B
BONKOWSKI & ASSOCIATES, INC.

3650 Mount Diablo Blvd.
Suite 200
Lafayette, California 94549

(510) 284-3552- FAX
(510) 283-9042

August 18, 1998
L98174

Mr. Barney Chan
Alameda County Health Agency
Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502

RE: Supplemental IRM Workplan
Oakland Cardlock
421 23rd Avenue
Oakland, California

Dear Mr. Chan:

This Supplemental IRM Workplan is written on behalf of Golden Gate Petroleum by Bonkowski & Associates, Inc. for the Oakland Cardlock facility located at 421 23rd Avenue, in Oakland, California (Figure 1). This workplan is submitted to the Alameda County Health Agency in response to your request of August 17, 1998. This Supplemental IRM Workplan builds upon the directives prescribed by the original Workplan approved by the City of Oakland Fire Inspector on August 14, 1998. A copy of the original Workplan is attached.

The Golden Gate Petroleum Oakland Cardlock site has been used for the retail sale of gasoline and petroleum fuel products since 1976. The Cardlock dispenses unleaded regular, plus unleaded and premium unleaded gasoline, and diesel fuel from one 8,000 gallon and four 12,000 gallon underground storage tanks. On August 11, 1998 Golden Gate Petroleum initiated work to remove the underground storage tanks, product lines and dispenser islands to comply with 40 CFR Code of Federal Regulations, Part 280. The underground storage tanks, product lines and dispenser islands were removed from the site on August 13, 1998.

Groundwater was encountered at a depth of approximately 11 feet below surface grade in the tank cavity. Soil and groundwater samples were collected from beneath the underground storage tanks, product lines and dispenser islands during the removal action and tested by

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Kiff Analytical in Davis, California. The chemical test results are summarized in Table 1 (attached). As shown, high concentrations of petroleum fuel hydrocarbons as gasoline, diesel fuel, BTEX and MTBE were reported in the soil and groundwater samples collected from the site. Soil samples collected from beneath the tanks, product lines, and/or dispenser islands contained up to 18,000 mg/kg TPHG, 22,000 mg/kg TPHD, 60,000 µg/kg benzene, 1,800,000 µg/kg toluene, 370,000 µg/kg ethylbenzene, 2,200,000 µg/kg total xylenes and 880,000 µg/kg MTBE. A substantial volume of separate phase hydrocarbons were observed on the groundwater surface, which was encountered in the tank cavity at a depth of about 11 feet below surface grade.

Consistent with Section 2722(b) of Title 23 Division 3 Chapter 16 California Code of Regulations, and to take advantage of the exposure to contaminated soils that the tank replacement work provided, the City of Oakland Fire Marshall required the removal of all contaminated soil beneath the tanks, product lines and dispenser islands to a threshold of 100 ppm. To comply with this directive, additional soil was excavated from the tank cavity on August 15, 1998. The excavation locations included the west ends of Tanks 1 and 2 and beneath the dispenser islands and product lines. These areas contained the highest concentration of petroleum fuel hydrocarbons encountered on the site to date.

The Fire Inspector, Mr. LeRoy Griffin, relinquished the oversight of this underground storage tank case to the Alameda County Health Department on August 17, 1998. On this same day you visited the site, and had a telephone and/or field conversation with both Ms. Cynthia A. Dittmar and Mr. Michael S. Bonkowski. We understand that based upon the results of your site visit on this day, and based upon our recommendations at that time, we agreed to perform the following Supplemental IRM Corrective Actions:

1. A Baker Tank was brought to the site to be used to contain groundwater containing separate phase hydrocarbons and high concentrations of aromatic hydrocarbons or MTBE. Approximately 20,000 gallons of groundwater was pumped into the Baker Tank on August 17, 1998.

2. We are currently in the process of obtaining a permit to discharge treated groundwater to the East Bay MUD Treatment Works. If a permit is obtained, groundwater may require treatment using a combination of carbon absorption units and spray aeration, to remove both aromatic hydrocarbons and MTBE before discharge. Modular treatment units will be brought to the site for this purpose, and placed in the effluent stream to treat groundwater prior to its discharge to the POTW.

3. If a permit cannot be obtained, the contaminated groundwater will be offhauled to an appropriate disposal facility, after three bids have been obtained to identify the most cost effective disposal method.

4. Soil samples were collected from potholes dug under the centers of the dispenser islands with the highest concentrations of petroleum fuel hydrocarbons. Chemical analysis show that additional soil will need to be excavated to under three of the dispenser islands.

5. A collector trench will be placed along the south and west sides of the tank cavity to hydraulically control petroleum fuel hydrocarbons left, or that may discharge into the groundwater resulting from soil leachate. The collector trench will be constructed of 4-inch PVC pipe wrapped in filter fabric and lain horizontally on the base of the tank cavity, approximately 4 feet below the top of the groundwater surface. Vertical risers will be placed at the ends of the horizontal piping, which will be used to access the trench pipe and can be used to place pumps for the extraction of contaminated groundwater.

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In order to comply with the directive from the City of Oakland Fire Services Agency, a Preliminary Site Assessment Report will be submitted within 30 days of completion of work at the site. This report will summarize the work done at the site to date.

I believe that this summarizes the results of your field directive issued on August 17, 1998. The tasks described herein will be implemented beginning on August 18, 1998. We request your concurrence with our summation of the aforementioned tasks by your signature below. Please feel free to contact either Ms. Cynthia Dittmar or Michael S. Bonkowski at (925) 283-9042 if you have any questions or need any additional information.

Sincerely,

Michael S. Bonkowski CEG 1329
Senior Managing Principal
Environmental and Engineering Services

Mr. Barney Chan
Alameda County Health Department

MB/km
Table
Figures
Attachment

cc: Mr. Terry Pinney, Golden Gate Petroleum
Mr. William Martin, Golden Gate Petroleum
Mr. LeRoy Griffin, Fire Inspector, City of Oakland

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

Well No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
Tank 1	East end	11	3,100	4,400	5,400	3,000	30,000	45,000	2,700	8/13/98
	West end	11	2,000	2,300	15,000	120,000	45,000	240,000	56,000	8/13/98
Tank 2	East end	11	ND	15	ND	ND	ND	ND	850	8/13/98
	West end	11	12,000	9,400	15,000	120,000	45,000	240,000	56,000	8/13/98
Tank 3	East end	11	1.4	1.7	ND	ND	ND	ND	1,800	8/13/98
	West end	11	2.6	8.8	34	5.4	36	200	270	8/13/98
Tank 4	East end	11	2.0	2.7	6.1	ND	ND	ND	2,800	8/13/98
	West end	11	1.8	150	ND	ND	8.1	12	7.1	8/13/98
Tank 5	East end	11	ND	ND	ND	ND	ND	ND	20	8/13/98
	West end	11	ND	1.8	ND	ND	ND	ND	ND	8/13/98
SP-N,S,E,W	Soil Pile		70	760	54	74	49	1.8	66	8/13/98
PL-1	Product line	2.5	<1.0	33	ND	ND	ND	ND	ND	8/14/98
PL-2	Product line	2.5	1,400	20,000	<500	10,000	1,200	5,000	1,200	8/14/98
PL-2A	Product line	2.5	60	670	42	160	<20	360	300	8/14/98
PL-3	Product line	2.5	<1.0	32	ND	ND	ND	ND	ND	8/14/98
PL-4A	Product line	2.5	ND	ND	ND	ND	ND	ND	ND	8/14/98
PL-4B	Product line	2.5	18,000	<50	60,000	1,800,000	370,000	2,200,000	880,000	8/14/98

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

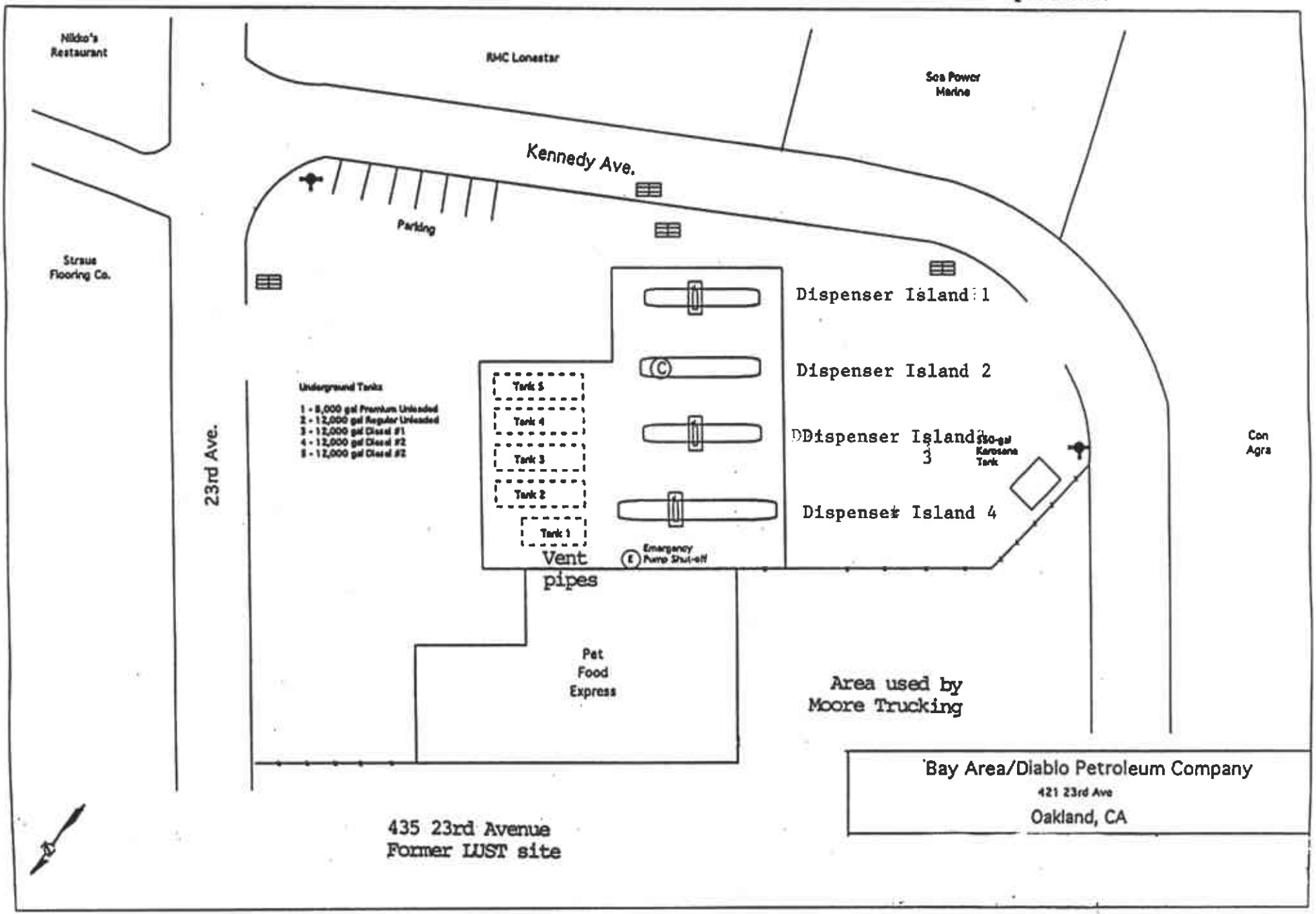
Well No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
PL-5	Product line	2.5	<1.0	540	ND	ND	ND	ND	8.4	8/14/98
DI-1E	Dispenser Island 1 East end	4	510	8,000	<200	390	<200	2,200	<200	8/14/98
DI-1W	Dispenser Island 1 West end	4	870	22,000	<200	1,400	350	7,600	<200	8/14/98
DI-2E	Dispenser Island 1 East end	4	290	1,900	<50	130	<50	<50	<50	8/14/98
DI-2W	Dispenser Island 1 West end	4	580	9,300	<200	310	<200	<200	<200	8/14/98
DI-3E	Dispenser Island 1 East end	4	680	4,600	<200	430	<200	900	<200	8/14/98
DI-3W	Dispenser Island 1 West end	4	21	31	230	2,000	350	3,400	240	8/14/98
DI-4E	Dispenser Island 1 East end	4	<1.0	<1.0	6.4	ND	ND	ND	7.0	8/14/98
DI-4W	Dispenser Island 1 West end	4	<1.0	<1.0	ND	ND	ND	ND	ND	8/14/98

Table 1. Soil Sample Chemical Analyses Results, Golden Gate Petroleum Oakland Cardlock, Oakland California

Well No.	Sample Location	Sample Depth (feet)	TPHG (mg/kg)	TPHD (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Date Sampled
T1-Eox	Tank 1 East end over- excavation	11	<1.0	<1.0	ND	ND	ND	ND	150	8/15/98
T1-Wox	Tank 1 West end over- excavation	11	<1.0	<1.0	ND	ND	ND	ND	68	8/15/98
T2-Wox	Tank 2 East end over- excavation	11	8.2	<1.0	10	8.2	ND	6.8	7,300	8/15/98
DI-1c	Dispenser Island 1 Center	7	240	1,400	350	900	1,400	2,800	1,700	8/15/98
DI-2c	Dispenser Island 1 Center	8	<1.0	<1.0	ND	ND	ND	ND	120	8/15/98
DI-3c	Dispenser Island 1 Center	7	87	86	30	120	440	380	130	8/15/98

Project No. L98174	Golden Gate Petroleum	SITE LOCATION MAP, 421 23 RD AVENUE, OAKLAND, CALIFORNIA	Figure 1
Bonkowski & Associates, Inc.			

Figure 2 - Subject Property Plan - Taken from HMMP Plan on File with the Oakland Fire Department.



KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Tim Tatum
Bonkowski and Associates
3650 Mount Diablo Blvd., Suite 200
Lafayette, CA 94549

RECEIVED
AUG 18 1998

Subject : 11 Soil Samples and 1 Water Sample
Project Name : L98174
Project Number : L98174

Dear Mr. Tatum,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Richard Brenzi for

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Subject : 11 Soil Samples and 1 Water Sample
Project Name : L98174
Project Number : L98174

Case Narrative

The measured value for TPH as Gasoline for sample W-L98174-Pit represents the MTBE in the sample. No other typical gasoline compounds were detected.

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 916-297-4800

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **W-L98174-Pit** Matrix : Water
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 25	25	ug/L	EPA 8020	08/14/98
Toluene	< 25	25	ug/L	EPA 8020	08/14/98
Ethylbenzene	< 25	25	ug/L	EPA 8020	08/14/98
Total Xylenes	< 25	25	ug/L	EPA 8020	08/14/98
Methyl-t-butyl ether	49000	250	ug/L	EPA 8020	08/14/98
TPH as Gasoline	43000	2500	ug/L	M EPA 8015	08/14/98
TPH as Diesel	12000	50	ug/L	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	86.7		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-Tank 1 E End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	5.4	1.0	mg/Kg	EPA 8020	08/14/98
Toluene	3.0	1.0	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	30	1.0	mg/Kg	EPA 8020	08/14/98
Total Xylenes	45	1.0	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	2.7	1.0	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	3100	200	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	4400	100	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	104		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-Tank 2 E End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.85**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**15**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	100		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	96.9		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-Tank 3 E End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**1.8**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**1.4**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**1.7**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	99.6		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-Tank 4 E End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.0061**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**2.8**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**2.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**2.7**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	99.1		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-Tank 5 E End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.020**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	98.7		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	99.5		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-Tank 1 W End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**15**	0.20	mg/Kg	EPA 8020	08/14/98
Toluene	**120**	0.20	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**45**	0.20	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**240**	0.20	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**56**	0.20	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**2000**	20	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**2300**	100	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	91.5		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	172		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-Tank 2 W End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**67**	5.0	mg/Kg	EPA 8020	08/14/98
Toluene	**650**	5.0	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**240**	5.0	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**1400**	5.0	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**100**	5.0	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**12000**	500	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**9400**	100	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	103		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	100		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-Tank 3 W End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.034**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**0.0054**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**0.036**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**0.20**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.27**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**2.6**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**8.8**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	110		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-Tank 4 W End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**0.0081**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**0.012**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.0071**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**1.8**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**150**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	100		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	100		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12089
Date : 08/17/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-Tank 5 W End** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**1.8**	1.0	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	99.3		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	96.7		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-SP-N,E,S,W** Matrix : Soil
Sample Date :08/13/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.054**	0.020	mg/Kg	EPA 8020	08/14/98
Toluene	**0.074**	0.020	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**0.049**	0.020	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**1.8**	0.020	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.066**	0.020	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**70**	5.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**760**	50	mg/Kg	M EPA 8015	08/14/98
aaa-Trifluorotoluene (8020 Surrogate)	100		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	101		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Analysis Report: Lead, EPA Method 6010

Client: Joel Kiff
720 Olive Drive,
Suite D
Davis, CA 95616

Project:

Date Sampled: 08/14/98
Date Received: 08/14/98
Date Extracted: 08/14/98
Date Analyzed: 08/14/98
Date Reported: 08/14/98

Project No.:
Contact: JOEL KIFF
Phone: (530)297-4800

Lab Contact: George Hampton
Lab ID No.: P6181
Job No.: 816181
COC Log No.: NO #
Batch No.: M980814A
Instrument ID: IP004
Analyst ID: PONGC
Matrix: SOIL

ANALYTICAL RESULTS

Lab / Client ID Analyte	CAS No.	Results (mg/kg)	Rep. Limit (mg/kg)	Dilution (factor)
1A / SP-N,E,S,W Pb (Lead)	7439-92-1	20	10	1.0

ND = Not detected at or above indicated Reporting Limit

CA DOHS ELAP Accreditation/Registration Number 1233

KIFF ANALYTICAL LLC

720 Olive Drive, Suite D
Davis, CA 95616

Lab: 916.297.4800
Fax: 916.297.4808

12089

Chain-of-Custody Record and Analysis Request

Project Manager: Tim Tatum	Phone No.: (925) 283-9042
Company/Address: Bonkowski & Assoc. Inc	FAX No.: (925) 284-3552
Project Number: L98174 / P.O. No.: —	Project Name: L98174
Project Location: Oakland	Sampler Signature:

Sample Designation	Sampling Date	Sampling Time	Container (Type/Amount) VOA	SLEEVE	1L GLASS	500 ml	Method Preserved HCl	HNO_3	ICE	NONE	Matrix WATER/SOIL	BTEX (8020)	BTEX/TPH Gas/MTBE (8020/M8015)	TPH as Diesel (M8015)	TPH as Motor Oil (M8015)	EPA8010	EPA 8080 - Pesticides	EPA 8080 - PCBs	EPA 8240	EPA 8270	CAM - 17 Metals	Lead (7421/239.2)	Cd, Cr, Pb, Zn, Ni	W.E.T. (X) / TOTAL (X)	TAT 12 hr / 24 hr / 48 hr / 72 hr / 1 wk / 2 wk	For Lab Use Only
W-L98174-Pit	9/13/98	12:30	/		/				X	~~X~~	S		/	/											24	-01
L98174-Tank 1 E end	11	1:00									S		/	/												-02
-Tank 2 E end											S		/	/												-03
-Tank 3 E end											S		/	/												-04
-Tank 4 E end											S		/	/												-05
-Tank 5 E end											S		/	/												-06
-Tank 1 W end											S		/	/												-07
-Tank 2 W end											S		/	/												-08
-Tank 3 W end											S		/	/												-09
-Tank 4 W end											S		/	/												-10

Relinquished by:	Date	Time	Received by:	Remarks:
Relinquished by:	Date	Time	Received by:	Email address: ☐ .doc ☐ .xls ☐ .txt ☐ other
Relinquished by:	Date 9/13/98	Time 1603	Received by Laboratory: Justin Reusch/Kiff	Bill to:

Distribution: White - Lab, Yellow - File, Pink - Originator

COC.fh5

KIFF ANALYTICAL LLC

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Lab: 916.297.4800
Fax: 916.297.4808

12089

Chain-of-Custody Record and Analysis Request

Project Manager: Tim Tatum	Phone No.: (925) 283-9042
Company/Address: Burlowski & Assoc., Inc.	FAX No.: (925) 284-3572
Project Number: L98174 / P.O. No.:	Project Name:
Project Location: Oakland	Sampler Signature:

Sample Designation	Sampling Date	Sampling Time	Container (Type/Amount) VOA	SLEEVE	1L GLASS	500 ml	Method Preserved HCl	HNO_3	ICE	NONE	Matrix WATER/SOIL	BTEX (8020)	BTEX/TPH Gas/MTBE (8020/M8015)	TPH as Diesel (M8015)	TPH as Motor Oil (M8015)	EPA8010	EPA 8080 - Pesticides	EPA 8080 - PCBs	EPA 8240	EPA 8270	W.E.T. (X) CAM - 17 Metals	Lead (7421/239.2)	TOTAL (X) Cd, Cr, Pb, Zn, Ni	TAT 12 hr/24 hr/48 hr/72 hr/1 wk/2 wk	For Lab Use Only
1 L98174-Tank 5 W end	8/13/98	1:00		/					/		S		/	/										24	-11
1 -SP-N (composite)	"	2:30		/					/		"		/	/											-12
1 -SP-E (composite)		"		/					/		"		/	/											-12
1 -SP-S (composite)		"		/					/		"		/	/											-12
1 -SP-W (composite)		"		/					/		"		/	/											-12

	Date	Time		
Relinquished by:			Received by:	Remarks:
Relinquished by:			Received by:	Email address: ☐ .doc ☐ .xls ☐ .txt ☐ other
Relinquished by:	8/13/98	1603	Received by Laboratory: Justin Kench	Bill to:

Distribution: White - Lab, Yellow - File, Pink - Originator

COC.fm5

KIFF ANALYTICAL LLC

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Davis, CA 95616

Lab: 916.297.4800
Fax: 916.297.4808

Page ____ of ____

Chain-of-Custody Record and Analysis Request

Project Manager: Joel Kiff

Phone No.:

Company/Address:

FAX No.:

Project Number:

P.O. No.:

Project Name:

Project Location:

Sampler Signature:

Sample Designation	Sampling Date	Sampling Time	Container (Type/Amount) VOA	SLEEVE	1L GLASS	500 ml	1 Baggie	Method Preserved HCl	HNO_3	ICE	NONE	Matrix WATER/SOIL	BTEX (8020)	BTEX/TPH Gas/MTBE (8020/M8015)	TPH as Diesel (M8015)	TPH as Motor Oil (M8015)	EPA8010	EPA 8080 - Pesticides	EPA 8080 - PCBs	EPA 8240	EPA 8270	CAM - 17 Metals	Lead (7421/239.2)	Cd, Cr, Pb, Zn, Ni	W.E.T. (X)	TOTAL (X)	TAT 12 hr/24 hr/48 hr/72 hr/1 wk/2 wk	For Lab Use Only
SP-N,E,S,W	8/14/98	845					1			X		S											X			X		

Relinquished by: Justin Dosack — Date 8/14/98 — Time 845

Received by: Teresa Cobbs — 8/14/98 08:45

Relinquished by: — Date — Time

Received by:

Relinquished by: — Date — Time

Received by Laboratory:

Remarks: Due 5 p.m. 8-14-98

Email address:

☐ .doc ☐ .xls ☐ .txt ☐ other _____

Bill to:

Distribution: White - Lab, Yellow - File, Pink - Originator

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KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

RECEIVED
AUG 18 1998

Tim Tatum
Bonkowski and Associates
3650 Mount Diablo Blvd., Suite 200
Lafayette, CA 94549

Subject : 15 Soil Samples
Project Name : L98174
Project Number : L98174

Dear Mr. Tatum,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Subject : 15 Soil Samples
Project Name : L98174
Project Number : L98174

Case Narrative

The Method Reporting Limit for TPH as Diesel for sample L98174-PL-4A is increased due to interference from gasoline-range hydrocarbons.

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 916-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-PL-1** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**33**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	94.5		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-PL-2** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	mg/Kg	EPA 8260B	08/14/98
Toluene	**10**	0.50	mg/Kg	EPA 8260B	08/14/98
Ethylbenzene	**1.2**	0.50	mg/Kg	EPA 8260B	08/14/98
Total Xylenes	**5.0**	0.50	mg/Kg	EPA 8260B	08/14/98
Methyl-t-butyl ether	**1.2**	0.50	mg/Kg	EPA 8260B	08/14/98
TPH as Gasoline	**1400**	50	mg/Kg	EPA 8260B	08/14/98
TPH as Diesel	**20000**	100	mg/Kg	M EPA 8015	08/15/98
Toluene - d8 (Surr)	104		% Recovery	EPA 8260B	08/14/98
4-Bromofluorobenzene (Surr)	104		% Recovery	EPA 8260B	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-PL-2A** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.042**	0.020	mg/Kg	EPA 8020	08/15/98
Toluene	**0.16**	0.020	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.020**	0.020	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**0.36**	0.020	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**0.30**	0.020	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**60**	5.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**670**	50	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	100		% Recovery	M EPA 8015	08/15/98

Sample : **L98174-PL-3** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	08/15/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	08/15/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	08/15/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	08/15/98
Methyl-t-butyl ether	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	08/15/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	EPA 8260B	08/15/98
TPH as Diesel	**32**	1.0	mg/Kg	M EPA 8015	08/15/98
Toluene - d8 (Surr)	97.1		% Recovery	EPA 8260B	08/15/98
4-Bromofluorobenzene (Surr)	101		% Recovery	EPA 8260B	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-PL-4A** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	97.0		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-PL-4B** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**60**	5.0	mg/Kg	EPA 8260B	08/15/98
Toluene	**1800**	5.0	mg/Kg	EPA 8260B	08/15/98
Ethylbenzene	**370**	5.0	mg/Kg	EPA 8260B	08/15/98
Total Xylenes	**2200**	5.0	mg/Kg	EPA 8260B	08/15/98
Methyl-t-butyl ether	**880**	5.0	mg/Kg	EPA 8260B	08/15/98
TPH as Gasoline	**18000**	500	mg/Kg	EPA 8260B	08/15/98
TPH as Diesel	**< 50**	50	mg/Kg	M EPA 8015	08/15/98
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	08/15/98
4-Bromofluorobenzene (Surr)	102		% Recovery	EPA 8260B	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-PL-5** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.0084**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**540**	100	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	99.7		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-DI-1E** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Toluene	**0.39**	0.20	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**2.2**	0.20	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**510**	20	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**8000**	100	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	98.4		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	99.0		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-DI-2E** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.050**	0.050	mg/Kg	EPA 8020	08/15/98
Toluene	**0.13**	0.050	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.050**	0.050	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**< 0.050**	0.050	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**< 0.050**	0.050	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**290**	10	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**1900**	50	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	97.9		% Recovery	M EPA 8015	08/15/98

Sample : **L98174-DI-3E** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Toluene	**0.43**	0.20	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**0.90**	0.20	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**680**	20	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**4600**	50	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	97.0		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-DI-4E** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.0064**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**0.0079**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	103		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	112		% Recovery	M EPA 8015	08/14/98

Sample : **L98174-DI-1W** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Toluene	**1.4**	0.20	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**0.35**	0.20	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**7.6**	0.20	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**870**	20	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**22000**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	96.8		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-DI-2W** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Toluene	**0.31**	0.20	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**< 0.20**	0.20	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**580**	20	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**9300**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	98.1		% Recovery	M EPA 8015	08/15/98

Sample : **L98174-DI-3W** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.23**	0.020	mg/Kg	EPA 8020	08/15/98
Toluene	**2.0**	0.020	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**0.35**	0.020	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**3.4**	0.020	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**0.24**	0.020	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**21**	5.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**31**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	103		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	97.0		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12100
Date : 08/15/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-DI-4W** Matrix : Soil
Sample Date :08/14/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
Methyl-t-butyl ether	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/14/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/14/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	102		% Recovery	EPA 8020	08/14/98
aaa-Trifluorotoluene (Gasoline Surrogate)	97.8		% Recovery	M EPA 8015	08/14/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

720 Olive Drive, Suite D
Davis, CA 95616

Lab: 916.297.4800
Fax: 916.297.4808

12100

Page 1 of 2

Chain-of-Custody Record and Analysis Request

Project Manager: Tim Tatum	Phone No.: (925) 283-9042
Company/Address: Bonkowski	FAX No.: (925) 284-3572
Project Number: L98174 / P.O. No.:	Project Name:
Project Location: Oakland	Sampler Signature:

	Sampling		Container (Type/Amount)					Method Preserved					Matrix	Analysis Request																	TAT	For Lab Use Only
Sample Designation	Date	Time	VOA	SLEEVE	1L GLASS	500 ml		HCl	HNO_3	ICE	NONE		WATER/SOIL	BTEX (8020)	BTEX/TPH Gas/MTBE (8020/M8015)	TPH as Diesel (M8015)	TPH as Motor Oil (M8015)	EPA8010	EPA 8080 - Pesticides	EPA 8080 - PCBs	EPA 8240	EPA 8270	CAM - 17 Metals	Lead (7421/239.2)	Cd, Cr, Pb, Zn, Ni						12 hr (24 h) / 48 hr / 72 hr / 1 wk / 2 wk	
																							W.E.T. (X)								
																							TOTAL (X)								
1 L98174-PL-1	8/14/98			/						/			S		/	/														24	-01
1 -PL-2																															-02
1 -PL-2A																															-03
1 -PL-3																															-04
1 -PL-4A																															-05
1 -PL-4B																															-06
1 -PL-5																															-07

	Date	Time		
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Relinquished by:			Received by:	Email address: ☐ .doc ☐ .xls ☐ .txt ☐ other
Relinquished by:	8/14/98	1400	Received by Laboratory: Justin Desch	Bill to:

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KIFF ANALYTICAL LLC

720 Olive Drive, Suite D
Davis, CA 95616

Lab: 916.297.4800
Fax: 916.297.4808

12100

Chain-of-Custody Record and Analysis Request

Project Manager: Jim Tatum	Phone No.: (925) 283-9042
Company/Address: Bonkowski	FAX No.: (925) 284-3552
Project Number: L98174 / P.O. No.:	Project Name:
Project Location: Oakland	Sampler Signature:

Sample Designation	Sampling: Date	Sampling: Time	Container (Type/Amount): VOA	SLEEVE	1L GLASS	500 ml	Method Preserved: HCl	HNO_3	ICE	NONE	Matrix: WATER/SOIL	BTEX (8020)	BTEX/TPH Gas/MTBE (8020/M8015)	TPH as Diesel (M8015)	TPH as Motor Oil (M8015)	EPA8010	EPA 8080 - Pesticides	EPA 8080 - PCBs	EPA 8240	EPA 8270	W.E.T. (X): CAM - 17 Metals	Lead (7421/239.2)	Cd, Cr, Pb, Zn, Ni	TAT: 12 hr/24 hr/48 hr/72 hr/1 wk/2 wk	For Lab Use Only
L98174-DI-1E	8/14/98			/					/		S		/	/										24	-08
-2E				/									/	/											-09
-3E				/									/	/											-10
-4E				/									/	/											-11
-DI-1W				/									/	/											-12
-2W				/									/	/											-13
-3W				/									/	/											-14
-4W				/									/	/											-15

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Relinquished by:	8/14/98	2:00	Received by Laboratory: Justin Leach	Bill to:

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KIFF ANALYTICAL LLC

Report Number : 12101
Date : 08/16/98

Tim Tatum
Bonkowski and Associates
3650 Mount Diablo Blvd., Suite 200
Lafayette, CA 94549

RECEIVED
AUG 18 1998

Subject : 6 Soil Samples
Project Name : L98174
Project Number : L98174

Dear Mr. Tatum,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 12101
Date : 08/16/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-T1 E OX** Matrix : Soil
Sample Date :08/15/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**0.15**	0.0050	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	101		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	101		% Recovery	M EPA 8015	08/15/98
1-Chlorooctadecane (Diesel Surrogate)	106		% Recovery	M EPA 8015	08/15/98

Sample : **L98174-T1 W OX** Matrix : Soil
Sample Date :08/15/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**0.068**	0.0050	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	105		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	105		% Recovery	M EPA 8015	08/15/98
1-Chlorooctadecane (Diesel Surrogate)	108		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12101
Date : 08/16/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-T2 W OX** Matrix : Soil
Sample Date :08/15/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.010**	0.0050	mg/Kg	EPA 8020	08/15/98
Toluene	**0.0082**	0.0050	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**0.0068**	0.0050	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**7.3**	0.020	mg/Kg	EPA 8020	08/16/98
TPH as Gasoline	**8.2**	1.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	106		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	104		% Recovery	M EPA 8015	08/15/98
1-Chlorooctadecane (Diesel Surrogate)	111		% Recovery	M EPA 8015	08/15/98

Sample : **L98174-DI-1C** Matrix : Soil
Sample Date :08/15/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.35**	0.20	mg/Kg	EPA 8020	08/15/98
Toluene	**0.90**	0.20	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**1.4**	0.20	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**2.8**	0.20	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**1.7**	0.20	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**240**	20	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**1400**	20	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	99.2		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	78.6		% Recovery	M EPA 8015	08/15/98
1-Chlorooctadecane (Diesel Surrogate)	Diluted Out		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 12101
Date : 08/16/98

Project Name : **L98174**
Project Number : **L98174**

Sample : **L98174-DI-2C** Matrix : Soil
Sample Date :08/15/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**0.12**	0.0050	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**< 1.0**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	100		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	98.1		% Recovery	M EPA 8015	08/15/98
1-Chlorooctadecane (Diesel Surrogate)	108		% Recovery	M EPA 8015	08/15/98

Sample : **L98174-DI-3C** Matrix : Soil
Sample Date :08/15/98

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**0.030**	0.020	mg/Kg	EPA 8020	08/15/98
Toluene	**0.12**	0.020	mg/Kg	EPA 8020	08/15/98
Ethylbenzene	**0.44**	0.020	mg/Kg	EPA 8020	08/15/98
Total Xylenes	**0.38**	0.020	mg/Kg	EPA 8020	08/15/98
Methyl-t-butyl ether	**0.13**	0.020	mg/Kg	EPA 8020	08/15/98
TPH as Gasoline	**87**	5.0	mg/Kg	M EPA 8015	08/15/98
TPH as Diesel	**86**	1.0	mg/Kg	M EPA 8015	08/15/98
aaa-Trifluorotoluene (8020 Surrogate)	99.2		% Recovery	EPA 8020	08/15/98
aaa-Trifluorotoluene (Gasoline Surrogate)	103		% Recovery	M EPA 8015	08/15/98
1-Chlorooctadecane (Diesel Surrogate)	111		% Recovery	M EPA 8015	08/15/98

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

720 Olive Drive, Suite D
Davis, CA 95616

Lab: 916.297.4800
Fax: 916.297.4808

12101

Page 1 of 1

Chain-of-Custody Record and Analysis Request

Project Manager: Tim Tatum
Bonkowski & Assoc

Phone No.: (925) 283-9042

Company/Address:

FAX No.: (925) 284-3552

Project Number: L98174

P.O. No.:

Project Name:

Project Location: Oakland

Sampler Signature:

Sample Designation	Sampling Date	Sampling Time	Container (Type/Amount) VOA	SLEEVE	1L GLASS	500 ml	Method Preserved HCl	HNO_3	ICE	NONE	Matrix WATER/SOIL	BTEX (8020)	BTEX/TPH Gas/MTBE (8020/M8015)	TPH as Diesel (M8015)	TPH as Motor Oil (M8015)	EPA8010	EPA 8080 - Pesticides	EPA 8080 - PCBs	EPA 8240	EPA 8270	CAM - 17 Metals	Lead (7421/239.2)	Cd, Cr, Pb, Zn, Ni	WET. (X)	TOTAL (X)				TAT 12 hr/24 hr/48 hr/72 hr/1 wk/2 wk	For Lab Use Only
L98174 - T1 Eox	9/15/98			/					/		S		/	/													-01		Monday a.m
- T1 W ox																		✓									-02		
- T2 W ox																											-03		
- DI - 1C																											-04		
- DI - 2C																											-05		
- DI - 3C																											-06		

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Relinquished by:	Date 9/15/98	Time 18:30	Received by Laboratory:	Bill to:

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COC.fm5

August 14, 1998
L98174

Mr. LeRoy Griffin
City of Oakland Fire Services Agency
505 Fourteenth Street, Suite 702
Oakland, CA 94612

RE: Interim Remedial Measures Workplan
Oakland Cardlock
421 23rd Avenue
Oakland, California

BONKOWSKI & ASSOCIATES, INC.

3650 Mount Diablo Blvd.
Suite 200
Lafayette, California 94549

(510) 284-3552- FAX
(510) 283-9042

Dear Mr. Griffin:

This Interim Remedial Measures (IRM) Workplan is submitted by Bonkowski & Associates, Inc. on behalf of Golden Gate Petroleum, for the Oakland Cardlock located at 421 23rd Avenue in Oakland, California (Figure 1). Soil and groundwater samples were collected at the site during the closure of five underground storage tanks. Chemical analysis of the samples confirm the presence of hydrocarbons at the site. We plan to conduct IRM measures concurrently with the removal and upgrade of the underground storage tanks, product lines, and dispenser islands as required under 40 Code of Federal Regulations, Part 280. The tank system upgrade and replacement work is currently being conducted.

To take advantage of the exposure to contaminated soils that the tank replacement work is providing, and consistent with Section 2722(b) of Title 23 Division 3 Chapter 16 California Code of Regulations, hydrocarbon contaminated soil and groundwater will be removed from the tank cavity.

Background

The Oakland Cardlock is located along the southwest side of 23rd Avenue in Oakland, California (Figure 2). The Oakland Cardlock has been used for the retail sale of gasoline and petroleum fuel products since 1976. The station presently dispenses unleaded regular, plus unleaded, and premium unleaded gasolines and diesel fuels.

During tank closure activities on 13 August 1998, Bonkowski & Associates, Inc. collected soil and grab groundwater samples from the tank cavity. Groundwater was encountered a depth of approximately 11 feet. The groundwater sample collected from the tank cavity contained 43 mg/l total

petroleum hydrocarbons as gasoline (TPHG), <25 µg/l benzene, <25 µg/l toluene, <25 µg/l ethylbenzene, <25 µg/l total xylenes, and 49,000 µg/l MTBE. The laboratory analytical results are included at the end of this workplan. The soil samples collected from the tank cavity contained up to 12,000 mg/kg TPHG, 4,400 mg/kg TPHD, 60,000 µg/kg benzene, 650,000 µg/kg toluene, 240,000 µg/kg ethylbenzene, 1,400,000 µg/kg total xylenes, and 100,000 µg/kg MTBE.

B

Remedial Action Goals

The Water Quality Control Plan for the Bay Area Region has designated the beneficial uses of groundwater beneath the site as suitable for municipal and domestic supply, agricultural supply, industrial water supply, and industrial process supply and freshwater replenishment to surface waters. The State and Federal standards applicable to groundwater at the site are based on Maximum Contaminant Levels (MCLs) established for hydrocarbon concentration and odor and taste thresholds. The standards are:

Aromatic Hydrocarbons

Benzene	1.0 µg/l	California Primary MCL[1]
Toluene	42 µg/l	Taste and odor threshold (U.S. EPA)[2]
Ethylbenzene	29 µg/l	Taste and odor threshold (U.S. EPA)[2]
Xylenes	17 µg/l	Taste and odor threshold (U.S. EPA)[2]
MTBE	14 µg/l	Proposed public health goal (OEHHA)[3]

Hydrocarbon Mixtures

Diesel or Kerosene	100 µg/l	Taste and odor threshold (U.S. EPA)[4]
Gasoline	5 µg/l	Taste and odor threshold (SWRCB)[5]

[1] Primary MCLs are based on health effects data, but contain other information relating to technical and economic feasibility of attainment in a water distribution system.

[2] Federal Register, Vol. 54, No. 97, pp. 22138, 22139.

[3] Office of Environmental Health Hazard Assessment

[4] 1980 Health Advisory. Documents states that the 100 µg/l level should be health protective for 10 days of exposure of less. No lifetime exposure advisory has been developed. However, lifetime health advisories are normally at least ten-fold lower than 10-day advisories. Therefore, a level of 10 µg/l would be a reasonable estimate of lifetime health protective level for diesel or kerosene.

[5] McKee & Wolf, *Water Quality Criteria*, 2nd Ed., State Water Resources Control Board (1963, 1978) p. 230.

No explicit remedial action goal for soil and groundwater has been stated by the local implementing agency or California regulations for the site. The State Water Resources Control Board (SWRCB) states the general goal for soil and groundwater remediation in the State's Non-Degradation Policy. State Water Resources Board Resolution No. 68-18 directs that there be no degradation in the quality of water and requires the attainment of "background" water quality levels and the remediation of contaminated soils to prevent further contamination. If background levels cannot be attained, the alternative cleanup levels, less stringent than background, shall:

B

1. Be consistent with maximum benefit to the people of the state.

2. Not unreasonably affect present and anticipated beneficial uses of such water.

3. Not result in water quality less than that prescribed in the Water Quality Control Plans and policies adopted by the State Regional Water Board.

Therefore, the proposed cleanup level is to be consistent with the protection of beneficial uses, the limitations of cleanup techniques, and the achievement of water quality control standards.

Statements of Work

To meet the State's proposed cleanup levels, and to take advantage of the access to contaminated soil and groundwater uncovered during the tank system upgrade activities, Bonkowski and Associates, Inc., plans to excavate and remove hydrocarbon impacted soils around the underground tank cavity, product lines, and dispenser islands as an IRM. The object of the work is the removal of hydrocarbon contaminated source soils around the tanks and the product lines that are, or may be, contributing to groundwater contamination at the site. Hydrocarbon impacted groundwater will be pumped from the excavation cavity during the excavation, and will be either sent to an appropriate disposal facility, or treated using an adequately sized carbon bed, and discharged to the City of Oakland publicly owned treatment works (POTW) or under a Waste Discharge Requirements (WDR) or a National Pollutant Discharge Elimination System (NPDES) permit to the storm sewer system. The work elements required to complete these tasks are summarized and described below.

Task 1. Soil Excavation and Disposal

The underground storage tanks, product lines and dispenser islands will be removed from the site. Groundwater is encountered at a depth of approximately 11 feet. Impacted soils will then be excavated using a track excavator. Overexcavation of the tank cavity will be to a depth of approximately 13 feet below ground surface and will extend outward as directed the by Oakland Fire Department inspector. Soil below the dispenser islands, loading rack and product lines will be sampled under the supervision

of the City of Oakland Fire Department. If the shallow soil has been impacted, it will be removed according to the criteria stated below.

Periodically, a soil sample taken from the bucket of the excavator will be analyzed for hydrocarbon content in the field using an Organic Vapor Meter (OVM). Soils that generate field screening readings of less than 100 parts per million TPH will be left in place. Soils that generate field screening readings of greater than 100 parts per million TPH will be stockpiled on-site and later loaded onto transport trucks and hauled to the nearest and most cost effective disposal facility that is permitted to receive them, such as Forward Landfill in Stockton, California.

B

Task 2. Soil Sampling and Laboratory Analysis

Soil samples will be collected at the soil water interface every 20 lineal feet along the perimeter of the excavation. In addition, a soil sample will be collected from soils that are offhauled to the disposal facility at a ratio of 1 sample per 50 cubic yards of soil. The samples will be placed in brass tubes, sealed at each end with Teflon tape and plastic end caps, placed on ice in a cooler, and transported under chain-of-custody to a State of California Certified Laboratory for chemical testing. The samples will be analyzed for TPHG, TPHD, BTEX, and MTBE using EPA Methods 8015 and 8020 respectively.

Task 3. Groundwater Treatment

As necessary, groundwater will be pumped from the excavation into a tank truck and delivered to an appropriate disposal facility.

Task 4. Excavation Backfilling

The excavation will be backfilled at the completion of the sampling activities. The backfill will consist of 1-1/2 inch crushed rock placed into the excavation to a depth of approximately 1 foot above the existing groundwater surface in the excavation. One layer of geo-textile fabric will be placed on the crushed rock, and clean imported fill material will be placed in two-foot lifts on top of the fabric. The site will be brought to grade with the clean fill material which has been compacted to 95% relative compaction. Asphalt or concrete will then be installed to match finished surfaces at the site.

Reporting

Upon the completion of the excavation and sampling activities and the receipt of the laboratory data from the soil and groundwater sampling, an Interim Remedial Measures Report will be prepared. The report will summarize the activities conducted at the site, present the laboratory data and recommendations for any future activities at the site.

Please contact our project manager Mr. Tim Tatum at (925) 284-0403 or Mr. Michael S. Bonkowski at (925) 283-9042 if you have any questions or need any additional information.

Sincerely,
BONKOWSKI & ASSOCIATES

B

Michael S. Bonkowski, CEG 1329
Senior Managing Principal

MB/cd
Figures

cc: Mr. William Martin, Golden Gate Petroleum