Product recovery probe PR-23 had a 2.25 inch/hour recharge rate. In contrast, RW-2 had a 0.60 inch/day recharge rate. This variance in recharge rate may be the result of differences in well development, well design, or well location with respect to the plume of gasoline and diesel.

The skimming pumps are moved from one probe to the next depending on the thickness of floating gasoline and diesel. When the gasoline level in the probe drops to the point beyond the skimming pumps capability, the pump is moved to another probe. In this way, the probe being pumped is allowed to recharge, and recovery rates are increased. The product thickness is measured using an interface tape to determine if the skimming pump needs to be moved, and to find the probe with the most floating gasoline and diesel.

3.2.2 BIOREMEDIATION OF EXCAVATED SOIL

From March 5 to March 6, 1989, 1,200 cubic yards of contaminated soil piled on the asphalt was spread out and fluffed to a lift of 2 to 3 feet. The following steps are being used to bioremediate the contaminated soil:

Table 3: Drawdown Recharge Test For Recovery Well RW-2 and Probe PR-23

Date/Time	Well Number	Product Thickness (Inches)	Recharge Rate
02/15/89, 13:12	RW-2	2.50	
02/15/89, 13:27	RW-2	2.50	
02/15/89, 13:47	RW-2	2.62	
02/15/89, 14:10	RW-2	2.50	
02/15/89, 14:35	RW-2	2.50	
02/16/89, 08:10	RW-2	3.50	
02/17/89, 09:05	RW-2	4.75	
02/21/89, 09:00	RW-2	5.25	
02/22/89, 09:15	RW-2	7.25	0.68 in./day
03/06/89, 11:15	PR-23	3.75	
03/06/89, 12:50	PR-23	7.50	
03/06/89, 14:10	PR-23	10.50	
03/06/89, 16:15	PR-23	14.50	
03/07/89, 08:00	PR-23	24.50	1.03 in./hour*

NOTE
*Probe may have completely recharged before 3/7/89.

1) Microbial Inoculation -- To bioremediate the gasoline and diesel, seedings of microorganisms will be applied to the soil. On March 7, 1989, AGE inoculated the soil with 75 pounds of microorganisms. In conjunction with this inoculation, 650 pounds of water soluble 24, 10, 18, nitrogen-phosphorus-potassium fertilizer was added to the soil to provide essential nutrients for microorganism growth. An additional 100 pounds of microorganisms were added to the soil on March 28, 1989. AGE anticipates a third inoculation in late April 1989.

2) Aeration -- The microbial degradation pathway requires oxygen. To provide oxygen the soil is fluffed on a periodic basis. Prior to the second seeding, the soil was completed remixed and fluffed with a backhoe. AGE plans to rework the soil preceding the third and last inoculation of microbes.

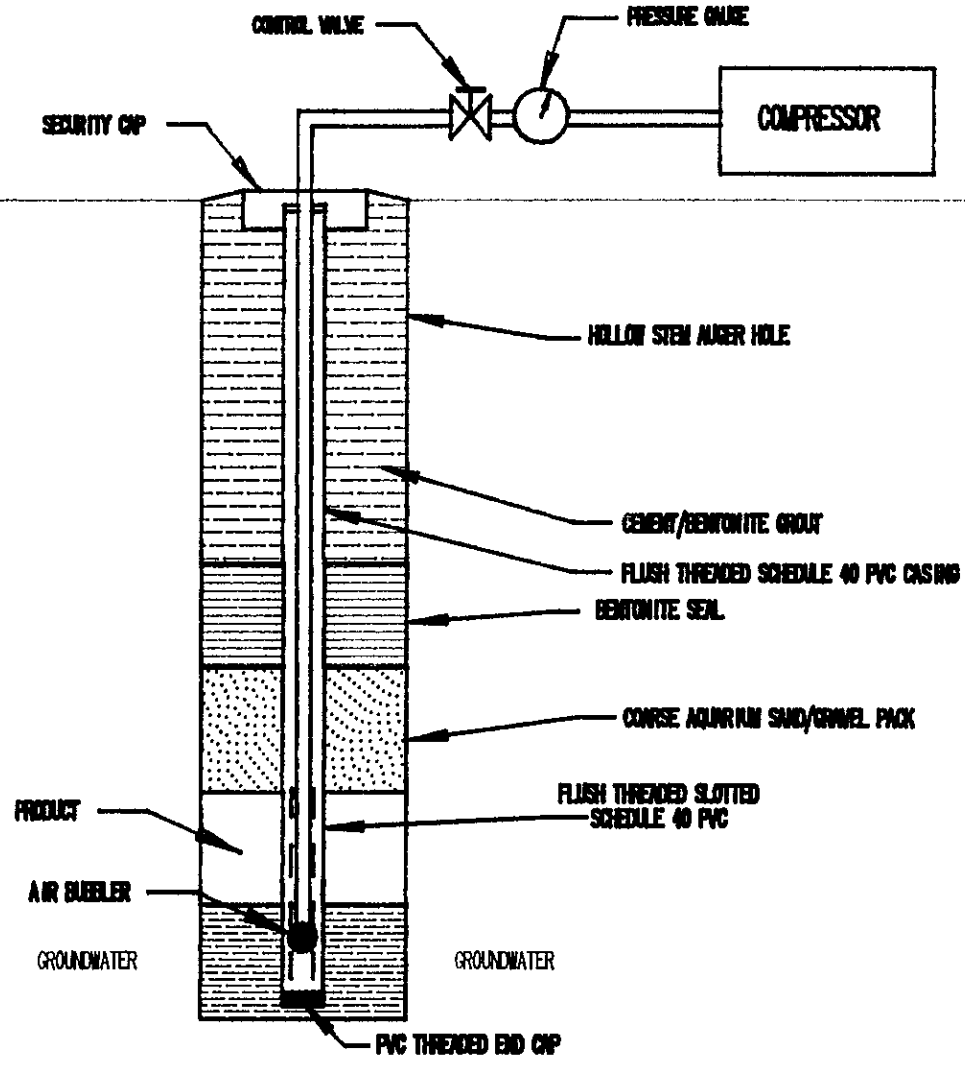
3) Insolation -- Microorganism flourish between 90 to 97 degrees Fahrenheit. To increase the temperature of the microbial environment, black plastic is covering the soil. In addition, a steam cleaner is used to periodically provide heat to the microorganisms.

4) Moisture -- The steam cleaner not only provides heat to the microbes, but also supplies needed water. The soil must maintain a moisture content between 20 to 80% saturation. The moisture content of the pile is monitored and steam cleaned water is added when required.

3.2.3 IN SITU SOIL AND GROUNDWATER BIOREMEDIATION

Microorganisms have been introduced into the aquifer. On January 26, 1989, microorganisms were added to the groundwater to bioremediate gasoline and diesel constituents. On February 26 and March 9, 1989, microbes were injected to remove dairy fat. The microorganisms were introduced in wells RW-1 and RW-2 in January and February 1989 (Plate 1). In March, the microbes were injected in several probes throughout the area of floating gasoline and diesel.

To increase the activity of microorganisms, air was introduced into wells RW-1 and RW-2 immediately following microbe inoculation. AGE plans to improve air introduction procedures using the air injection unit shown in Figure 8. The unit can be easily moved from one probe to another to evenly spread oxygen throughout the zone of floating product.



AGE

ANANIA GEOLOGIC ENGINEERING

TITLE: AIR INJECTION UNIT					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO: 004-88-059	
SITE LOCATION: 1310 14th ST. AT POPLAR ST. OAKLAND					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	3-30-89	CHRIS DIDIO			NONE

Microbial injection has been successful. Dairy fat levels as thick as six inches in 2-inch wells have been reduced to non-detected in several product recovery probes. Emulsification of gasoline and diesel into the groundwater has been reduced. Microorganisms capable of degrading dairy fat, diesel, and gasoline will be periodically injected into the aquifer.

3.3 PLANNED REMEDIAL ACTIVITIES

3.3.1 GROUNDWATER CLEANUP SYSTEM

To remediate the on-site soil and groundwater at this Facility, floating gasoline and diesel should be recovered expeditiously. As Plate 2 illustrates, gasoline and diesel may be floating on the groundwater north of the shop building. In addition, a second plume of floating gasoline and diesel is located south of the main excavation.

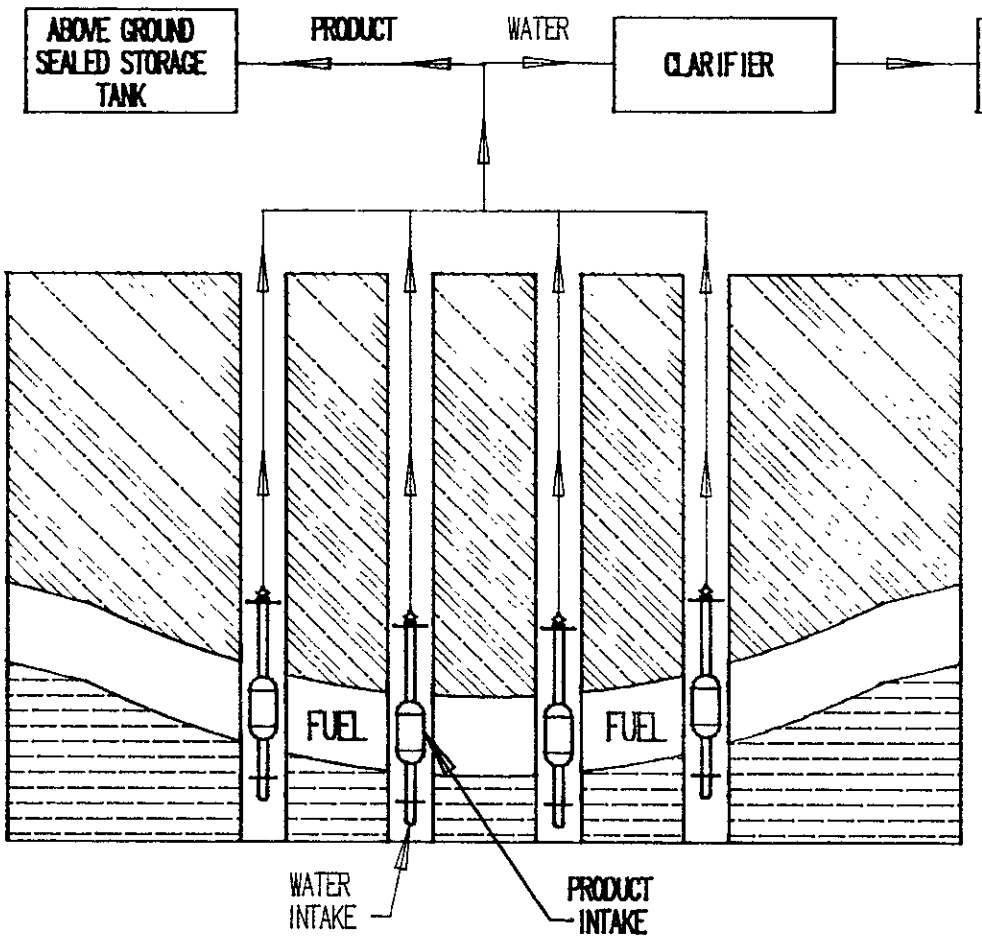
To remediate on-site soil and groundwater, AGE plans to implement a groundwater cleanup system to create a cone of depression on-site in order to draw possible off-site gasoline and diesel onto the property. Extraction wells will be installed to alter the direction of groundwater flow by pumping groundwater to the surface. The locations of these extraction wells will be determined at a later date. Each well will be equipped with a dual pumping system which can remove groundwater and floating gasoline and diesel. Existing product recovery probes will hastened remedial activities by providing a means to skim additional gasoline and diesel and to inject microorganisms and oxygen.

go offsite

Groundwater extracted from the aquifer will be clarified, bioremediated, and injected back into the groundwater. Gasoline and diesel will be pumped into a storage tank for removal or recycling. A conceptual schematic of the dual pumping system is included in Figure 9.

Groundwater extracted from the aquifer will be pumped through a clarifier system to remove lead. The effluent from the clarifier will be put into a bioremediation tank to remove gasoline and diesel constituents. Treated water will be injected back into the groundwater.

AGE plans to collect water samples before reinjection to verify accepted levels of lead, gasoline, and diesel constituents. Water that does not meet established levels shall continue to be remediated. No unacceptable water will be injected into the groundwater.



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: GROUND WATER AND FLOATING PRODUCT EXTRACTION/REMEDIATION SYSTEM					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO: 004-88-059	
SITE LOCATION: 1310 14TH ST. OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	3-30-89	CHRIS DIDIO			NONE

3.3.2 GROUNDWATER SAMPLES

Additional groundwater samples will be collected on a monthly basis for the first three months and then quarterly from on-site monitoring wells. Samples will be taken to monitor cleanup activities.

3.3.3 ADDITIONAL PERMITS AND DOCUMENTS

AGE anticipates additional documents and permits will need to be issued to inform all parties about remedial activities at the Facility and to implement the groundwater cleanup system. This may include updated site safety plans, contingency plans, amendments to the Unauthorized Release Report, and air and NPDS discharge permits.

3.3.4 ESTABLISHING CRITERIA TO STOP REMEDIATION

Before cleanup levels of lead, dairy fat, gasoline constituents and diesel constituents are established, AGE will consult with Carnation to evaluate reasonable cleanup levels. At a later time, AGE will propose cleanup levels to Alameda County. AGE intends to negotiate with Alameda County when more is known about conditions at this Facility.

4.0 CONCLUSIONS AND RECOMMENDATIONS

1) AGE estimates that as much as 75,000 gallons of on-site gasoline and diesel may be floating on the groundwater in two separate plumes of 60,000 and 15,000 gallons (Figure 4 and 5).

2) Although investigative borings have not confirmed that floating gasoline and diesel have migrated off-site, AGE believes the plume of gasoline and diesel beneath the shop building may extend beyond the property boundary.

3) The two existing plumes of gasoline and diesel may have originated from separate sources. The four underground fuel storage tanks removed in January 1989, in agreement with the Alameda County Health Department, appeared to be intact. However, soil samples collected during tank removal procedures, suggest that fuel may have leaked from the main transfer line connecting four underground tanks to the above ground pumps, the waste oil tank, and from an unknown source south of the four tanks. With the direction of groundwater flow to the north to north-northwest, as established in the Preliminary Site Characterization Report (Appendix D, bound

separately), AGE suspects overspill during tank refueling may account for the plume south of the excavation.

4) Laboratory experiments have confirmed that gasoline, diesel, dairy fat and detergent can be bioremediated with microorganisms.

5) Groundwater bioremediation has been successful. Dairy fat levels once as thick as six inches in some recovery probes and wells, have been reduced to non-detection in several wells and probes. Additional microorganisms will be injected into the groundwater aquifer.

6) Additional product recovery probes may need to be installed near product recovery probe PR-12 and in front of the eastern end of the shop building to increase the recovery rate of floating gasoline and diesel. Probes should be placed no more than 20 feet apart.

7) Based on recharge and effective radius tests performed on existing recovery probes (Table 3), 2-inch recovery probes can be placed 20 feet apart to effectively remove floating gasoline and diesel.

8) Approximately 1,800 gallons of floating gasoline and diesel have been removed from the groundwater surface. Skimming operations will continue.

9) Groundwater and soil at this Facility can be remediated. In order for AGE to effectively remediate soil and groundwater the following should be considered:

   a) Extraction wells should be installed to remove groundwater from the aquifer to create a cone of depression on-site. Pumps within the extraction wells can remove groundwater and floating gasoline and diesel separately, and simultaneously. In addition, this pumping action should draw floating gasoline and diesel toward the extraction wells possibly containing the contaminants on-site and drawing the gasoline and diesel off-site back onto the property.

   b) Existing product recovery probes and wells can continue to aid the remediation process by providing a means to inject air and microorganisms into the groundwater aquifer.

c) Groundwater extracted from the aquifer should be clarified to remove lead to acceptable levels for reintroduction into the groundwater;

d) Clarified groundwater should be bioremediated to remove gasoline and diesel constituents to levels acceptable for reintroduction to the groundwater;

e) Only water of acceptable purity as established by local, state, and federal regulatory agencies should be reintroduced back into the aquifer. Samples must be taken before reintroduction to confirm purity.

f) Extracted gasoline and diesel can be stored in tanks on-site for later disposal or recycling.

10) In order to implement the soil and groundwater remedial system, documents such as updated site safety plans, contingency plans, amendments to the Unauthorized Release Report, as well as air quality and discharge permits may need to be periodically submitted to all interested parties and regulatory agencies.

12) Before cleanup levels of lead, dairy fat, gasoline constituents and diesel constituents are established, AGE will consult with Carnation to evaluate reasonable cleanup levels. At a later time, AGE will propose cleanup levels to Alameda County. AGE intends to negotiate with Alameda County when more is known about conditions at this Facility.

5.0 REMARKS AND SIGNATURE

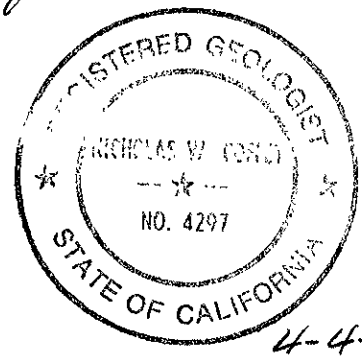
This Remedial Action Plan was prepared in accordance with current industry standards and practice. The work described herein has been and will be performed under the supervision of a California Registered Geologist.

Written by:

Christopher M. Nielson-Cerquone 4-3-89

Chris M. Nielson-Cerquone
Project Remediation Scientist

Date



Prepared Under Supervision of
and Reviewed by:

4-4-89

Nicholas W. Coffey
General Partner
California Registered Geologist No. 4297

Date

Approved by:

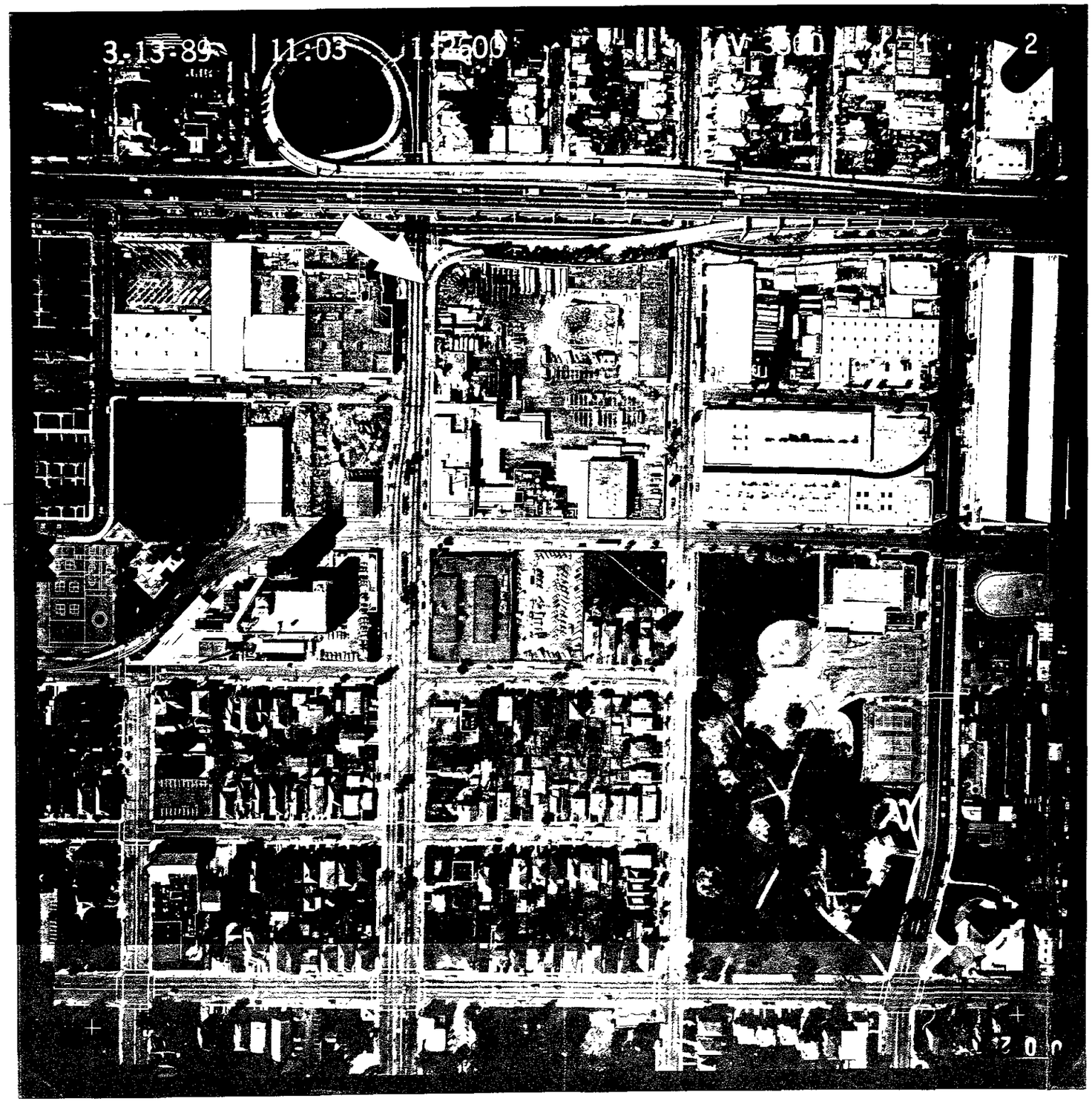
Karl J. Ania 4-3-89

Karl J. Ania
Managing Partner
California Registered Geologist No. 4306

Date

APPENDIX A

Historical Aerial Photographs



Aerial Photo: March 15, 1989


5-2-69
902-05-16

X-3-59 AV-337 05 26

Cheese-making Dairy Facility

Aerial Photo - July 2, 1959

arnation Oakland Dairy Facility

Aerial Photo: August 1[illegible], 1953

APPENDIX B

Amendment to the Unauthorized Release Report

AGE
11330 SUNRISE PARK DR., SUITE C • RANCHO CORDOVA, CA 95742
P.O. BOX 161148 • SACRAMENTO, CA 95816 • PHONE (916) 631-0154 FAX (916) 631-0528

UPDATE No. 1

AMENDMENT TO UNAUTHORIZED RELEASE REPORT FOR CARNATION DAIRY FACILITY LOCATED AT 1310 14TH STREET IN OAKLAND, CALIFORNIA

FEBRUARY 27, 1989

AGE PROJECT No. 004-88-059

UPDATE NO. 1
AMENDMENT TO UNAUTHORIZED RELEASE REPORT
FOR THE CARNATION DAIRY FACILITY LOCATED AT
1310 14TH STREET IN OAKLAND, CALIFORNIA

FEBRUARY 27, 1989

AGE Project No. 004-88-059

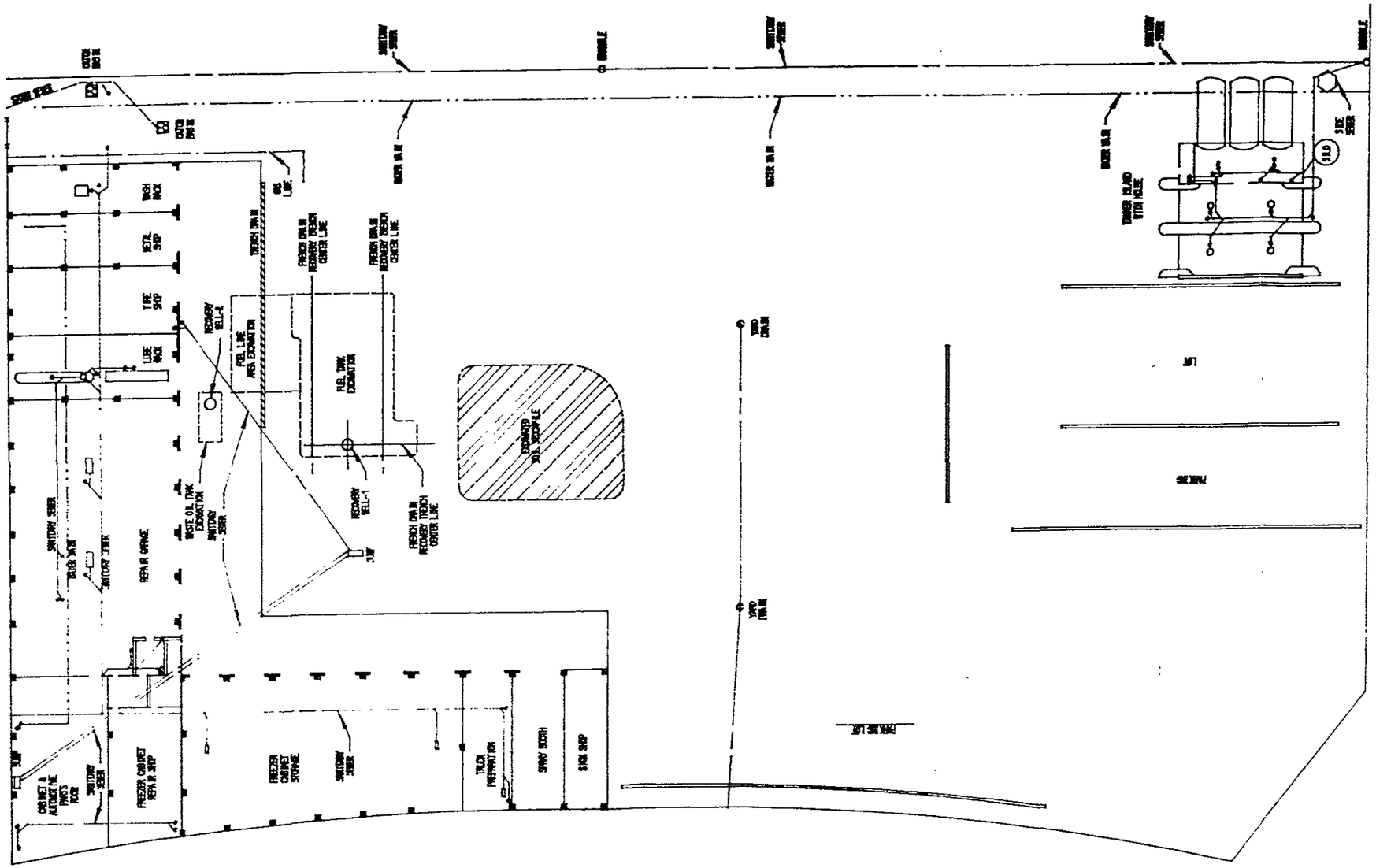
This amendment is an update to the January 17, 1989, Unauthorized Release Report (URR) prepared for the Carnation Dairy Facility located at 1310 14th Street in Oakland. A copy of the Unauthorized Release Report is included in Appendix A. A site map of the western portion of the facility is shown on Figure 1. At the time AGE prepared the original report, an unauthorized release had occurred but the analytical results were not yet available from the analyzing laboratories. This addendum includes the analytical results from soil and ground water sampling in the former tank excavation area, description of emergency remediation measures, product recovery system design, and preliminary conclusions and plans for further remedial action at the site.

The first section expands on the "Type, Quantity, and Concentration of Chemicals" portion of the URR. Analytical results from soil samples collected at the soil-water interface at each end of each fuel tank, under the waste oil tank, and under the product lines are enclosed. Results from a ground water sample collected in the fuel tank excavation pit is also included.

In addition, this update describes emergency remediation measures performed to contain and recover free fuel (gasoline/diesel) floating on the groundwater, treatment of animal fat floating on the groundwater beneath the fuel layer, and treatment of the detergent in the groundwater. Also, included are results of bench testing, field pilot tests, and data such as product thicknesses and groundwater chemistry from the recovery wells.

FUEL TANK AREA

Eight soil samples were collected at the soil-water interface at each end of the four underground fuel tanks. The samples were collected as grab samples from the backhoe bucket in six-inch brass tubes. One ground water sample was collected from the west side of the tank excavation. The water in the excavation was not purged



AGE

ANANIA GEOLOGIC ENGINEERING

TITLE: CARNATION DAIRY FACILITY - WESTERN HALF					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO:	004-88-059
SITE LOCATION: 1310 14TH ST. AT POPLAR OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	2-21-89	CHRIS DIDIO			NONE

prior to collecting the sample. The water was brought to the surface in the backhoe bucket. The water sample was collected in 40 ml VOA vials and in a one-liter amber bottle. One composite soil sample was collected from the excavated soil stockpile. All samples were collected following proper protocol and were transported to Chemwest Analytical Laboratory in Sacramento in a cooler with dry ice under chain of custody. Sample locations are shown on Figure 2.

All of the samples were analyzed for total petroleum hydrocarbons (TPH), benzene, ethylbenzene, toluene, xylene and total organic lead. The ground water was sampled again at the time of the waste oil tank removal and analyzed for methyl blue active substances (MBAS). The analytical results are listed in Table 1. Copies of the analytical results and chain of custody forms are included in Appendix B.

WASTE OIL TANK

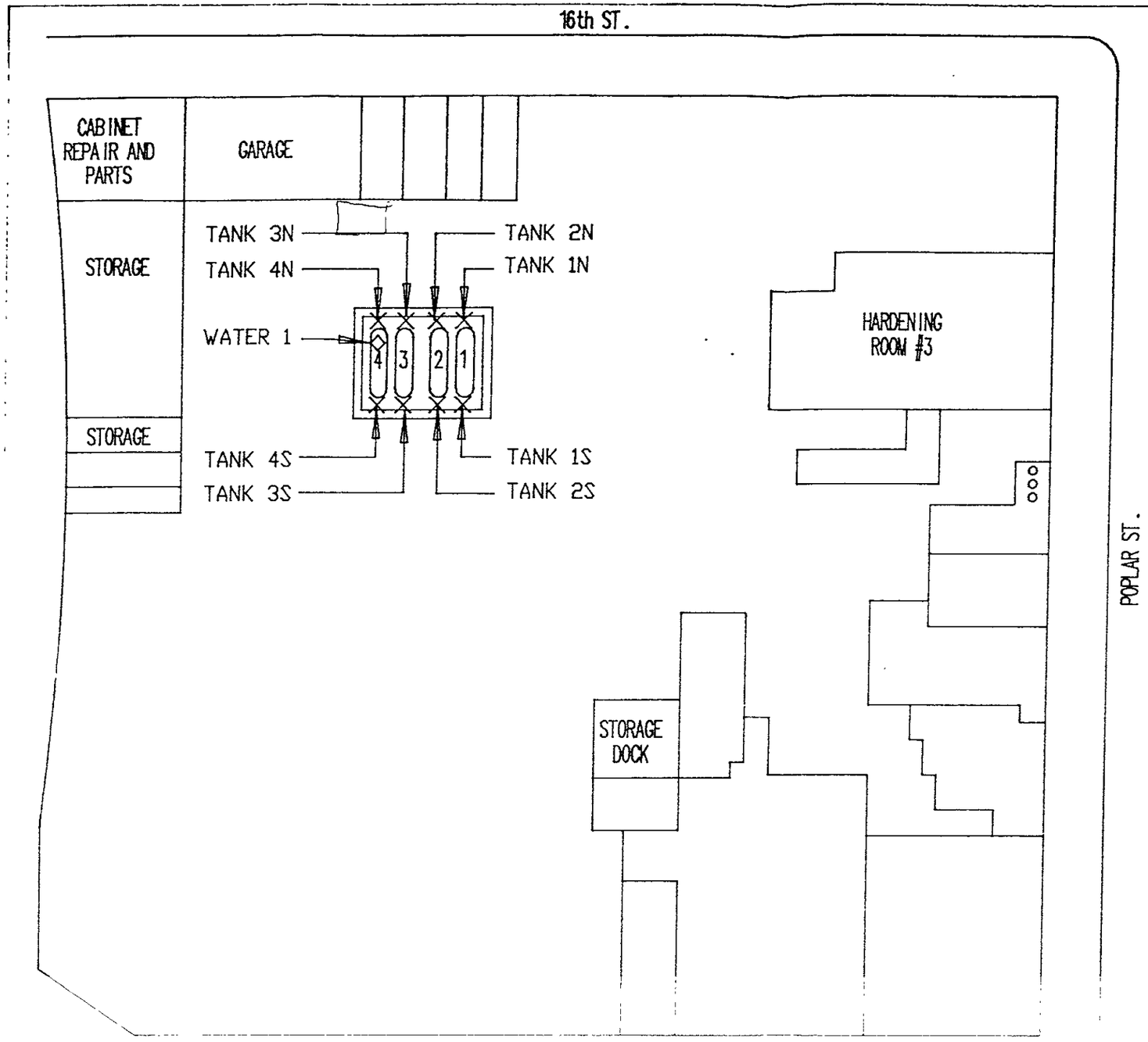
The soil in the waste oil tank excavation was sampled twice. The initial sampling was performed when the waste oil tank was removed. Four soil samples were collected in brass tubes from soil in the backhoe bucket. The samples were collected following proper protocol and were transported to Chemwest Analytical Laboratories in Sacramento in a cooler with ice under chain of custody. The samples were analyzed for TPH, volatile organics, semivolatile organics and cadmium, chromium, lead and zinc by methods 8015 Modified, 8240, 8270 and ICAP, respectively. The reported results for TPH were 19,000 ppm as gasoline and below reporting limits (1000 ppm) for diesel. Volatile organic results reported 27,000 ppb toluene, 12,000 ppb ethylbenzene, and 92,000 ppb total xylenes. Naphthalene and 2-methylnaphthalene were detected at concentrations of 31,000 ppb and 20,000 ppb, respectively. Chromium and zinc concentrations were reported as 26 ppm and 23 ppm, respectively. The remaining chemical constituents were below reporting limits for the analyses performed. Certified analytical results and the chain of custody form are included in Appendix B.

An additional soil sample was collected from the waste oil tank on January 15, 1989. The sample was collected in the same manner as described previously and was transported to Precision Analytical Laboratory in Richmond under chain of custody. The sample was analyzed for PCBs. The analytical results show no PCBs detected. Analytical results and a copy of the chain of custody are included in Appendix B.

PRODUCT LINES AND FUEL ISLAND

Four soil samples were collected below the product lines. The sampling locations are shown on Figure 3. The soil in the vicinity

FIGURE 2



N

LEGEND

FORMER UNDERGROUND STORAGE LOCATIONS

4 3 2 1

SOIL SAMPLE LOCATION × TANK 1N

WATER SAMPLE LOCATION ◇ WATER 1

AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: TANK SAMPLE LOCATIONS						
PROJECT NAME: CARNATION/OAKLAND					PROJECT NO. 004-88-059	
SITE LOC: 1310 14TH ST. AT POPLAR OAKLAND, CA.						
REV.	DATE	DESCRIPTION	DWG BY	CHK BY	APP BY	SCALE:
0	2-23-89	SAMPLE	C.DIDIO			NONE

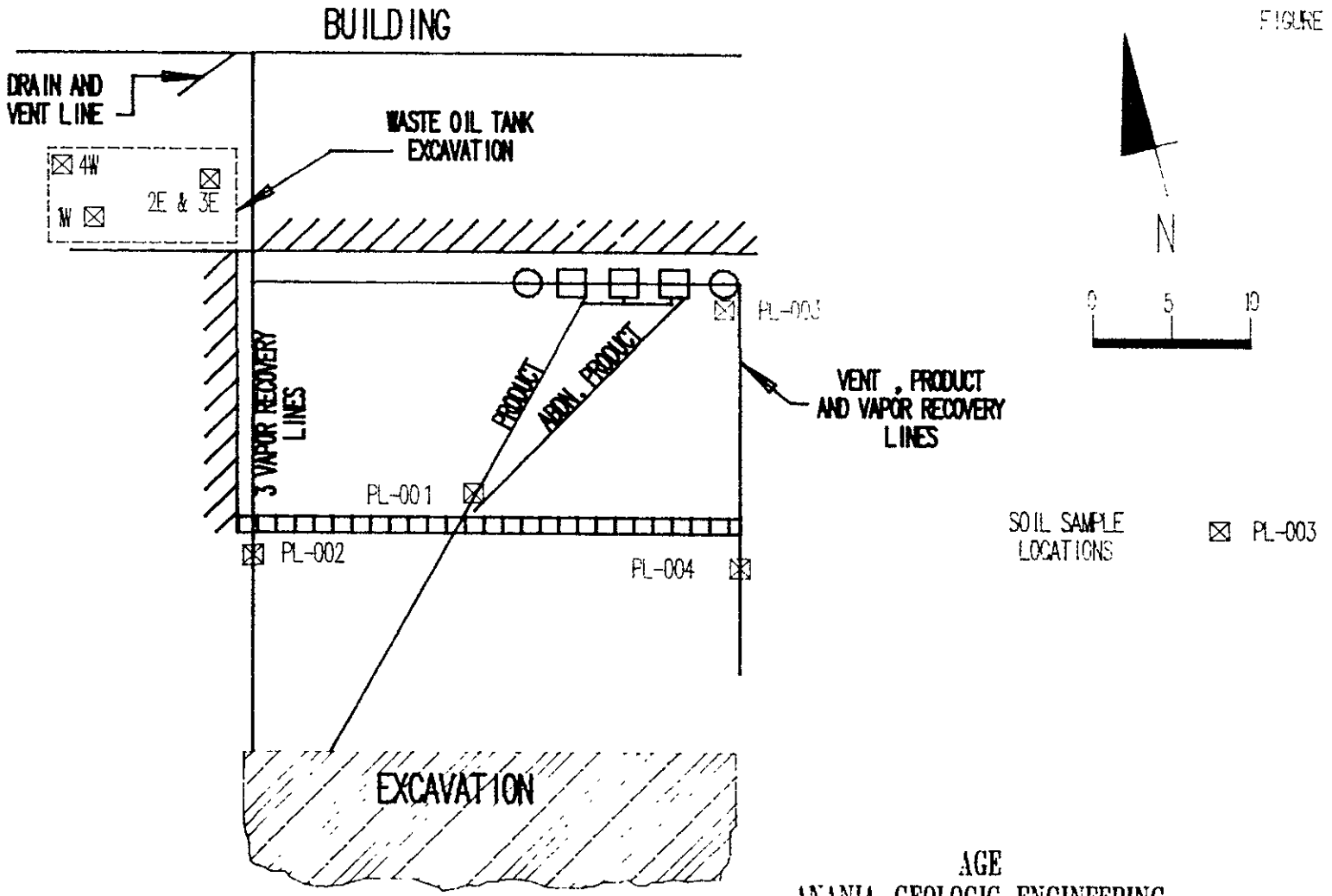
TABLE 1: ANALYTICAL RESULTS FOR SAMPLES FROM FUEL TANK AREA, IN PPM

Sample No.	TPH Gasoline	TPH Diesel	Benzene	Ethyl-benzene	Toluene	Xylene	Total Organic Lead
Tank 1N	17000	280	200	130	660	580	BRL
Tank 1S	570	36	40	54	190	260	BRL
Tank 2N	12000	BRL*	50	44	190	200	BRL
Tank 2S	26000	570	200	BRL**	740	690	BRL
Tank 3N	31000	BRL*	300	BRL**	940	840	BRL
Tank 3S	9700	BRL*	20	36	110	50	BRL
Tank 4N	18000	BRL*	100	BRL	520	520	BRL
Tank 4S	38000	BRL*	200	200	910	850	BRL
Soil Pile 1	BRL***	6500	1.1	0.5	0.4	2.0	BRL
Water 1	1400	0.93	22	1.7	25	--	BRL

BRL = Below reporting limit.
* = Reporting limit 1000 ppm.
** = Reporting limit 200 ppm.
*** = Reporting limit 5000 ppm.
Reporting limit for Total Organic Lead for soil samples is 10 ppm.
Reporting limit for Total Organic Lead for water sample is 1 ppm.

[TABLE1.059, URRV2-14]

FIGURE 3



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: PRODUCT LINES & WASTE OIL TANK LOCATIONS					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO:	094-88-059
SITE LOCATION: 1310 14th ST. AT POPLAR ST., OAKLAND					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
0	2-23-89	CHRIS DIDIO			1" = 10'

of the product lines and the fuel islands was a sandy fill material to depths of greater than four feet below ground surface. The soil samples were collected at depths between 3.5 and 4 feet below ground surface from the fill material and not in native soil. The samples were collected below the sand bed lining the pipe trenches. Two samples were collected on the north side of the trench drain, which lies between the fuel islands and the former fuel tanks, and two samples were collected on the south side of the drain. All four soil samples were collected from the backhoe bucket in six-inch brass tubes following proper protocol. The samples were transported to Precision Analytical Laboratory in Richmond under chain of custody. All samples were analyzed for TPH, BTEX, and TTLC lead by methods 8015 Modified, 8020 and ICAP, respectively. Analytical results are shown in Table 2. Copies of the laboratory reports and chain of custody form are enclosed in Appendix B.

GROUNDWATER

A groundwater sample was collected from Recovery Well No. 1 on January 16, 1989. The sample was bailed from the recovery well. The well had not been purged prior to sampling. The sample was submitted for complete water chemistry analyses to include TPH, volatile hydrocarbons, ammonia analysis, total dissolved solids, pH, and metals. Concentrations of detected constituents are listed in Table 3. Certified analytical results and the chain of custody are in Appendix B.

METHODS OF CLEANUP TO DATE

The four fuel tanks, the waste oil tank, product lines, and fuel dispensers have been removed. Soil was excavated from these areas and stockpiled on site for later treatment, as shown on Figure 1. Two recovery wells and French drain trenches were installed in the fuel tank and waste oil excavations as shown on Figure 4. A cross-section of the fuel tank excavation recovery system and fuel skimming system[1] are shown on Figure 5. The pneumatic pumping system for developing and testing the recovery wells and the product storage tank with carbon polishers on the vent are shown on Figure 6.

As of February 27, 1989, approximately 1000 gallons of free fuel, mostly composed of gasoline, has been recovered and is being stored in an 8000-gallon storage tank on the site. The fuel will be manifested to Gibson Oil for recycling on an as-needed basis. Product recovery points to depths of 15 and 20 feet are currently being installed in the locations shown on Figure 7 in accordance with the design shown on Figure 8. Additional product recovery points that

---

[1]The Clean Environment Engineers, Inc., Selective Oil Skimmer uses wire-braided hoses to ground the system back to the well.

TABLE 2: ANALYTICAL RESULTS FOR SAMPLES FROM UNDER THE PRODUCT LINES, IN PPM

Sample	PL-001	PL-002	PL-003	PL-004
TPH - Gasoline	651	ND<20	ND<20	ND<20
TPH - Diesel	ND<20	ND<20	7855	ND<20
Benzene	ND<0.5	ND<1	5	ND<0.5
Ethylbenzene	3	ND<1	<0.5	ND<0.5
Toluene	4	ND<1	9	ND<0.5
Xylene	10	ND<1	8	ND<0.5
Total Lead	10	13	180	7.1
Total Organic Lead*	<0.5	<0.5	<0.5	<0.5

ND = Not detected.
* = Values are reported as parts per billion (ug/g)

[TABLE2.059, URRV2-14]

TABLE 3: ANALYTICAL RESULTS FOR DETECTED CONSTITUENTS IN GROUNDWATER SAMPLE FROM RECOVERY WELL NO. 1

Constituent	Concentration
TPH - Gasoline	2170 ppm
TPH - Diesel	420 ppm
Benzene	35 ppm
Toluene	54 ppm
Ethylbenzene	6 ppm
Xylene	30 ppm
Total Dissolved Solids	0.74 mg/l
Ammonia	20 ppm
pH	7.5
Zinc	0.1 ppm
Lead	0.3 ppm
Nickel	0.03 ppm
Copper	0.02 ppm
Barium	0.03 ppm

Table3.059

will be installed later will be shown on updated versions of Figure 7.

In addition, bench and field tests are being conducted to determine the effectiveness of bioremediating the fuel constituents, detergent, and animal fat. Initial bench and pilot tests have indicated that Solmar Bioculture formulation L-104 will be very effective for biodegrading the detergent in the groundwater and soil and for bioremediating the fuel constituents in the soil and groundwater. Tests have also indicated that Solmar formulation I-107 will be effective at mitigating/biodegrading the animal fat layer.

Field performance test of the Solmar L-104 culture resulted in rapid degradation of the detergent in the groundwater and a corresponding increase in free fuel thickness. Adding 25 pounds of Solmar L-104 into RW No. 1 resulted in the free fuel layer in RW No. 2 increasing from 1 inch to 29 inches in 15 days. The field test also indicated that the aquifer is anaerobic and oxygen demand will be very high. Additional testing indicated that the oxygen demand can be met by injecting compressed air into the wells.

RW No. 2 was developed by pumping 200 gallons of free product out of the well in two hours. The fuel layer thickness decreased from 14 inches to 2 inches and recovered at a rate of 1.4 inches per day. The recovery data indicates that the transmissivity of fuel in RW No. 2 in the shallow aquifer is 2.8 $ft^3/ft/day$.

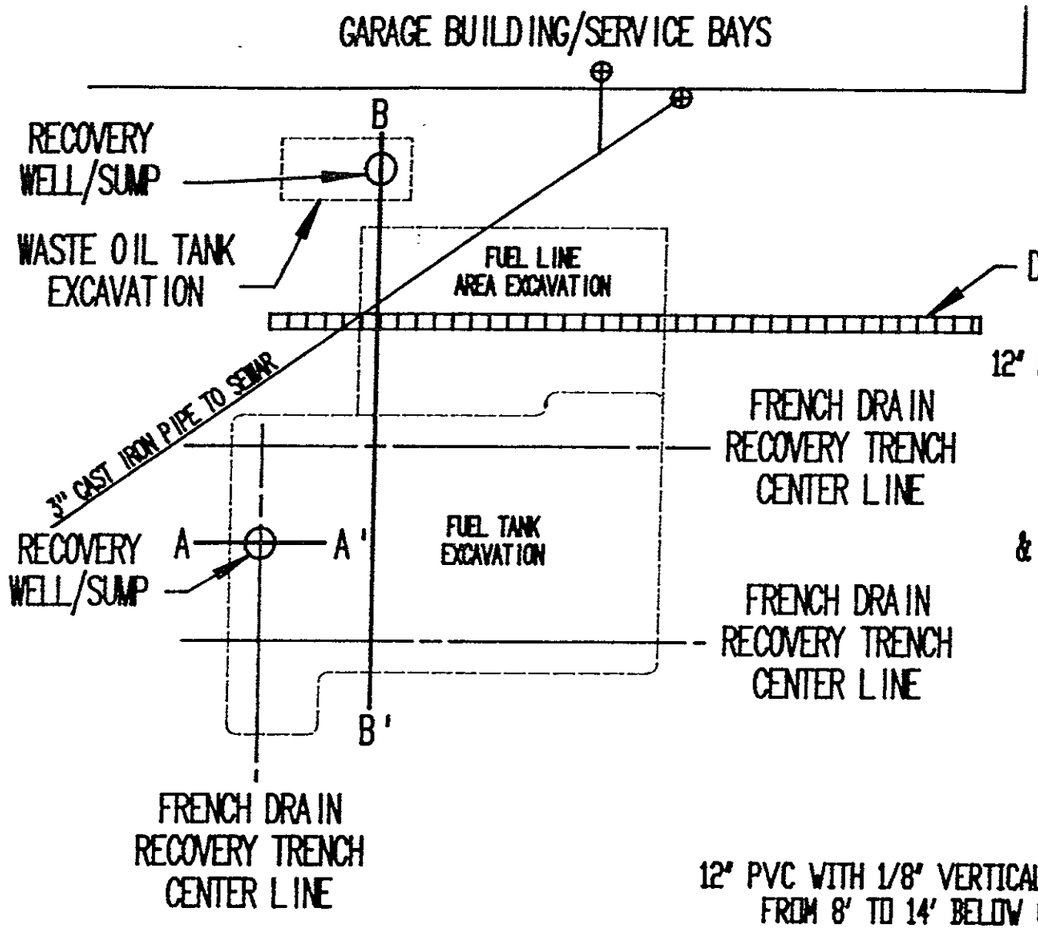
DETERMINATION OF EXTENT OF IMPACT FROM RELEASE

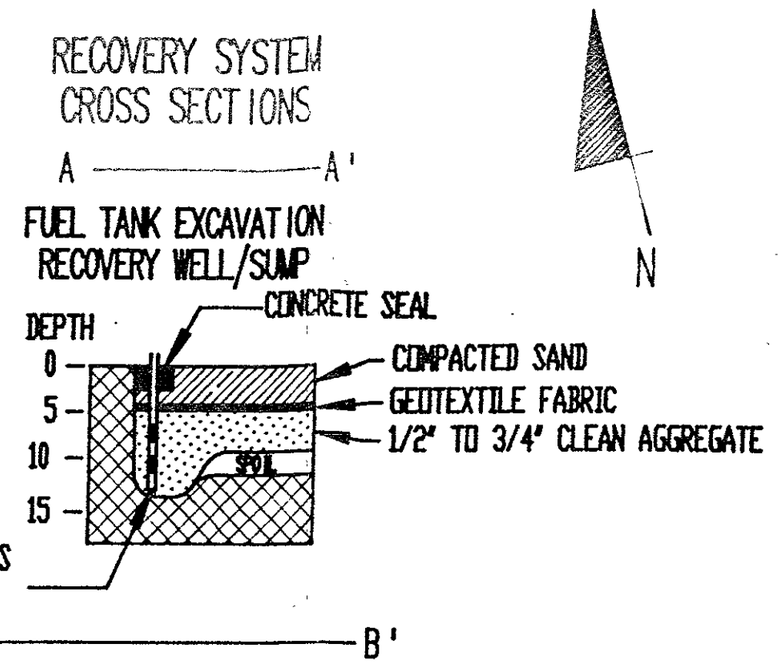
The full extent of the unauthorized release of fuel (gasoline and diesel) is unknown at this time. However, the recovery points installed nearest the building, RP 20 through RP 23 (shown on Figure 7), contained between 2 and 3 feet of free fuel. Recovery points 27 through 29, located 35 feet away from the building, had six inches or less of product.

Approved by:

Karl J. Anania
California Registered
Geologist No. 4306

FIGURE 4





NOTE 1: NO BENTONITE WAS USED TO SEAL THE RECOVERY WELL/SUMPS

NOTE 2: WATER LEVEL CHANGES FROM 9' TO 12' DUE TO TIDAL INFLUENCES

0 10 20
HORIZONTAL SCALE

0 5 10
VERTICAL SCALE

AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: TANK EXCAVATION FRENCH DRAIN RECOVERY SYSTEM AS BUILT

PROJECT NAME: CARNATION/OAKLAND PROJECT NO: 004-88-059

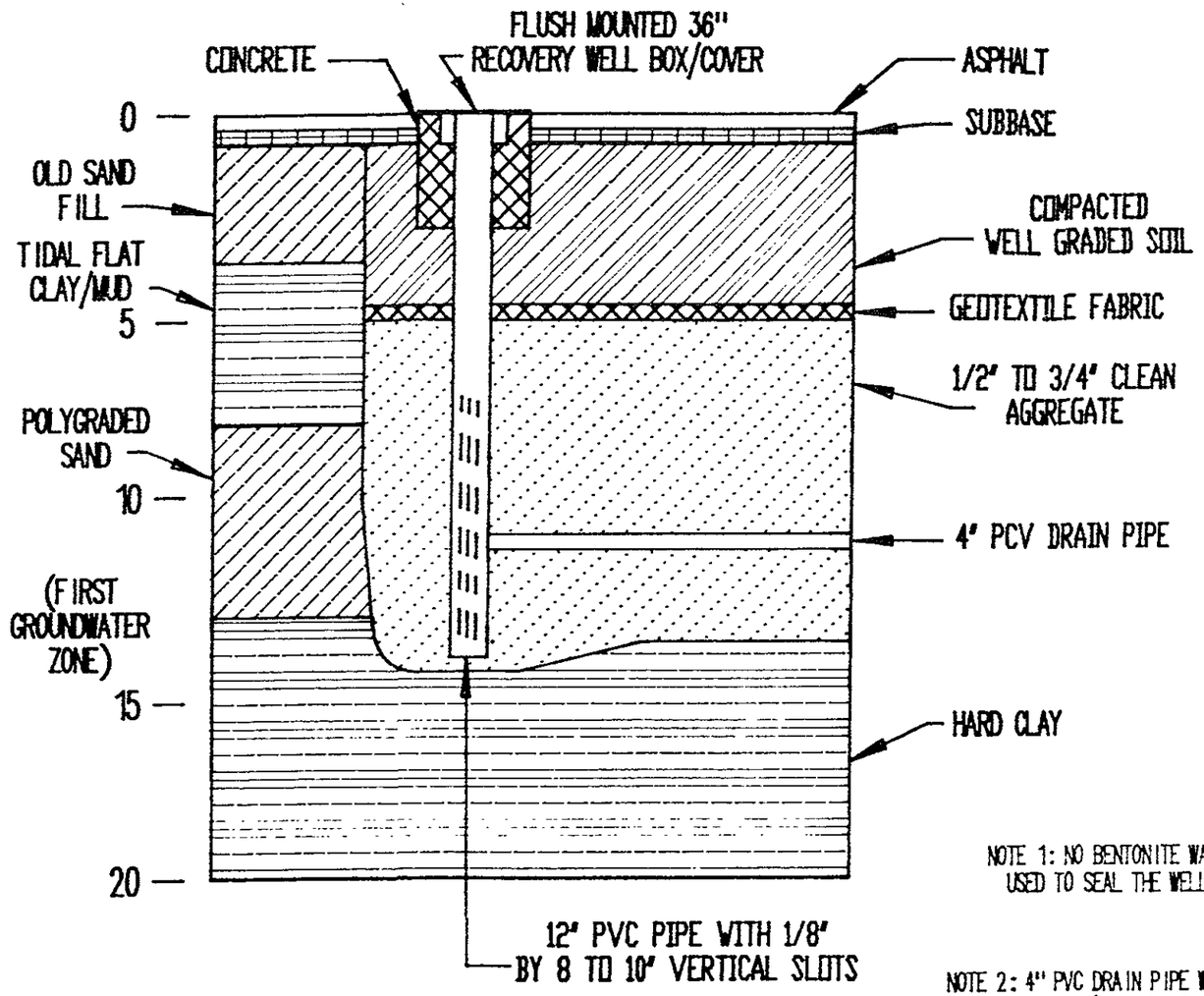
SITE LOCATION: 1310 14st. OAKLAND, CA.

REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
1	2-8-89	CHRIS DIDIO		K.J.A.	1" = 20'

FIGURE 5

NOT TO SCALE

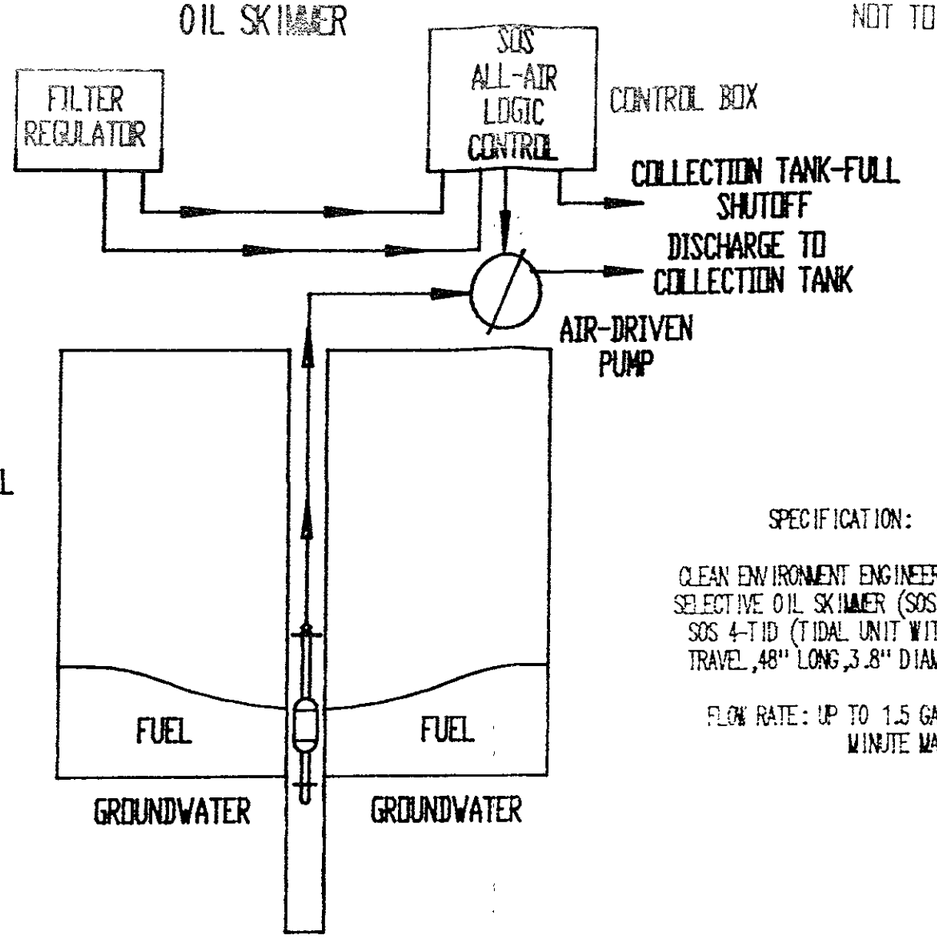
PROFILE
RECOVERY WELL/SUMP AND
FRENCH DRAIN FOR FUEL TANK EXCAVATION



NOTE 1: NO BENTONITE WAS USED TO SEAL THE WELL

NOTE 2: 4" PVC DRAIN PIPE WITH 3/8" HOLES AT A 1"/100' SLOPE TOWARDS RECOVERY WELL/SUMP

SCHEMATIC SHALLOW
WELL SELECTIVE
OIL SKIMMER



SPECIFICATION:

CLEAN ENVIRONMENT ENGINEERS, INC.
SELECTIVE OIL SKIMMER (SOS) MODEL
SOS 4-TID (TIDAL UNIT WITH 24"
TRAVEL, 48" LONG, 3.8" DIAMETER)

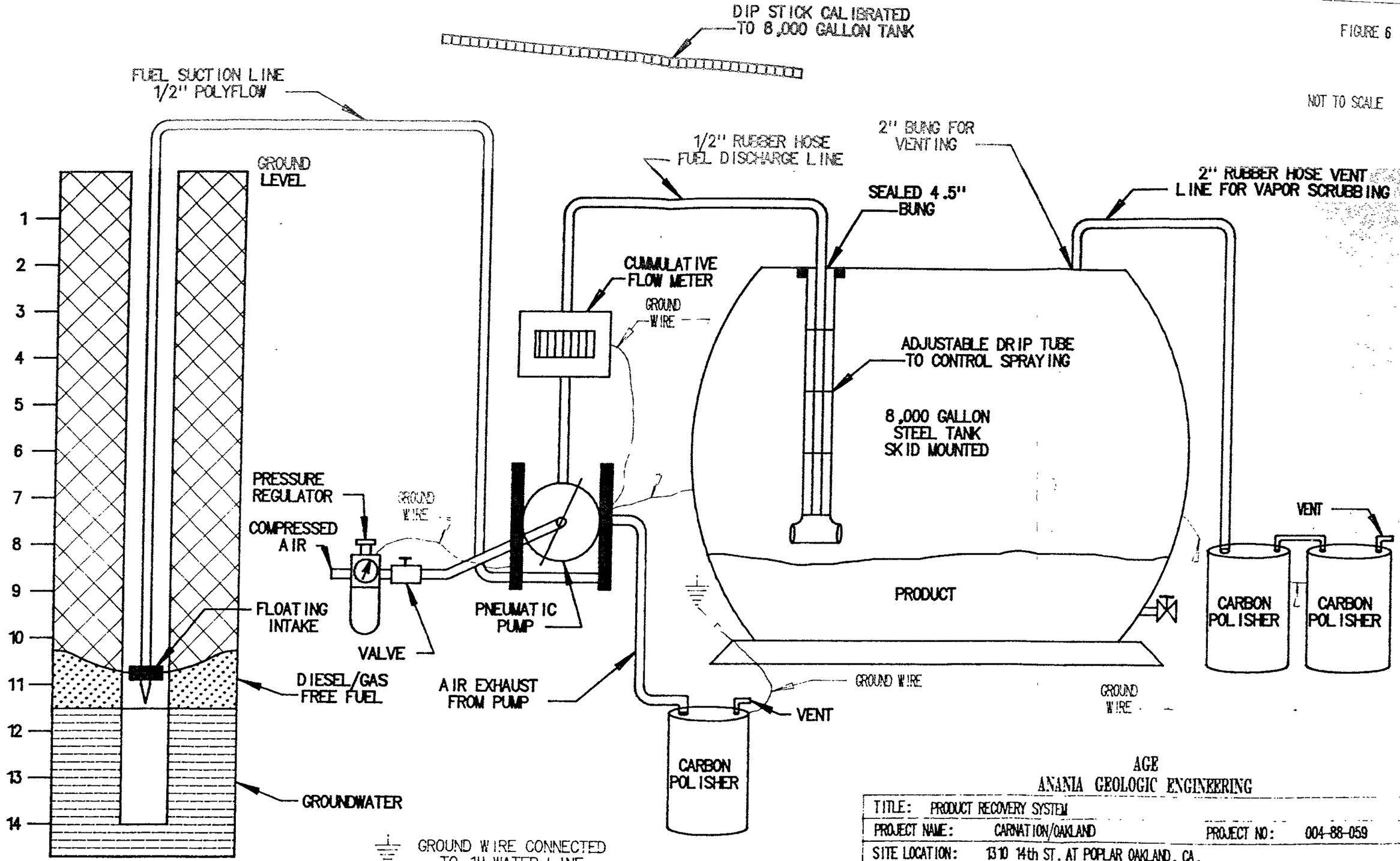
FLOW RATE: UP TO 1.5 GALLONS PER
MINUTE MAXIMUM

AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: FRENCH DRAIN AND RECOVERY WELL/SUMP WITH SKIMMER SCHEMATIC						
PROJECT NAME: CARNATION/OAKLAND					PROJECT NO.	004-88-059
SITE LOC: 1310 14th ST. AT POPLAR ST. OAKLAND						
REV.	DATE	DESCRIPTION	DWG BY	CHK BY	APP BY	SCALE:
0	1-16-89		C.DIDIO			DWG NO. 2
1	1-31-89		C.DIDIO			FIGURE:
						PAGE:

FIGURE 6

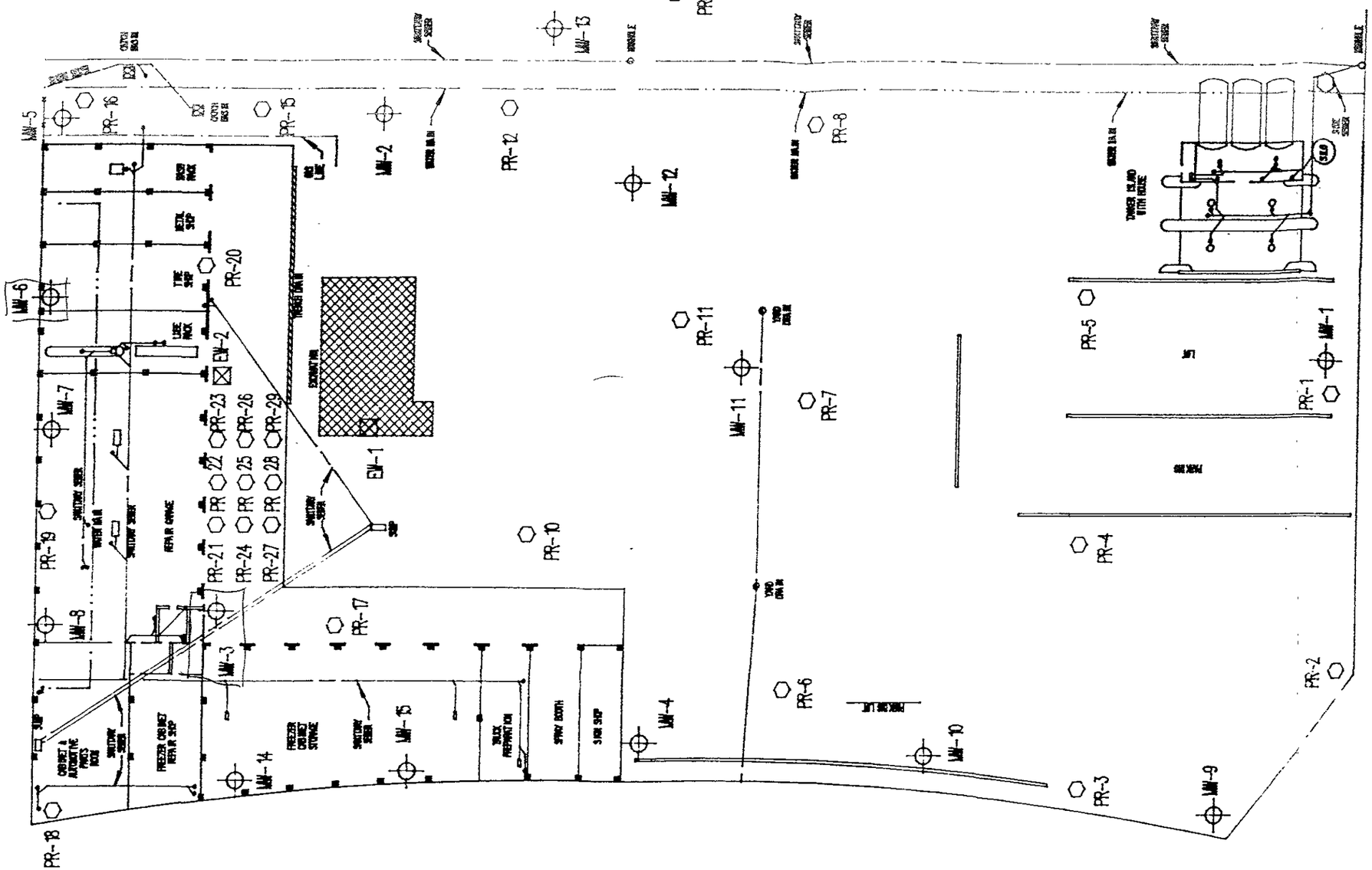
NOT TO SCALE



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: PRODUCT RECOVERY SYSTEM					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO:	004-88-059
SITE LOCATION: 1310 14th ST. AT POPLAR OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	2-21-89	CHRIS DIDIO			NONE

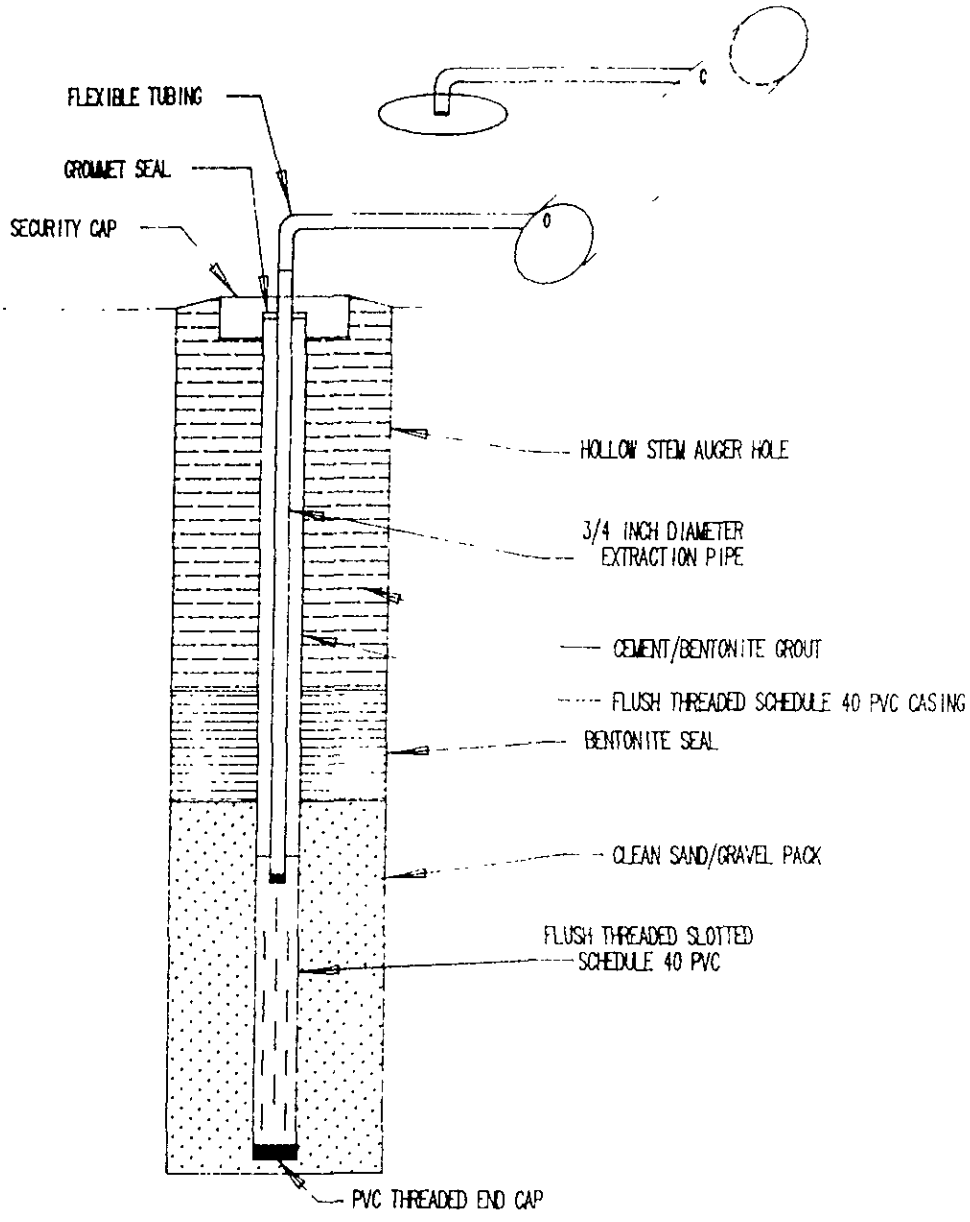
FIGURE 7



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: PROJECT BORING LOCATIONS					
PROJECT NAME: CARNATION/OAKLAND				PROJECT NO:	004-88-059
SITE LOCATION: 1310 14TH ST. AT POPLAR OAKLAND, CA.					
REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
		C.D.I.D.10			NONE

FIGURE 8



AGE
ANANIA GEOLOGIC ENGINEERING

TITLE: PROPOSED PRODUCT RECOVERY EXTRACTION POINT

PROJECT NAME: CARNATION/OAKLAND PROJECT NO: 104-88-02M

SITE LOCATION: 1310 14th ST. AT POPLAR ST. OAKLAND

REV.	DATE	DRAWING BY	CHECKED BY	APPROVED BY	SCALE
	2-13-89	CHRIS DIDIO			NONE

APPENDIX A

UNAUTHORIZED RELEASE REPORT

UNAUTHORIZED RELEASE REPORT FOR THE CARNATION DAIRY FACILITY LOCATED AT 1310 14th STREET OAKLAND, ALAMEDA COUNTY, CALIFORNIA

JANUARY 17, 1989
AGE PROJECT NO. 004-88-059

In order to comply with the "Unauthorized Release Reporting Requirements" of the California Code of Regulations (CCR) Title 23, Article 5, section 2652, Mr. Karl J. Anania gave the required 24-hour notice to the Alameda County Department of Health (County) Regional Water Quality Control Board on January 5, 1989. This written report is prepared as a follow-up confirmation of the unauthorized release.

Floating product was present in the bottom of the pit during the excavation of four steel tanks on January 5, 1989. Two 12,000-gallon tanks contained diesel fuel and two 10,000-gallon tanks stored unleaded gasoline. All four of the tanks were in good condition and did not have any visible holes during the removal operation. Staining in the side walls adjacent to the product lines strongly indicate leaking pipelines as the source of the release.

TYPE, QUANTITY AND CONCENTRATION CHEMICALS

At this time the quantity of the release is not known. Eight soil samples were collected at the liquid interface of the excavation sidewall approximately 9.5 feet below ground surface. One sample was taken at each end of each tank. Sample locations are shown in Figure 1. One groundwater sample was collected from liquid in the bottom of the excavation pit. The pit was not purged prior to collecting the groundwater sample. Analytical results for these samples have not yet been received from the laboratory (Chemwest Analytical Laboratory in Sacramento). Requested analyses and methods for all samples are as follows:

Test	Method
Total Petroleum Hydrocarbons (TPH)	8015 Modified
Benzene	8020
Ethyl Benzene	8020
Toluene	8020
Xylenes	8020
Total Organic Lead (TOL)	DOHS Approved

1447 46TH STREET SACRAMENTO, CALIFORNIA 95819 PHONE (916) 451-0921 FAX (916) 737-1044

Final results are expected on or about January 27, 1989. An addendum to this report will be sent after the laboratory reports are received.

DETERMINATION OF EXTENT OF IMPACT FROM RELEASE

The extent of the unauthorized release from the diesel and gasoline tanks is not known at this time. It is also not yet known whether groundwater has been impacted. Anania Geologic Engineering (under the direct supervision of Karl J. Anania) is under contract with Carnation to perform a site characterization. Preliminary plans are to drill up to 15 borings which can be converted to monitoring wells around the perimeter of the site to determine lateral and vertical extent of contamination and groundwater flow direction. The wells can also be used to monitor progress of the remediation system. A work plan will be submitted to the lead agency prior to beginning work on the site characterization.

METHODS OF CLEANUP TO DATE

All four tanks have been removed and approximately 500 cubic yards of soil have been stockpiled onsite and covered with plastic. The excavated soil was sampled the same day as the tank pit and groundwater, and has been submitted for the same analyses. Results are expected around January 27.

Absorbant boom and pads were used to recover free product from the excavation pit. The boom and pads were put into seven barrels for solidification and are currently stored onsite. The barrels will be hauled offsite by a licensed hazardous waste hauler at a later date. The approximate cost of cleanup and investigation to date is $125,000.00.

PLANNED CLEANUP ACTIONS

A petroleum skimming system is being installed as part of the immediate measures to contain the "spill." The design and operational characteristics of the system will be submitted within the next week. The excavation pit is being filled with clean 1/2-inch to 3/4-inch aggregate to 5 feet below ground surface. A geotextile fabric will be placed on the gravel. Approximately 4-1/2 feet of sand will be placed in the pit and compacted. The surface will be paved with asphalt on a gravel subbase.

A 12-inch recovery well will be installed in the west side of the excavated area for the recovery of free product. The well will extend to approximately 14 feet and will be constructed with schedule 80 slotted PVC. Vertical slots approximately 1/8-inch wide and 10 to 12 inches in length will be cut into the pipe with a skill saw. Bentonite will not be used to seal or set the recovery well.

A recovery trench system designed as French drains will connect to the recovery well. The recovered product will be stored onsite in a 5,000 or 10,000-gallon above-ground tank equipped with overfill control.

FACILITY OPERATOR'S NAME AND PHONE NUMBER:

Mr. Howard R. Shmuckler
(213) 932-6464

Prepared by:

Mary L. Scruggs
Project Manager/Geologist

Approved by:

Karl J. Anania
California Registered
Geologist No. 4306

ACE 1447 35TH STREET SACRAMENTO, CALIFORNIA 95816 PHONE (916) 451-0921 FAX (916) 737-1844

APPENDIX B

ANALYTICAL RESULTS AND CHAIN OF CUSTODY FORMS

CHEMWEST
ANALYTICAL LABORATORIES, INC.

January 23, 1989

RECEIVED JAN 26 1989

A.G.E.
1447 35th Street
Sacramento, CA 95816

Attention: Ms. Mary Scruggs

Subject: Report of Data - Case Number 3040

Dear Ms. Scruggs:

The technical staff at CHEMWEST is pleased to provide our report for the analyses you requested: Aromatic Volatile Organics - EPA Method 8020/602; TPH EXTN/GC-FID; and Total Organic Lead - DHS Method.

Ten samples (9 soils & 1 water) for Project Carnation Oakland, Project Number 004-88-059 were received January 6, 1989 in good condition. Results of the analyses along with the analytical methodology and appropriate reporting limits are presented on the following page(s).

Thank you for choosing CHEMWEST Laboratories. Should you have questions concerning this data report or the analytical methods employed, please do not hesitate to contact Toni Weeks, our Technical Service Representative or your project manager. We hope that you will consider CHEMWEST Laboratories for your future analytical support and service requirements.

Sincerely,

Jill B. Hehes, Ph.D.
Vice President of Technical Services

and

Margie Namba
Project Manager

MN:ds

cc: Joel Bird, President
File

600W North Market Boulevard • Sacramento, CA 95834 • Phone (916) 923-0840 • FAX (916) 923-1938

A Subsidiary of CompuChem Corporation

ANALYTICAL METHODOLOGY

Aromatic Volatile Organics by Purge & Trap and GC-PID

WATER - Method 602 or 8020

A 5 ml sample volume, or 5 ml of a suitable dilution, is purged on a suitable purge and trap system with helium. The purged sample is analyzed on a Gas Chromatograph equipped with a Photoionization Detector (PID). A packed column is used to separate the compounds.

SOIL - Method 8020

A 10 gram, or other appropriate aliquot of soil, is weighed into a clean VOA vial. Soils received in brass core tubes are sampled by discarding 2-5 centimeters of soil from each end of the tubes (this is done to reduce the possibility of analyzing a portion of soil that has been exposed to sampling technique contamination). Equal aliquots of soil are then removed from each end of the tube and combined in the VOA vial. Soil in jars or bags is aliquoted using a similar technique, which discards exposed sample surfaces. A 10 ml, or other appropriate volume of methanol, is added to the soil and the soil is shaken with the solvent. 100 ul of the extract, or a reduced aliquot or volume of a suitable dilution, is injected into 5 ml of laboratory blank water and analyzed by the same technique used for water samples.

ANALYTICAL METHODOLOGY

Total Petroleum Hydrocarbons (TPH) Extractables by GC-FID

Extraction Procedure:

WATER -

A 1 liter sample is poured into a 2 liter separatory funnel. 3x100 ml extractions with methylene chloride (2 minute shake outs) are completed. The methylene chloride is decanted off and concentrated to a 5 ml final volume.

SOIL -

A 30 gram, or other appropriate aliquot of soil, is mixed with 10 grams of washed sodium sulfate. 100 mls of methylene chloride is added to the soil and placed on a mechanical shaker for 1 hour. The liquid is decanted off and the process is repeated with an additional 50 ml of methylene chloride. The combined solvent extracts are filtered through sodium sulfate and the extract is concentrated to a 5 ml final volume.

GC ANALYSIS -

An appropriate volume of the sample extract is injected into a Gas Chromatograph equipped with a Flame Ionization Detector (FID), a split/splitless capillary injector (operated in the splitless mode), and a fused silica capillary column. The TPH fraction is quantitated as gasoline and/or #2 diesel fuel (and/or different petroleum hydrocarbon fuel types if requested, such as JP-4 jet fuel) based on relative retention times and examination of the elution profile. The TPH fraction quantitation is based on chromatographic peak areas against a multipoint standard curve.

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 1N
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-1
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	200	25
Toluene	660	50
Ethylbenzene	130	100
Chlorobenzene	BRL	50
Total Xylenes (1)	580	50
1,4-Dichlorobenzene	BRL	300*
1,3-Dichlorobenzene	BRL	200*
1,2-Dichlorobenzene	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	89%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 1S
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-2
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	40	5
Toluene	190	10
Ethylbenzene	54	20
Chlorobenzene	BRL	100*
Total Xylenes (1)	260	10
1,4-Dichlorobenzene	BRL	150*
1,3-Dichlorobenzene	BRL	100*
1,2-Dichlorobenzene	BRL	10

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	102%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 2N
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-3
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	50	10
Toluene	190	20
Ethylbenzene	44	40
Chlorobenzene	BRL	75*
Total Xylenes (1)	200	20
1,4-Dichlorobenzene	BRL	100*
1,3-Dichlorobenzene	BRL	100*
1,2-Dichlorobenzene	BRL	20

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	105%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 2S
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-4
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	200	50
Toluene	740	100
Ethylbenzene	BRL	200
Chlorobenzene	BRL	300*
Total Xylenes (1)	690	100
1,4-Dichlorobenzene	BRL	400*
1,3-Dichlorobenzene	BRL	300*
1,2-Dichlorobenzene	BRL	100

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	105%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: KC

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 3N
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-5
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	300	50
Toluene	940	100
Ethylbenzene	BRL	200
Chlorobenzene	BRL	300*
Total Xylenes (1)	840	100
1,4-Dichlorobenzene	BRL	400*
1,3-Dichlorobenzene	BRL	400*
1,2-Dichlorobenzene	BRL	100

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	100%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 3S
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-6
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	20	5
Toluene	110	10
Ethylbenzene	36	20
Chlorobenzene	BRL	100*
Total Xylenes (1)	150	10
1,4-Dichlorobenzene	BRL	150*
1,3-Dichlorobenzene	BRL	100*
1,2-Dichlorobenzene	BRL	10

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	87%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 4N
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-7
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	100	50
Toluene	520	100
Ethylbenzene	BRL	200
Chlorobenzene	BRL	200*
Total Xylenes (1)	520	100
1,4-Dichlorobenzene	BRL	300*
1,3-Dichlorobenzene	BRL	300*
1,2-Dichlorobenzene	BRL	100

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	93%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Tank 4S
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-8
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	200	25
Toluene	910	50
Ethylbenzene	200	100
Chlorobenzene	BRL	400*
Total Xylenes (1)	850	50
1,4-Dichlorobenzene	BRL	500*
1,3-Dichlorobenzene	BRL	400*
1,2-Dichlorobenzene	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	87%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Water 1
Date Analyzed: 01/13/89

CHEMWEST I.D.: 3040-9
Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	22000	250
Toluene	25000	500
Ethylbenzene	1700	1000
Chlorobenzene	BRL	3000*
1,4-Dichlorobenzene	BRL	3200*
1,3-Dichlorobenzene	BRL	1500*
1,2-Dichlorobenzene	BRL	500

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	81%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Soil Pile 1
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-10
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	1.1	0.05
Toluene	0.4	0.1
Ethylbenzene	0.5	0.2
Chlorobenzene	BRL	0.5*
Total Xylenes (1)	2.0	0.1
1,4-Dichlorobenzene	BRL	10*
1,3-Dichlorobenzene	BRL	5*
1,2-Dichlorobenzene	BRL	0.1

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	132%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.
*: Matrix Interference.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
AROMATIC VOLATILE ORGANICS

Client I.D.: Method Blank
Date(s) Analyzed: 01/13/89

CHEMWEST I.D.: 3040-MB
Matrix : Soil

Compound	Amount Detected (mg/Kg)	RL (mg/Kg)
Benzene	BRL	0.05
Toluene	BRL	0.1
Ethylbenzene	BRL	0.2
Chlorobenzene	BRL	0.1
Total Xylenes (1)	BRL	0.1
1,4-Dichlorobenzene	BRL	0.1
1,3-Dichlorobenzene	BRL	0.1
1,2-Dichlorobenzene	BRL	0.1

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	105%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of O-, M-, and P-Xylenes.

Approved by: _____

REV3.1.89

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Date Extracted : 01/10/89
Date(s) Analyzed: 01/13/89

Case : 3040
Matrix: Soil

Reporting Units: mg/Kg

Client ID	CHEMWEST ID	Gasoline Result	Gasoline RL	Diesel Result	Diesel RL	Other Hydrocarbon Mixture Result	Other Hydrocarbon Mixture RL
Method Blank	3040-MB	BRL	10	BRL	10	BRL	10
Tank 1N	3040-1	17000	1000	280	200	BRL	1000
Tank 1S	3040-2	570	10	36	10	BRL	10
Tank 2N	3040-3	12000	1000	BRL	1000	BRL	1000
Tank 2S	3040-4	26000	1000	570	500	BRL	1000
Tank 3N	3040-5	31000	1000	BRL	1000	BRL	1000
Tank 3S	3040-6	9700	1000	BRL	1000	BRL	1000
Tank 4N	3040-7	18000	1000	BRL	1000	BRL	1000
Tank 4S	3040-8	38000	1000	BRL	1000	BRL	1000
Soil Pile 1	3040-10	BRL	5000	6500	5000	BRL	5000

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: _____

REV3:1.89

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Date Extracted : 01/10/89
Date(s) Analyzed: 01/10/89

Case : 3040
Matrix: Water

Reporting Units: mg/L

Client ID	CHEMWEST ID	Gasoline Result	Gasoline RL	Diesel Result	Diesel RL	Other Hydrocarbon Mixture Result	Other Hydrocarbon Mixture RL
Method Blank	3040-MB	BRL	10	BRL	10	BRL	10
Water 1	3040-9	1400	10	0.93	10	BRL	10

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: _____

REV2:9.88

CHEMWEST ANALYTICAL LABORATORIES
TOTAL ORGANIC LEAD

Date(s) Analyzed: 01/13/89
thru: 01/13/89

Case : 3040
Matrix: Soil

Client ID	CHEMWEST ID	Amount Detected (mg/Kg)
Tank 1N	3040-1	BRL
Tank 1S	3040-2	BRL
Tank 2N	3040-3	BRL
Tank 2S	3040-4	BRL
Tank 3N	3040-5	BRL
Tank 3S	3040-6	BRL
Tank 4N	3040-7	BRL
Tank 4S	3040-8	BRL
Soil Pile 1	3040-10	BRL

The reporting limit for Total Organic Lead is 10 mg/Kg.

BRL: Below Reporting Limit.

Approved by: _____

REV3:1.89

CHEMWEST ANALYTICAL LABORATORIES
TOTAL ORGANIC LEAD

Date(s) Analyzed: 01/13/89
thru: 01/13/89

Case : 3040
Matrix: Water

Client ID	CHEMWEST ID	Amount Detected (mg/L)
Water 1	3040-9	BRL

The reporting limit for Total Organic Lead is 1.0 mg/L.

BRL: Below Reporting Limit.

Approved by: JBH

REV3:1.89

CHEM WEST ANALYTICAL LABORATORIES INC.
600 West North Market Blvd.
Sacramento, California 95834
(916) 923-0840 FAX (916) 923-1938

Order No. 3040
Date Rec'd. 1/6/89 @ 0940
Compl. Date
Section Margie Hamley

CLIENT: A.G.E.
1447 th ~~Street~~ 35th Street
Sacramento, CA 95816

Project Name: Carnation Oakland
Project No. 004-88-059
P.O. NO. Mary Scruggs
Contact Karl J Antarsa
Phone (916) 451-0921

ANALYSIS: Ten sample's recd 1/6/89 (9 soils & 1 water) to be analyzed for TPH EXTN GC-FID, Aromatic Volatile Organics by 602/8020, ~~Extractable Hydrocarbons~~ and Total Organic Lead.

* Report due on 1/20/89

	Sample Id	Date	Time	analysis	Matrix	container
3040-1	Tank 1N	1/6/89	1450	TPH, 8020 for organics	soil	1-6" core tube
-2	Tank 1S		1525			
-3	Tank 2N		1459			
-4	Tank 2S		1520			
-5	Tank 3N		1504			
-6	Tank 3S		1518			
-7	Tank 4N		1507			
-8	Tank 4S		1514			
-9	Water 1		1537		water	1-1 liter bottle 3-40 ml vials
-10	Soil pit 1		1600		soil	1-6" core tube

RL, GC 1/6
M/: MICHELLE TOUVER

D.T.C.

ENVIRONMENTAL AGE — EW I.D. 3040 — ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation Oakland . PROJECT No. 004-88-059 .

REPORT RESULTS TO: Karl J. Anania / Mary L. Scruggs .

SURVEY: Tank Excavation

SAMPLERS: Karl Anania / Mary Scruggs

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	TANK 1 N	1/5/89	1455		X		1	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 1 S	1/5/89	1525		X		8	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 2 N	1/5/89	~~1504~~ 1515		X		2	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 2 S	1/5/89	1520		X		7	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 3 N	1/5/89	1504		X		3	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 3 S	1/5/89	1513		X		6	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 4 N	1/5/89	1507		X		4	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	TANK 4 S	1/5/89	1514		X		5	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl Lead
	WATER 1	1/6/89	1537			X	9	3 VOAs 1 Amber bottle (1L)	~~602~~ 8015M (TPH) 8020 Total organic lead
	VOA Field Blank	1/5/89	1532					VOAs preserved w/ Ascorbic Acid	per conversation w/ mary scruggs 1/6/89
								1 VOA	Sample Broken
Note: Log in	Tetraethyl lead as w/ mary scruggs	total 1/6/89	organic 1630 hrs	lead	per	conversation			

RELINQUISHED BY: Mary L Scruggs — RECEIVED BY: — DATE / TIME: 1/6/89 | 9140

RELINQUISHED BY: — RECEIVED BY: — DATE / TIME:

RELINQUISHED BY: — RECEIVED BY: — DATE / TIME:

RECEIVED FOR LABORATORY BY: Bill McBenge [BILL McBENGE] — DATE / TIME: 1/6/89 | 09:40

METHOD OF SHIPMENT: ½ cooler w/ dry ice by vehicle O.T.C.

GW I.D. 3040

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation / Oakland. PROJECT No. 004-88-059.

REPORT RESULTS TO: Karl J. Anania / Mary L Scruggs.

SURVEY: Soil Pile Composite

SAMPLERS: Karl J. Anania

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE: SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	Soil Pile 1	1/5/89	16⁰⁰	X				1 BRASS TUBE	8015 Mod. TPH 8020 TOTAL LEAD organic (TCLP) (per conversation w/ mary Scruggs 1/6/89 1445 hrs.)

RELINQUISHED BY: Karl J Anania — RECEIVED BY: Mary L Scruggs — DATE / TIME: 1/5/89 16⁲⁰

RELINQUISHED BY: Mary L Scruggs — RECEIVED BY: — DATE / TIME: 1/6/89 1940

RELINQUISHED BY: — RECEIVED BY: — DATE / TIME:

RECEIVED FOR LABORATORY BY: Bill McBenge "BILL McBENGE" — DATE / TIME: 1/6/89 09:40

METHOD OF SHIPMENT: in cooler w/ dry ice my vehicle O.T.C

ENVIRONMENTAL AGE ENERGY MINERALS

I.D. 3040

N↑

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation Oakland . PROJECT No. 004-BC-059 .

REPORT RESULTS TO: Karl J Anania / Mary L. Scruggs

SURVEY: Tank Excavation

SAMPLERS: Karl Anania / Mary Scruggs

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE: SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	TANK 1 N	1/5/89	1455		X		1	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 1 S	1/5/89	1525		X		8	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 2 N	1/5/89	[illegible]		X		2	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 2 S	1/5/89	1520		X		7	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 3 N	1/5/89	1504		X		3	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 3 S	1/5/89	1518		X		6	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 4 N	1/5/89	1457		X		4	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	TANK 4 S	1/5/89	1514		X		5	1 Brass Tube	8015 Modified (TPH) 8020 Tetraethyl lead
	WATER 1	1/5/89	1537			X	9	2 VOAs 1 Amber 1 HCl (1)	8015 Modified (TPH) 8020 Total organic lead
	VOA Field Blank	1/5/89	1537					VOAs preserved w/ hydrochloric acid	
								1 VOA	

RELINQUISHED BY: Mary L. Scruggs	RECEIVED BY:	DATE / TIME 1/6/89 / 9:40
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY: Bill McBenge (BILL McBENGE)		DATE / TIME 1/6/89 / 09:40

METHOD OF SHIPMENT: 7 coolers w/ dry ice by vehicle O.T.C.

C & I.D. 3040

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation / Oakland. PROJECT NO. 004-88-059.

REPORT RESULTS TO: Karl J. Anania / Mary L Scruggs.

SURVEY: Soil Pile Composite

SAMPLERS: Karl J. Anania

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE: SOIL COMP	SAMPLE TYPE: SOIL GRAB	SAMPLE TYPE: WATER	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	Soil Pile 1	1/[illegible]/89	5:20	X				1 BRASS TUBE	8015 Mod - FH 8020 TOTAL LEAD

RELINQUISHED BY: Karl J Anania — RECEIVED BY: Mary L Scruggs — DATE / TIME: 1/5/89 16:20

RELINQUISHED BY: Mary L Scruggs — RECEIVED BY: — DATE / TIME: 1/6/89 1[illegible]

RELINQUISHED BY: — RECEIVED BY: — DATE / TIME:

RECEIVED FOR LABORATORY BY: Bill McBenge "BILL McBENGE" — DATE / TIME: 1/6/89 09:40

METHOD OF SHIPMENT: in cooler w/ dry ice by vehicle O.T.C

CHEMWEST
ANALYTICAL LABORATORIES, INC.

January 28, 1989

Anania Geologic Engineering
1447 35th Street
Sacramento, CA 95816

Attention: Ms. Mary Scruggs

Subject: Report of Data - Case Number 3096

Dear Ms. Scruggs:

The technical staff at CHEMWEST is pleased to provide our report for the analyses you requested: Volatile Organics - EPA Method 8240; Semivolatile Organics - EPA Method 8270; TPH EXTN/GC-FID; ICP Metals (Cd, Cr, Pb, and Zn); and MBAS - EPA Method 425.1.

Five samples (4 soil and 1 water) for Project Carnation/Oakland, Project Number 004-88-059 were received January 13, 1989 in good condition. Results of the analyses along with the analytical methodology and appropriate reporting limits are presented on the following page(s).

Thank you for choosing CHEMWEST Laboratories. Should you have questions concerning this data report or the analytical methods employed, please do not hesitate to contact Toni Weeks, our Technical Service Representative or your project manager. We hope that you will consider CHEMWEST Laboratories for your future analytical support and service requirements.

Sincerely,

Jill B. Henes, Ph.D.
Vice President of Technical Services

and

Margie M. Namba
Project Manager

MMN:ds

cc: Joel Bird, President
File

ANALYTICAL METHODOLOGY

Volatile Organics

The analytical techniques used for water and soil analysis are based on EPA Methods 624 and 8240 (Purgeables) and follow EPA Contract Laboratory Program (CLP) recommendations. Water and soil samples are analyzed by a purge and trap, packed column GC/MS technique. The samples are analyzed under full scan GC/MS which monitors a mass range of 35-260.

Water -

A 5 ml sample volume to which 3 internal standards and 3 surrogates are added and purged with helium at ambient temperature. The sample is collected on a Tenax silica gel trap and then desorbed onto a packed column.

Soil/Sludge: Low -

A 5 gram sample weight is added to 5 mls of reagent water containing 3 internal standards and 3 surrogates and purged with helium at 40°C.

Soil/Sludge: Medium -

A 5 gram sample is weighed into a QA/QC prepped VOA vial and then shaken with 10 ml methanol. A 100 ul portion of the methanolic extract is combined with 5 ml of water. Surrogates and internal standards are added, and the sample analysis then follows the water protocol.

The 5 gram samples used for analysis are a mix taken from the top, middle and bottom of the sample container. This mix was used to ensure that the analysis represented an accurate analysis of a non-homogenous soil/sludge sample.

Tuning and Blanks

The samples are run after meeting GC/MS hardware tuning ion abundance criteria, using p-Bromofluorobenzene (BFB) for volatiles. Laboratory blanks are run each day and a trip blank is also analyzed.

Surrogates:

Surrogates were included in all samples. Surrogates are used to monitor extractions recovery efficiency.

Compounds	% EPA Allowable Recovery	
	Water	Soil
1,2-Dichloroethane-d4	76 - 114	70 - 121
Toluene-d8	88 - 110	81 - 117
4-Bromofluorobenzene	86 - 115	74 - 121

Matrix Spikes:

Matrix spikes are additional quality assurance controls. Known amounts of selected compounds are added to samples and analytical accuracy is determined by sample analysis.

Matrix Spike Compounds	% EPA Allowable Recovery	
	Water	Soil
1,1-Dichloroethane	61 - 145	59 - 172
Trichloroethene	71 - 120	62 - 137
Chlorobenzene	75 - 130	60 - 133
Toluene	76 - 125	59 - 139
Benzene	76 - 127	66 - 142

ANALYTICAL METHODOLOGY

Semivolatile Organics

Waters -

The sample techniques used for both water and soil samples are based on EPA Methods 625 and 8270, and follow EPA Contract Laboratory Program (CLP) recommendations. Waters are extracted in a separatory funnel utilizing methylene chloride as the extraction solvent. Six surrogate compounds are added prior to extraction to monitor extraction efficiency. After extraction, the solvent is concentrated to 1 ml, internal standards are added and the sample is ready for analysis.

Soils -

Six surrogates are added to a weighed portion of soil. Three times methylene chloride/acetone is added and the soil is shaken vigorously. The solvent is concentrated, internal standards are added and the sample is ready for analysis.

GC/MS -

Samples are analyzed on a GC/MS equipped with a DB-5 capillary column. Helium is the carrier gas and 1 ul of the sample extract is injected. The samples are analyzed under full scan GC/MS which monitors a mass range of 35-550.

Tuning and Blanks

The samples are run after meeting GC/MS hardware tuning ion abundance criteria, Decafluorotriphenylphosphine (DFTPP) for semi-volatiles. Laboratory blanks are extracted with each batch of water samples and soil samples.

Surrogates:

Surrogates were included in all samples. Surrogates are used to monitor extractions recovery efficiency.

Surrogate Compounds	% EPA Allowable Recovery	
	Water	Soil
Nitrobenzene-d5	35 - 114	23 - 120
2-Fluorobiphenyl	43 - 116	30 - 115
p-Terphenyl-d14	33 - 141	18 - 147
Phenol-d5	10 - 94	24 - 113
2-Fluorophenol	21 - 100	25 - 121
2,4,6-Tribromophenol	10 - 123	19 - 122

Matrix Spikes:

Matrix spikes are additional quality assurance controls. Known amounts of selected compounds are added to samples and analytical accuracy is determined by sample analysis.

Matrix Spike Compounds	% EPA Allowable Recovery	
	Water	Soil
1,2,4-Trichlorobenzene	39 - 98	38 - 107
Acenaphthene	46 - 118	31 - 137
2,4-Dinitrotoluene	24 - 96	28 - 89
Pyrene	26 - 127	35 - 142
N-Nitroso-di-n-dipropylamine	41 - 116	41 - 126
1,4-Dichlorobenzene	36 - 97	28 - 104
Pentachlorophenol	9 - 103	17 - 109
Phenol	12 - 89	26 - 90
2-Chlorophenol	27 - 123	25 - 102
4-Chloro-3-methylphenol	23 - 97	26 - 103
4-Nitrophenol	10 - 80	11 - 114

ANALYTICAL METHODOLOGY

Total Petroleum Hydrocarbons (TPH) Extractables by GC-FID

Extraction Procedure:

WATER -

A 1 liter sample is poured into a 2 liter separatory funnel. 3x100 ml extractions with methylene chloride (2 minute shake outs) are completed. The methylene chloride is decanted off and concentrated to a 5 ml final volume.

SOIL -

A 30 gram, or other appropriate aliquot of soil, is mixed with 10 grams of washed sodium sulfate. 100 mls of methylene chloride is added to the soil and placed on a mechanical shaker for 1 hour. The liquid is decanted off and the process is repeated with an additional 50 ml of methylene chloride. The combined solvent extracts are filtered through sodium sulfate and the extract is concentrated to a 5 ml final volume.

GC ANALYSIS -

An appropriate volume of the sample extract is injected into a Gas Chromatograph equipped with a Flame Ionization Detector (FID), a split/splitless capillary injector (operated in the splitless mode), and a fused silica capillary column. The TPH fraction is quantitated as gasoline and/or #2 diesel fuel (and/or different petroleum hydrocarbon fuel types if requested, such as JP-4 jet fuel) based on relative retention times and examination of the elution profile. The TPH fraction quantitation is based on chromatographic peak areas against a multipoint standard curve.

CHEMWEST ANALYTICAL LABORATORIES
VOLATILE ORGANICS

Client I.D.: Method Blank
Date(s) Analyzed: 01/25/89

CHEMWEST I.D.: 3096 -MB
Matrix : Soil

Compound	Amount Detected (ug/Kg)	RL (ug/Kg)
Chloromethane	BRL	10
Bromomethane	BRL	10
Vinyl Chloride	BRL	10
Chloroethane	BRL	10
Methylene Chloride	BRL	10
Acetone	BRL	20
Carbon Disulfide	BRL	5
1,1-Dichloroethene	BRL	5
1,1-Dichloroethane	BRL	5
1,2-Dichloroethene (total)	BRL	5
Chloroform	BRL	5
1,2-Dichloroethane	BRL	5
2-Butanone	BRL	20
1,1,1-Trichloroethane	BRL	5
Carbon Tetrachloride	BRL	5
Vinyl Acetate	BRL	10
Bromodichloromethane	BRL	5
1,2-Dichloropropane	BRL	5
cis-1,3-Dichloropropene	BRL	5
Trichloroethene	BRL	5
Benzene	BRL	5
Dibromochloromethane	BRL	5
1,1,2-Trichloroethane	BRL	5
trans-1,3-Dichloropropene	BRL	5
Bromoform	BRL	5
4-Methyl-2-pentanone	BRL	10
2-Hexanone	BRL	10
Tetrachloroethene	BRL	5
1,1,2,2-Tetrachloroethane	BRL	5
Toluene	BRL	5
Chlorobenzene	BRL	5
Ethylbenzene	BRL	5
Styrene	BRL	5
Xylenes (total)	BRL	5

Surrogates	% Recovery	Acceptance Window
1,2-Dichloroethane-d4	104%	70-121%
Toluene-d8	90%	81-117%
4-Bromofluorobenzene	95%	74-121%

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: [signature]

REV4:1.89

CHEMWEST ANALYTICAL LABORATORIES
VOLATILE ORGANICS

Client I.D.: 2E
Date(s) Analyzed: 01/25/89

CHEMWEST I.D.: 3096-2
Matrix : Soil

Compound	Amount Detected (ug/Kg)	RL (ug/Kg)
Chloromethane	BRL	20000
Bromomethane	BRL	20000
Vinyl Chloride	BRL	20000
Chloroethane	BRL	20000
Methylene Chloride	BRL	20000
Acetone	BRL	40000
Carbon Disulfide	BRL	10000
1,1-Dichloroethene	BRL	10000
1,1-Dichloroethane	BRL	10000
1,2-Dichloroethene (total)	BRL	10000
Chloroform	BRL	10000
1,2-Dichloroethane	BRL	10000
2-Butanone	BRL	40000
1,1,1-Trichloroethane	BRL	10000
Carbon Tetrachloride	BRL	10000
Vinyl Acetate	BRL	20000
Bromodichloromethane	BRL	10000
1,2-Dichloropropane	BRL	10000
cis-1,3-Dichloropropene	BRL	10000
Trichloroethene	BRL	10000
Benzene	BRL	10000
Dibromochloromethane	BRL	10000
1,1,2-Trichloroethane	BRL	10000
trans-1,3-Dichloropropene	BRL	10000
Bromoform	BRL	10000
4-Methyl-2-pentanone	BRL	20000
2-Hexanone	BRL	20000
Tetrachloroethene	BRL	10000
1,1,2,2-Tetrachloroethane	BRL	10000
Toluene	27000	10000
Chlorobenzene	BRL	10000
Ethylbenzene	12000	10000
Styrene	BRL	10000
Xylenes (total)	92000	10000

Surrogates	% Recovery	Acceptance Window
1,2-Dichloroethane-d4	105%	70-121%
Toluene-d8	103%	81-117%
4-Bromofluorobenzene	106%	74-121%

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: ew

REV4:1.89

CHEMWEST ANALYTICAL LABORATORIES
SEMIVOLATILE ORGANICS

Client I.D.: Method Blank
Date Extracted : 01/09/89
Date(s) Analyzed: 01/24/89

CHEMWEST I.D.: 3096-MB
Matrix : Soil

Compound	Amount Detected (ug/Kg)	RL (ug/Kg)
Phenol	BRL	200
2-Chlorophenol	BRL	200
bis(2-Chloroethyl) ether	BRL	200
1,3-Dichlorobenzene	BRL	200
1,4-Dichlorobenzene	BRL	200
1,2-Dichlorobenzene	BRL	200
Benzyl alcohol	BRL	200
2-Methylphenol	BRL	200
bis(2-Chloroisopropyl) ether	BRL	200
Hexachloroethane	BRL	200
N-Nitroso-di-n-propylamine	BRL	200
4-Methylphenol	BRL	200
Nitrobenzene	BRL	200
Isophorone	BRL	200
2-Nitrophenol	BRL	200
2,4-Dimethylphenol	BRL	200
bis(2-Chloroethoxy) methane	BRL	200
2,4-Dichlorophenol	BRL	200
1,2,4-Trichlorobenzene	BRL	200
Benzoic acid	BRL	400
Naphthalene	BRL	200
4-Chloroaniline	BRL	200
Hexachlorobutadiene	BRL	200
4-Chloro-3-methylphenol	BRL	200
2-Methylnaphthalene	BRL	200
Hexachlorocyclopentadiene	BRL	200
2,4,6-Trichlorophenol	BRL	200
2,4,5-Trichlorophenol	BRL	400
2-Chloronaphthalene	BRL	200
2-Nitroaniline	BRL	400
Acenaphthylene	BRL	200
Dimethylphthalate	BRL	200
2,6-Dinitrotoluene	BRL	200
3-Nitroaniline	BRL	400
Acenaphthene	BRL	200
2,4-Dinitrophenol	BRL	400
Dibenzofuran	BRL	200
4-Nitrophenol	BRL	400
2,4-Dinitrotoluene	BRL	200
Fluorene	BRL	200
4-Chlorophenyl-phenylether	BRL	200
Diethylphthalate	BRL	200
4-Nitroaniline	BRL	400
4,6-Dinitro-2-methylphenol	BRL	400

CHEMWEST ANALYTICAL LABORATORIES
SEMIVOLATILE ORGANICS

Client I.D.: Method Blank

CHEMWEST I.D.: 3096-MB
Matrix : Soil

Compound	Amount Detected (ug/Kg)	RL (ug/Kg)
N-Nitrosodiphenylamine	BRL	200
4-Bromophenyl-phenylether	BRL	200
Hexachlorobenzene	BRL	200
Pentachlorophenol	BRL	400
Phenanthrene	BRL	200
Anthracene	BRL	200
Di-n-butylphthalate	BRL	200
Fluoranthene	BRL	200
Pyrene	BRL	200
Butylbenzylphthalate	BRL	200
Benzo(a)anthracene	BRL	200
3,3'-Dichlorobenzidine	BRL	400
Chrysene	BRL	200
bis(2-Ethylhexyl)phthalate	BRL	200
Di-n-octylphthalate	BRL	200
Benzo(b)fluoranthene	BRL	200
Benzo(k)fluoranthene	BRL	200
Benzo(a)pyrene	BRL	200
Indeno(1,2,3-cd)pyrene	BRL	200
Dibenz(a,h)anthracene	BRL	200
Benzo(g,h,i)perylene	BRL	200

Surrogates	% Recovery	Acceptance Window
2-Fluorophenol	83%	25-121%
Phenol-d5	82%	24-113%
Nitrobenzene-d5	83%	23-120%
2-Fluorobiphenyl	76%	30-115%
2,4,6-Tribromophenol	61%	19-122%
Terphenyl-d14	58%	18-137%

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: [signature]

REV4:1.89

CHEMWEST ANALYTICAL LABORATORIES
SEMIVOLATILE ORGANICS

Client I.D.: 4W
Date Extracted : 01/09/89
Date(s) Analyzed: 01/24/89

CHEMWEST I.D.: 3096-4
Matrix : Soil

Compound	Amount Detected (ug/Kg)	RL (ug/Kg)
Phenol	BRL	2000
2-Chlorophenol	BRL	2000
bis(2-Chloroethyl) ether	BRL	2000
1,3-Dichlorobenzene	BRL	2000
1,4-Dichlorobenzene	BRL	2000
1,2-Dichlorobenzene	BRL	2000
Benzyl alcohol	BRL	2000
2-Methylphenol	BRL	2000
bis(2-Chloroisopropyl) ether	BRL	2000
Hexachloroethane	BRL	2000
N-Nitroso-di-n-propylamine	BRL	2000
4-Methylphenol	BRL	2000
Nitrobenzene	BRL	2000
Isophorone	BRL	2000
2-Nitrophenol	BRL	2000
2,4-Dimethylphenol	BRL	2000
bis(2-Chloroethoxy) methane	BRL	2000
2,4-Dichlorophenol	BRL	2000
1,2,4-Trichlorobenzene	BRL	2000
Benzoic acid	BRL	4000
Naphthalene	31000	2000
4-Chloroaniline	BRL	2000
Hexachlorobutadiene	BRL	2000
4-Chloro-3-methylphenol	BRL	2000
2-Methylnaphthalene	20000	2000
Hexachlorocyclopentadiene	BRL	2000
2,4,6-Trichlorophenol	BRL	2000
2,4,5-Trichlorophenol	BRL	4000
2-Chloronaphthalene	BRL	2000
2-Nitroaniline	BRL	4000
Acenaphthylene	BRL	2000
Dimethylphthalate	BRL	2000
2,6-Dinitrotoluene	BRL	2000
3-Nitroaniline	BRL	4000
Acenaphthene	BRL	2000
2,4-Dinitrophenol	BRL	4000
Dibenzofuran	BRL	2000
4-Nitrophenol	BRL	4000
2,4-Dinitrotoluene	BRL	2000
Fluorene	BRL	2000
4-Chlorophenyl-phenylether	BRL	2000
Diethylphthalate	BRL	2000
4-Nitroaniline	BRL	4000
4,6-Dinitro-2-methylphenol	BRL	4000

CHEMWEST ANALYTICAL LABORATORIES
SEMIVOLATILE ORGANICS

Client I.D.: 4W

CHEMWEST I.D.: 3096-4
Matrix : Soil

Compound	Amount Detected (ug/Kg)	RL (ug/Kg)
N-Nitrosodiphenylamine	BRL	2000
4-Bromophenyl-phenylether	BRL	2000
Hexachlorobenzene	BRL	2000
Pentachlorophenol	BRL	4000
Phenanthrene	BRL	2000
Anthracene	BRL	2000
Di-n-butylphthalate	BRL	2000
Fluoranthene	BRL	2000
Pyrene	BRL	2000
Butylbenzylphthalate	BRL	2000
Benzo(a)anthracene	BRL	2000
3,3'-Dichlorobenzidine	BRL	4000
Chrysene	BRL	2000
bis(2-Ethylhexyl)phthalate	BRL	2000
Di-n-octylphthalate	BRL	2000
Benzo(b)fluoranthene	BRL	2000
Benzo(k)fluoranthene	BRL	2000
Benzo(a)pyrene	BRL	2000
Indeno(1,2,3-cd)pyrene	BRL	2000
Dibenz(a,h)anthracene	BRL	2000
Benzo(g,h,i)perylene	BRL	2000

Surrogates	% Recovery	Acceptance Window
2-Fluorophenol	90%	25-121%
Phenol-d5	91%	24-113%
Nitrobenzene-d5	108%	23-120%
2-Fluorobiphenyl	72%	30-115%
2,4,6-Tribromophenol	49%	19-122%
Terphenyl-d14	48%	18-137%

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: ew

REV4:1.89

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Date Extracted : 01/19/89
Date(s) Analyzed: 01/25/89

Case : 3096
Matrix: Soil

Reporting Units: mg/Kg

Client ID	CHEMWEST ID	Gasoline Result	Gasoline RL	Diesel Result	Diesel RL	Other Hydrocarbon Mixture Result	Other Hydrocarbon Mixture RL
Method Blank	3096-MB	BRL	10	BRL	10	BRL	10
1W	3096-1	19000	1000	BRL	1000	BRL	1000

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: KP

REV3:1.89

CHEMWEST ANALYTICAL LABORATORIES
METALS ANALYSIS
ICAP SCAN

Client I.D.: 3E
Date(s) Analyzed: 01/26/89
thru: 01/26/89

CHEMWEST I.D.: 3096-3
Matrix : Soil

Element	Amount Detected (mg/Kg)	RL (mg/Kg)
Cadmium	BRL	1
Chromium	26	2
Lead	BRL	10
Zinc	23	5

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by:

REV3:1.89

CHEMWEST ANALYTICAL LABORATORIES
MBAS

Date(s) Analyzed: 01/23/89
thru: 01/23/89

Case : 3096
Matrix: Water

Client ID	CHEMWEST ID	Amount Detected (mg/L)
1A	3096-5	0.34

The reporting limit for MBAS is 0.025 mg/L.

BRL: Below Reporting Limit.

Approved by:

REV2:1.88

CHEM WEST ANALYTICAL LABORATORIES, INC.
600 West North Market Blvd.
Sacramento, California 95834
(916) 923-0840 FAX (916) 923-1938

CLIENT

Order No. 3096
Date Rec'd. 1/13/89 @ 1234
Compl. Date
Section M. Namba

CLIENT: A. G. E. (Anania Geologic Engineering)
1747 35th Street
Sacramento, CA 95816

Project Name: Carnation Oakland
Project No. 004-88-059
P.O. NO. ~~Mary Scruggs~~
Contact (Tom E. Eatlands) OK
Phone (916) 451-0921

ANALYSIS: Five samples recd under chain of custody in 6" brass core tube (4) and 1qt amber glass jar (1) to be analyzed for TPH EXTN/GC-FID, 8240, ICAP, Cd, Cr, Pd, Zinc, 8270 and MBAS.
(Mobile and Water)

	Sampled	Date	Time	analysis	matrix	container
3096-1	1W	1/12	1340	TPH EXTN	Soil	1-6" core tube
-2	2E		1300	8240		
-3	3E		1305	ICAP Cd, Cr, ~~Pd~~ Pb (new), Zn		
-4	4W		1400	8270		
-5	1A		1630	MBAS	Water	1-1qt jar

AMENDED

Per conversation between Karl Anania and Margie Namba on 1/16/89 at 1500 hrs, change Pd on 3096-3 to Pb.
3096-3 will be analyzed for Cd, Cr, Zn, and Pb by ICAP.

JCW 1/16/89

RI
M.A. MICHELLE TOLIVER

O.K. C.

C.O. 3096

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation Oakland PROJECT No. 004-88-059.

REPORT RESULTS TO: Tom E. Edwards / Karl J. Anania.

SURVEY: Waste Oil Tank Pull

SAMPLERS: Karl J Anania Joe Southerland

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE SOIL COMP	SAMPLE TYPE SOIL GRAB	SAMPLE TYPE WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	Waste Oil 1W	1/12/89	1345		X			Brass Tube	TPH (GCFID) MOD 8015
	2E	1/12/89	1350		X			11	8240
	3E	1/12/89	1355		X			11	ICAP Cd, Cr Pb, & Zn
	4W	1/12/89	1400		X			11	8270
									2 Liter Vertals
									SAMPLES RECEIVED IN GOOD CONDITION

RELINQUISHED BY: Joe Southerland	RECEIVED BY:	DATE / TIME 1/13/89 12.35
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY: Michelle Tolentino		DATE / TIME 1/13 12.35

METHOD OF SHIPMENT: Ice chest in car

C.O 3096

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation/Oakland . PROJECT NO. 004-88-059 .

REPORT RESULTS TO: Tom E. Edwards / Karl J. Anania .

SURVEY Groundwater from tank excavation for Soaps/Sufractants SAMPLERS Karl Anania Joe Sandhoffer

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	Sample 1A	1/12/89	16:30			X		Brown liter	Soap/Sufractant & degreesors
	~~Sample 1B~~	~~1/12/89~~	~~16:30~~			X		"	Soap/Sufractants & degreasers

SAMPLES REC'D IN GOOD CONDITION

Hold at AGE

1/14/89

RELINQUISHED BY: Joe Sandhoffer	RECEIVED BY:	DATE / TIME 1/13/89 12:30
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY: Michelle Solis		DATE / TIME 1/13/89 12:34

METHOD OF SHIPMENT: Ice chest in car

C.W. 2046

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation Oakland PROJECT No. 004-88-059

REPORT RESULTS TO: Tom E. Edwards / Karl J. Anania

SURVEY: Waste Oil Tank Pull

SAMPLERS: Karl J Anania / Joe Sandhofer

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE: SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	Waste Oil 1 W	1/12/89	1345		X			Brass Tube	TPH (GCFID) MOD 8015
	2E	1/12/89	1350		X			"	8240
	3E	1/12/89	1355		X			"	ICAP Cd, Cr Pb, & Zn
	4W	1/12/89	1400		X			"	8270
									2 week Vertals
									SAMPLES REC'D IN GOOD CONDITION

RELINQUISHED BY: Joe Sandhofer	RECEIVED BY:	DATE / TIME 1/13/89 / 12:35
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY: Michelle Tolbert		DATE / TIME 1/13 / 12:35

METHOD OF SHIPMENT: Ice chest in car

C.O 30416

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

trial due 1

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation/Oakland . PROJECT No. 004-88-059 .

REPORT RESULTS TO: Tom E. Edwards / Karl J. Anania .

SURVEY Groundwater from tank excavation for Soaps/Sufractants SAMPLERS Karl Anania Joe Sandhoffner

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	Sample 1A	1/12/89	1630			X		Brown liter	Soap/Sufractan & degreesors
	~~Sample 1B~~	~~1/12/89~~	~~1630~~			X		"	Soap/Sufractant & degreasers

SAMPLES REC'D IN GOOD CONDITION

Hold at ACE 1/14/89

RELINQUISHED BY: Joe Sandhoffner	RECEIVED BY:	DATE / TIME 1/13/89 12:30
RELINQUISHED BY: —	RECEIVED BY:	DATE / TIME
RELINQUISHED BY: —	RECEIVED BY: —	DATE / TIME
RECEIVED FOR LABORATORY BY: Michelle Jolin		DATE / TIME 1/13/89 12:34

METHOD OF SHIPMENT: Ice chest in car

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND CA 94806 PHONE (415) 222 0300 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 01/26/89
Reported: 02/10/89
Job No. #: 70645

Attn: Karl Anania / Tom Edwards
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Project: CARNATION

Total Petroleum Hydrocarbon Analysis; By Modified Method 8015
Nitrogen (Ammonia) Analysis; By Standard Method 417D
Total Dissolved Solids; By Standard Method 209B
mg/l

Lab ID	Client ID	Diesel	Gasoline	TDS	Ammonia	pH
70645-1	Groundwater	420	2,170	0.74	20	7.5

QA/QC: Spike Recovery for Diesel: 80%
Spike Recovery for Gasoline: 112%

Detection Limit for TPH: 20
Detection Limit for Ammonia: 10

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-0300 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 01/26/89
Reported: 02/10/89
Job No #: 70645

Attn: Karl Anania / Tom Edwards
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Project: Carnation

Aromatic Volatile Hydrocarbon Analysis:
EPA Method 8020
mg/l

Lab ID	Client ID	Benzene	Toluene	MDL
70645-1	Groundwater	35	54	5

Lab ID	Client ID	Ethylbenzene	Xylene	MDL
70645-1	Groundwater	6	30	5

QA/QC: Spike Recovery for Benzene: 119%
Spike Recovery for Xylenes: 117%

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-0300 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 01/26/89
Reported: 02/10/89
Job #: 70645

Attn: Tom Edwards
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Project: Carnation - Oakland, CA. #004-88-059

Analysis Method EPA 6010
Prep Method EPA 3010
mg/l

Lab ID #: 70645
Client ID: Groundwater sample

METAL		MDL	% SPIKE RECOVERY
Tl	<1.0	1.0	100
As	<1.0	1.0	108
Hg	<1.0	1.0	96
Se	<1.0	1.0	98
Mo	<0.04	0.04	102
Sb	<0.04	0.04	90
Zn	0.1	0.006	100
Cd	<0.01	0.01	100
Pb	0.3	0.044	102
Co	<0.02	0.02	98
Ni	0.03	0.026	98
Cr	<0.05	0.05	100
V	<0.05	0.05	102
Be	<0.05	0.05	102
Cu	0.02	0.004	98
Ag	<0.05	0.05	N/A
Ba	0.3	0.004	106

MDL: Method detection Limit: Compound below this level would not be detected.

Jaime Chow
Laboratory Director

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation/Oakland . PROJECT No. 004-88-059 .

REPORT RESULTS TO: Kari J Anania / Tom Edwards .

SURVEY: Recovery Well Baseline

SAMPLERS: Kari J Anania / Joe Southerland

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE SOIL COMP	SOIL GRAB	WATER	SEQ. No.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	GROUNDWATER 1	1/26	1:30			✓	1	8 oz AMBER	Cam metals pH, TDS, (available) Nitrogen,
	GROUNDWATER 2	1/26	1:35			✓	2	8 oz AMBER	
	GROUNDWATER 3	1/26	1:40			✓	3	1 LITER AMBER	Phosphorus, chlorides
	GROUND WATER 4	1/26	1:45			✓	4	1 LITER AMBER	and physical chemistry.
	GROUND WATER 5	1/26	1:50			✓	5	VOA	TPH & BTX
	GROUND WATER 6	1/26	1:55			✓	6	VOA	& EB: Total
	GROUND WATER 7	1/26	2.00			✓	7	VOA	Oil & Grease
	GROUND WATER 8	1/26	2:05			✓	8	VOA	USE sample
	GROUND WATER 9	1/26	2:10			✓	9	VOA	from appropriate
	GROUNDWATER 10	1/26	2:15			✓	10	VOA	bottles
	GROUNDWATER 11	1/26	2:20			✓	11	VOA	
	GROUNDWATER 12	1/26	2:25			✓	12	VOA	

RELINQUISHED BY:	RECEIVED BY:	DATE / TIME 1/26 16:08
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY:		DATE / TIME

METHOD OF SHIPMENT:

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

Pg 2 of 3

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation / Oakland . PROJECT NO. 004-88-059 .

REPORT RESULTS TO: Karl J. Anania / Tom Edwards .

SURVEY: Recovery Well Baseline

SAMPLERS: Karl J Anania / [illegible]

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	GROUND WATER 13	1/26	2:30			✓	13	VOA	
	GROUND WATER 14	1/26	2:35			✓	14	VOA	
	GROUNDWATER 15	1/26	2:40			✓	15	VOA	
	GROUNDWATER 16	1/26	2:45			✓	16	VOA	
	GROUNDWATER 17	1/26	2:50			✓	17	VOA	
	GROUNDWATER 18	1/26	3:00			✓	18	VOA	
	GROUNDWATER 19	1/26	3:06			✓	19	PLASTIC BOTTLE	
	GROUNDWATER 20	1/26	3:10			✓	20	PLASTIC BOTTLE	
	GROUNDWATER 21	1/26	3:24			✓	21	PLASTIC BOTTLE	
	GROUNDWATER 22	1/26	3:34			✓	22	PLASTIC BOTTLE	
	GROUND WATER 23	1/26	3:40			✓	23	PLASTIC BOTTLE	
	GROUND WATER 24	1/26	3:47			✓	24	PLASTIC BOTTLE	

See page 1

RELINQUISHED BY:	RECEIVED BY:	DATE / TIME 1-26-89 16:00
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY:		DATE / TIME

METHOD OF SHIPMENT:

ENVIRONMENTAL **AGE** ENERGY MINERALS

ANANIA GEOLOGIC ENGINEERING

Pg 3 of 3

CHAIN OF CUSTODY RECORD

PROJECT NAME: Carnation/Oakland. PROJECT No. 004-88-059.

REPORT RESULTS TO: Karl J. Anania / Tom Edwards.

SURVEY: Recovery Well Baseline

SAMPLERS: Karl J. Anania / Tom Edwards

LABORATORY LOG NUMBER	STATION NUMBER	DATE	TIME	SAMPLE TYPE: SOIL COMP	SOIL GRAB	WATER	SEQ. No.	No. OF CONTAINERS	ANALYSIS REQUIRED
	GROUND WATER 25	1/26	3:54			✓	25	PLASTIC BOTTLE	see page 1 KJA
	GROUNDWATER 26	1/26	4:00			✓	26	PLASTIC BOTTLE	

RELINQUISHED BY: Tom Edwards	RECEIVED BY:	DATE / TIME 1/26/88 16:09
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RELINQUISHED BY:	RECEIVED BY:	DATE / TIME
RECEIVED FOR LABORATORY BY:		DATE / TIME

METHOD OF SHIPMENT:

APPENDIX C

Analytical Results and Chain of Custody Forms

SOIL

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 02/22/89
Reported: 02/23/89
Job No. #: 70684

Attn: Mary Scruggs
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Total Petroleum Hydrocarbon Analysis
By Modified Method 8015
mg/kg

Lab ID	Client ID	Concentration	Hydrocarbon	MDL
70684-1	PR-5 5'	ND<20	N/A	20
70684-2	PR-5 10'	ND<20	N/A	20

QA/QC: Spike Recovery for Diesel: 100%

MDL: Method detection limit: Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 02/22/89
Reported: 02/23/89
Job No #: 70684

Attn: Mary Scruggs
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Aromatic Volatile Hydrocarbon Analysis:
EPA Method 8020
mg/kg

Lab ID	Client ID	Benzene	Toluene	MDL
70684-1	PR-5 5'	ND<0.5	ND<0.5	0.5
70684-2	PR-5 10'	ND<0.5	ND<0.5	0.5

Lab ID	Client ID	Ethylbenzene	Xylene	MDL
70684-5	PR-5 5'	ND<0.5	ND<0.5	0.5
70684-6	PR-5 10'	ND<0.5	ND<0.5	0.5

Lab ID	Client ID	1,2 DCB	1,3 DCB	1,4 DCB	MDL
70684-5	PR-5 5'	ND<0.5	ND<0.5	ND<0.5	0.5
70684-6	PR-5 10'	ND<0.5	ND<0.5	ND<0.5	0.5

QA/QC: Spike recovery for Benzene: 98%
Spike recovery for Xylenes: 90%

MDL: Method detection limit; Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS RECEIVED MAR 3 1 1989

STATE LICENSE NO. 211

Received: 02/22/89
Reported: 02/23/89
Job #: 70684

Attn: Mary Scruggs
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Organic Lead Analysis
ppm

Lab ID #:	70684-1	70684-2	
Client ID:	PR-5 5'	PR-5 10'	
			MDL
Organic Lead	<10	<10	10

MDL: Method detection Limit: Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

RECEIVED MAR 1 7 1989

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 02/27/89
Reported: 03/13/89
Job No. #: 70697

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Total Petroleum Hydrocarbon Analysis
By Modified Method 8015
mg/kg

Lab ID	Client ID	Concentration	Hydrocarbon	MDL
70697-1	# 3138	ND<10	N/A	10

QA/QC: Spike Recovery for Diesel: 91%

MDL: Method detection limit: Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

RECEIVED MAR 14 1989

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 02/27/89
Reported: 03/13/89
Job No #: 70697

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Aromatic Volatile Hydrocarbon Analysis:
EPA Method 8020
mg/kg

Lab ID	Client ID	Benzene	Toluene	MDL
70697-1	# 3138	ND<0.03	ND<0.03	0.03

Lab ID	Client ID	Ethylbenzene	Xylene	MDL
70697-1	# 3138	ND<0.03	ND<0.03	0.03

QA/QC: Spike Recovery for Average: 90%

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

RECEIVED MAR 14 1989

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 02/27/89
Reported: 03/13/89
Job #: 70697

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Analysis Method EPA 6010
mg/kg

Lab ID	Client ID	Total Lead
70697-1	#3138	8.0

QA/QC: Spike Recovery for Lead: 82 %

Jaime Chow
Laboratory Director

ANANIA GEOLOGIC ENGINEERING

AGE

PROJECT NO.	LAB REPORT NO.
004-88-059	
P.O. NO.	SAMPLERS: (signature) Eric J. Ankh

LAB LOG NO.	DATE/TIME	SAMPLE I.D.	NO. OF CON-TAINERS	SAMPLE TYPE: SOIL COMP	SOIL GRAB	AIR OR WATER	ANALYSES: Modified 8015	8020	TTLC Lead					REMARKS
	2/22/89 1140	3133 PR-5 5'	1		X		X	X	X					6" Brass tube
	2/22/89 1150	3134 PR-5 10'	1		X		X	X	X					6" Brass Tube

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
Eric J. Ankh	2/22/89 1545	Mary A. Scruggs
RELINQUISHED BY: (signature) Mary A. Scruggs	DATE/TIME 2/22/89 1555	RECEIVED BY: (signature) 1551 4/22/89
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)

REMARKS:

24 Hour Rush on Analyses

SEND RESULTS TO:

ATTN: MARY SCRUGGS
ANANIA GEOLOGIC ENGINEERING
1447 35th STREET
SACRAMENTO, CA. 95816
(916) 451-0921

CHAIN OF CUSTODY

ANANIA GEOLOGIC ENGINEERING

AGE

PROJECT NO.	LAB REPORT NO.
004-88-059	
P.O. NO.	SAMPLERS: (signature)
	Eric J. Ekstrom

LAB LOG NO.	DATE/TIME	SAMPLE I.D.	NO. OF CONTAINERS	SAMPLE TYPE: SOIL COMP	SOIL GRAB	AIR OR WATER	ANALYSES: TPH M 8015	EPA 8020	BTEX	TTLC Lead					REMARKS
	2/27/89 14:00	3138	1		X		X	X	X						

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
Eric J. Ekstrom	2/27/89 15:20	[signature]
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
[signature]	2-27-89 1644	[signature]
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)

REMARKS:

Regular Turnaround

SEND RESULTS TO:

ATTN: Mary Scruggs

ANANIA GEOLOGIC ENGINEERING
1447 35th STREET
SACRAMENTO, CA. 95816
(916) 451-0921

CHAIN OF CUSTODY

GROUNDWATER

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 02/24/89
Reported: 03/09/89
Job No #: 70694

Attn: Karl Anania
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Project: #004-88-059

Aromatic Volatile Hydrocarbon Analysis:
EPA Method 8020
mg/kg

Lab ID	Client ID	Benzene	Toluene	MDL
70694-1	RW-1	0.73	<0.3	0.3

Lab ID	Client ID	Ethylbenzene	Xylene	MDL
70694-1	RW-1	0.99	6.4	0.3

QA/QC: Spike Recovery for Benzene: 84%
Spike Recovery for Toluene: 83%
Spike Recovery for Xylenes: 107%

MDL: Method detection limit; Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 02/24/89
Reported: 03/09/89
Job No #: 70694

Attn: Karl Anania
Anania Geological Engineering
1447 35th Street
Sacramento, CA. 95816

Project: 004-88-059

Total Petroleum Hydrocarbon Analysis: By Modified Method 8015
Oil & Grease Analysis: By Standard Method 503D
mg/kg

Lab ID	Client ID	TPH as Diesel	Oil & Grease	Total Lead
70694-1	RW-1	179	515	17

QA/QC: Spike Recovery for Diesel: 102%
Spike Recovery for Gasoline: 78%
Spike Recovery for Lead: 88%

Detection limit for Diesel: 20
Detection Limit for Gasoline: 20
Detection Limit for Lead: 20

Jaime Chow
Laboratory Director

ANANIA GEOLOGIC ENGINEERING

AGE

PROJECT NO.	LAB REPORT NO.	NO. OF CONTAINERS	SAMPLE TYPE			ANALYSES							
004-88-059			SOIL		WATER	TPH, BTXE and Total Lead							
P.O. NO.	SAMPLERS: (signature) Christopher Cerqueira		COMP	GRAB									
LAB LOG NO.	DATE	TIME	SAMPLE I.D.										REMARKS
	2/23/89	1445	RW-1 *	5 incl			X								Set include 2 amber bottles and 3 VOA's

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	REMARKS:	SEND RESULTS TO:
Christopher Cerqueira	2-23-89, 1645			ATTN: Karl Anania
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)		Anania Geologic Engineering
				1447 35th St.
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)		Sacramento, CA 95816
				PHONE NO. (916) 451-0921

CHAIN OF CUSTODY

White - AGE Yellow - LAB Copy Pink - File

GASOLINE

AGE
11330 SUNRISE PARK DR., SUITE C • RANCHO CORDOVA, CA 95742
P.O. BOX 161148 • SACRAMENTO, CA 95816 • PHONE (916) 631-0154 FAX (916) 631-0528

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 03/23/89
Reported: 03/27/89
Job No #: 70748

Attn: Tom Edwards
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Project: #004-88-059

Analysis Method EPA 6010
mg/kg

Lab ID	Client ID	Lead
70748-15	Gasoline Sample	189

(Gasoline sample is a composite of MW-7, MW-8, & PR-30, #3175)

QA/QC: Spike Recovery for Lead: 85%

Detection Limit for Lead: 0.044

Jaime Chow
Laboratory Director

RECEIVED MAR 2 3 1989

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 03/17/89
Reported: 03/21/89
Job #: 70734

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C.
Rancho Cordova, CA. 95742

Project: #004-88-059

Analysis Method EPA 6010
mg/l

Lab ID	Client ID	Total Lead	MDL
70734-1	PR-23 #3173	145.0	0.044

QA/QC: Spike Recovery for Lead: 78 %

MDL: Method detection limit; Compound below this level would not be detected.

Jaime Chow
Laboratory Director

ANANIA GEOLOGIC ENGINEERING

AGE

PROJECT NO.	LAB REPORT NO.
004-88-059	

P.O. NO.	SAMPLERS: (signature)
	Chris Cerqueira / Nick Coffee

LAB LOG NO.	DATE	TIME	SAMPLE I.D.	NO. OF CONTAINERS	SAMPLE TYPE: SOIL COMP	SOIL GRAB	GW WATER	ANALYSES: Method 3010 Total Lead in gasoline	TPH	BTXE	Total Lead				REMARKS
	3-16-89	1620	PR-23 # 3173	1 Amber				X							Sample Type - baseline Sampled by Chris C.
	~~3-16-89~~	1335	AGE # 3153 MW-7	1 ~~brass tube~~		X			X	X	X	CHNC			~~Sampled by Nick Coffee~~
	~~3-16-89~~	1340	~~AGE # 3154 MW-7~~	"		X			X	X	X	did Croissants.			" " " "
	~~3-16-89~~	1408	~~AGE # 3155 MW-7~~	"		X			X	X	X				" " " "
	~~3-16-89~~	1415	~~AGE # 3156 MW-7~~	~~"~~		X			X	X	X				" " " "

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
	3/16/89	Christopher Cerqueira
Christopher Cerqueira	3/17/89 1515	
Mary K. Scruggs	3/17/89 3:30	

REMARKS: Rush Turnaround

SEND RESULTS TO:
ATTN: Mary Scruggs
AGE
11130 Sunrise Park Dr Suite C
~~Rancho~~ Rancho Cordova, CA 95742
PHONE NO. (916) ~~451-0921~~ 631-0154

CHAIN OF CUSTODY

White - AGE Yellow - LAB Copy Pink - File

ANANIA GEOLOGIC ENGINEERING

AGE NO

PROJECT NO. 004-88-059 | LAB REPORT NO.

P.O. NO. | SAMPLERS: (signature) Karl J Anania

LAB LOG NO.	DATE	TIME	SAMPLE I.D.	NO. OF CONTAINERS	SAMPLE TYPE: SOIL COMP	SOIL GRAB	WATER	Total Pb	GC/FID TPH 8015 Mod.	BTEX	EPA 418.1 Grease				REMARKS
	3-21-89	820	MW-5 @ 6' 3965	1		X		X	X	X	X				
	3-21	0905	MW-5@10' 3966	1		X		X	X	X	X				
	3-21	1330	MW-13@6' 3969	1		X		X	X	X	X				
	3-21	1350	MW-13@9 3970	1		X		X	X	X	X				
	3-22	1430	MW-16@6 3972	1		X		X	X	X	X				
	3-22	1520	MW-16@11 3974	1		X		X	X	X	X				
	3-22	1600	Comp. MW-7, NW-8, & PR-30, #3175	1			EAS	X							Gasoline Sample

RELINQUISHED BY: (signature) Karl J Anania — DATE/TIME 3/23 12:00 — RECEIVED BY: (signature)

RELINQUISHED BY: (signature) — DATE/TIME — RECEIVED BY: (signature)

RELINQUISHED BY: (signature) — DATE/TIME — RECEIVED BY: (signature)

REMARKS: 24 hour Rush

SEND RESULTS TO: AGE Mary Scruggs

ATTN: [redacted] Eric Hukari Suite C

11330 Sunrise Park Dr.

Rancho Cordova, CA 95742

PHONE NO. (916) 451-0921

CHAIN OF CUSTODY

CLARIFIER SYSTEM

AGE
11330 SUNRISE PARK DR., SUITE C • RANCHO CORDOVA, CA 95742
P.O. BOX 161148 • SACRAMENTO, CA 95816 • PHONE (916) 631-0154 FAX (916) 631-0528

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 03/09/89
Reported: 03/16/89
Job No. #: 70724

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Total Petroleum Hydrocarbon Analysis
EPA Method 5030
ug/l

Lab ID	Client ID	Concentration	Hydrocarbon	MDL
70724-1	3987	19.8	Gasoline	0.5
70724-2	3992	1.1	Gasoline	0.5

QA/QC: Spike Recovery for Gasoline: 120%

MDL: Method detection limit: Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 211

Received: 03/09/89
Reported: 03/16/89
Job No. #: 70724

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Total Petroleum Hydrocarbon Analysis
EPA Method 5030
mg/l

Lab ID	Client ID	Concentration	Hydrocarbon	MDL
70724-1	3987	19.8	Gasoline	0.5
70724-2	3992	1.1	Gasoline	0.5

QA/QC: Spike Recovery for Gasoline: 120%

MDL: Method detection limit: Compound below this level would not be detected.

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

State License No. 211

Received: 03/09/89
Reported: 03/14/89
Job No #: 70724

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C
Rancho Cordova, CA. 95742

Project: #004-88-059

Aromatic Volatile Hydrocarbon Analysis:
EPA Method 8020
ug/l

Lab ID	Client ID	Benzene	Toluene	MDL
70724-1	3988	9,200	8,100	0.03
70724-2	3993	235	195	0.03

Lab ID	Client ID	Ethylbenzene	Xylene	MDL
70724-5	3988	2,900	31,000	0.03
70724-6	3993	130	640	0.03

QA/QC: Spike Recovery for BTX Average: 84%

Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.
4136 LAKESIDE DRIVE, RICHMOND, CA 94806 PHONE (415) 222-3002 FAX (415) 222-1251

CERTIFICATE OF ANALYSIS RECEIVED MAR 3 1 1989

STATE LICENSE NO. 211

Received: 03/09/89
Reported: 03/16/89
Job #: 70724

Attn: Mary Scruggs
Anania Geological Engineering
11330 Sunrise Park Drive, Suite C.
Rancho Cordova, CA. 95742

Project: #004-88-059

Analysis Method EPA 6010
mg/l

Lab ID	Client ID	Total Lead	MDL
70724-1	3991	0.05	0.044
70724-2	3996	<0.044	0.044

QA/QC: Spike Recovery for Lead: 88 %

MDL: Method detection limit; Compound below this level would not be detected.

Jaime Chow
Laboratory Director

ANANIA GEOLOGIC ENGINEERING

AGE № 10

PROJECT NO.	LAB REPORT NO.
CC4RE.059	
P.O. NO.	SAMPLERS: (signature)
	MLS / ~~Chris Conyard~~

LAB LOG NO.	DATE	TIME	SAMPLE I.D.	NO. OF CONTAINERS	SAMPLE TYPE: SOIL COMP	SOIL GRAB	WATER	ANALYSES: Modified 8020 +TAH (gas & diesel)	8015 BTEX	Total Lead TPC					REMARKS
	3/9/89	1248	3987	1 Amber			X	X							Sampled from clarifier discharge
	3/9/89	1253	3988	1 VOA			X		X						Sampled from clarifier discharge
	3/9/89	1254	3989 Dupl.	40ml VOA			X		X	1					Sampled from clarifier discharge
	3/9/89	1256	3990 Dupl.	1-VOA			X		X						Sampled from clarifier discharge
	3/9/89	1258	3991	1 Amber w/HNO3			X			X					Sampled from clarifier discharge
	3/9/89	1304	3992	1L Amber			X	X							Sampled from carbon filter discharge
	3/9/89	1307	3993	1 40ml VOA			X		X						Sampled from carbon filter discharge
	3/9/89	1308	3994 Dupl.	40ml VOA			X		X	1					Sampled from carbon filter discharge
	3/9/89	1309	3995 Dupl.	40ml VOA			X		X						Sampled from carbon filter discharge
	3/9/89	1310	3996	1L Amber			X			X					Sampled from carbon filter discharge
				1L Amber w/HNO3											

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
~~Christopher Conyard~~	~~3/9/0915~~	
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
Mary X Scruggs	3/9/89 ~~10~~ 1550	
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)

REMARKS:
All water from RW-1 & RW-2 Sampled under COC #1010

SEND RESULTS TO: MARY SCRUGGS
ATTN: AGE
11330 Sunrise Park Dr. Suite C
Rancho Cordova, CA 95742
PHONE NO. (916) 451-0921

CHAIN OF CUSTODY

White- AGE Yellow – LAB Copy Pink- File

ANANIA GEOLOGIC ENGINEERING

AGE Nº 101

PROJECT NO.	LAB REPORT NO.	NO. OF CONTAINERS	SAMPLE TYPE			ANALYSES							
004-GS 059			SOIL		WATER	Run thru clarifier	& 1 carbon filter						
P.O. NO.	SAMPLERS: (signature) Chris Cerqueira		COMP	GRAB									
LAB LOG NO.	DATE	TIME	SAMPLE I.D.										REMARKS
	3/9/89	8:15	3985	1.5gal bucket			X	did not use					5gal bucket for clarifier
	3/9/89	8:45	3986	1.5gal bucket			X						5gal bucket for clarifier

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	REMARKS:	SEND RESULTS TO:
Christopher Cerqueira	3-9-0915		Samples taken from clarifier & 8 carbon filter were sampled & recorded on C.O.C #1011	ATTN:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)		
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)		PHONE NO. (916) 451-0921

CHAIN OF CUSTODY

White- AGE Yellow- LAB Copy Pink- File

MATERIAL SAFETY DATA SHEETS

AGE
11330 SUNRISE PARK DR., SUITE C • RANCHO CORDOVA, CA 95742
P.O. BOX 161148 • SACRAMENTO, CA 95816 • PHONE (916) 631-0154 FAX (916) 631-0528

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*
Advanced Bio Cultures Formulation L-104

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name
Solmar Corp.

Address *(Number, Street, City, State, and ZIP Code)*
625 West Katella Avenue, Suite 5
Orange, California 92667

Emergency Telephone Number
(714) 538-0881

Telephone Number for Information
(714) 538-0881

Date Prepared
January 4, 1988

Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Enzymes related to harmless saprophytes				

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	0.7
Vapor Pressure (mm Hg.)	N/A	Melting Point	0
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water
Appreciable

Appearance and Odor
Free flowing powder and granules; particles vary from white to tan

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used) N/A	Flammable Limits N/A	LEL N/A	UEL N/A

Extinguishing Media
N/A

Special Fire Fighting Procedures
None

Unusual Fire and Explosion Hazards
None

(Reproduce locally)

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*
Advanced Bio Cultures Formulation L-104

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name
Solmar Corp.

Address *(Number, Street, City, State, and ZIP Code)*
625 West Katella Avenue, Suite 5
Orange, California 92667

Emergency Telephone Number
(714) 538-0881

Telephone Number for Information
(714) 538-0881

Date Prepared
January 4, 1988

Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Enzymes related to harmless saprophytes				

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	0.7
Vapor Pressure (mm Hg.)	N/A	Melting Point	0
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water
Appreciable

Appearance and Odor
Free flowing powder and granules; particles vary from white to tan

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A	N/A	N/A	N/A

Extinguishing Media
N/A

Special Fire Fighting Procedures
None

Unusual Fire and Explosion Hazards
None

(Reproduce locally)

Section V — Reactivity Data

Stability			
	Unstable	X	Conditions to Avoid: Temperatures above 120°F; high humidity
	Stable		

Incompatibility (*Materials to Avoid*): Germacides/strong acids/strong alkalies (to maintain efficiency)

Hazardous Decomposition or Byproducts: None

Hazardous Polymerization			
	May Occur		Conditions to Avoid
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Yes | Skin? Yes | Ingestion? Yes

Health Hazards (*Acute and Chronic*)

May cause allergic skin or respiratory reaction

Carcinogenicity: NTP? No | IARC Monographs? No | OSHA Regulated? No

Signs and Symptoms of Exposure: skin rash possible

Medical Conditions Generally Aggravated by Exposure: unknown

Emergency and First Aid Procedures: Wash thoroughly after handling. Wash clothing before reuse. In case of eye contact flush eyes for at least 15 minutes. Call a physician.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled: Sweep up dry spills and dispose of in accordance with appropriate regulations.

Waste Disposal Method: Can be disposed of as any solid non-hazardous waste. Small quantities can be disposed of through the commode.

Precautions to Be Taken in Handling and Storing: Avoid direct contact with skin, eyes, and clothing. Avoid breathing dust. Store in a cool, dry place.

Other Precautions: None

Section VIII — Control Measures

Respiratory Protection (*Specify Type*): Avoid breathing dust. respirator may be preferred.

Ventilation		
	Local Exhaust: N/A	Special: N/A
	Mechanical (General): N/A	Other: N/A

Protective Gloves: recommended | Eye Protection: recommended

Other Protective Clothing or Equipment: N/A

Work/Hygienic Practices: Wash thoroughly after use of product.

* USGPO: 1988-491-529/45775

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*
Advanced Bio Cultures Formulation I-107

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name SOLMAR CORP.	Emergency Telephone Number (714) 538-0881
Address *(Number, Street, City, State, and ZIP Code)* 625 West Katella Avenue, Suite #5 Orange, California 92667	Telephone Number for Information (714) 538-0881
	Date Prepared January 4, 1988
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Enzymes related to harmless saprophytes				

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	0.7
Vapor Pressure (mm Hg.)	N/A	Melting Point	0
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water
Appreciable

Appearance and Odor
Free flowing powder and granules; particles vary from white to tan

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A	N/A	N/A	N/A

Extinguishing Media
N/A

Special Fire Fighting Procedures
None

Unusual Fire and Explosion Hazards
None

Section V — Reactivity Data

Stability	Unstable	X	Conditions to Avoid: Temperatures above 120°F: high humidity
	Stable		

Incompatibility (*Materials to Avoid*)
Germacides/strong acids/strong alkalies (to maintain efficiency)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Yes | Skin? Yes | Ingestion? Yes

Health Hazards (*Acute and Chronic*)

May cause allergic skin or respiratory reaction

Carcinogenicity: NTP? No | IARC Monographs? No | OSHA Regulated? No

Signs and Symptoms of Exposure
skin rash possible

Medical Conditions
Generally Aggravated by Exposure

unknown

Emergency and First Aid Procedures
Wash thoroughly after handling. Wash clothing before reuse. In case of eye contact flush eyes for at least 15 minutes. Call a physician.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled
Sweep up dry spills and dispose of in accordance with appropriate regulations.

Waste Disposal Method
Can be disposed of as any solid non-hazardous waste. Small quantities can be disposed of through the commode.

Precautions to Be Taken in Handling and Storing
Avoid direct contact with skin, eyes, and clothing. Avoid breathing dust. Store in a cool, dry place.

Other Precautions
None

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
Avoid breathing dust. Respirator may be preferred.

Ventilation	Local Exhaust: N/A	Special: N/A
	Mechanical (*General*): N/A	Other: N/A

Protective Gloves: Recommended | Eye Protection:

Other Protective Clothing or Equipment
N/A

Work/Hygienic Practices
Wash thoroughly after use of product.

★ U.S.G.P.O.: 1988-491-529/45775

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*
Advanced Bio Cultures Formulation L-103

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name Solmar Corp.	Emergency Telephone Number (714) 538-0881
Address *(Number, Street, City, State, and ZIP Code)* 625 West Katella Avenue, Suite 5 Orange, California 92667	Telephone Number for Information (714) 538-0881
	Date Prepared January 4, 1988
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Enzymes related to harmless saprophytes				

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	0.7
Vapor Pressure (mm Hg.)	N/A	Melting Point	0
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water
Appreciable

Appearance and Odor
Free flowing powder and granules; particles vary from white to tan

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A	N/A	N/A	N/A

Extinguishing Media
N/A

Special Fire Fighting Procedures
None

Unusual Fire and Explosion Hazards
NOne

(Reproduce locally)

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable	X	Temperatures above 120°; high humidity
	Stable		

Incompatibility (*Materials to Avoid*)
Germacides/strong acids/strong alkalies (to maintain efficiency)

Hazardous Decomposition or Byproducts
None

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Yes Skin? Yes Ingestion? Yes

Health Hazards (*Acute and Chronic*)

May cause allergic akin or respiratory reaction

Carcinogenicity: NTP? No IARC Monographs? NO OSHA Regulated? No

Signs and Symptoms of Exposure

Skin rash possible

Medical Conditions
Generally Aggravated by Exposure

Unknown

Emergency and First Aid Procedures
Wash thoroughly after handling. Wash clothing before reuse. In case of eye contact, flush eyes for at least 15 minutes. Cal a physician

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Sweep up dry spills and dispose of in accordance with appropriate regulations.

Waste Disposal Method
Can be disposed of as any solid non-hazardous waste. Small quantities can be disposed of through the commode.

Precautions to Be Taken in Handling and Storing
Avoid direct contact with skin, eyes, and clothing. Avoid breathing dust. Store in a cool, dry place.

Other Precautions
None

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
Avoid breathing dust. Respirator may be preferred.

Ventilation		
	Local Exhaust: N/A	Special: N/A
	Mechanical (*General*): N/A	Other: N/A

Protective Gloves	Eye Protection
recommended	recommended

Other Protective Clothing or Equipment
N/A

Work/Hygienic Practices
Wash thoroughly after use of product.

• USGPO: 1986-491-239/45775

APPENDIX D

Preliminary Site Characterization Report
(Bound Separately)