

Mr. Amir Gholami Alameda County Environmental Health Services Environmental Protection Division 1131 Harbor Bay Parkway, Suite 250 Alameda, CA 94502-6577

December 15, 2004

RE: Groundwater Monitoring Report, Fourth Quarter 2004

Eagle Gas Station
4301 San Leandro Street
Oakland, California 94601
LOP StID# 2118
USTCF Claim No. 014551
Clearwater Group Project # ZP046B

Dear Mr. Gholami,

Enclosed please find a copy of the Fourth Quarter 2004 Groundwater Monitoring Report for the above referenced project location. If there are any questions regarding the information as it is presented in the plan, please do not hesitate to contact our office at 510-307-9943 ext 231.

Sincerely,

Clearwater Group

Jim Ho, Ph.D., P.E., CGWP

Principal Engineer

Enclosure



December 15, 2004

Mr. Leroy Griffin, Unit Supervisor Hazardous Materials Unit Oakland Fire Department 1605Martin Ruther King, Jr. Oakland, CA 94612

Re: Groundwater Monitoring Report, Fourth Quarter 2004

Eagle Gas Station 4301 San Leandro Street Oakland, California 94601 LOP Site ID# 2118 USTCF Claim No. 014551 Clearwater Project No. ZP046B

Dear Mr. Griffin:

The Clearwater Group (Clearwater) has prepared the following letter report of the Fourth Quarter 2004 groundwater monitoring at the above referenced site. Groundwater monitoring was requested by the Alameda County Environmental Health Services (ACEHS) in a letter dated October 18, 2001.

### Site Description

The site is located in the southern portion of Oakland, Alameda County, California at the south corner of San Leandro Street and High Street, approximately 1,000 feet east of Interstate Highway 880. The site is bounded by commercial property to the southeast, southwest and northwest and by the Bay Area Rapid Transit (BART) tracks to the northeast (Figure 1.) The site is underlain predominantly by clays with some clayey gravel and clayey sand at depths to approximately 10 feet below ground surface (bgs), and silty sand below 20 feet in some areas.

### Background

On April 21 and 22, 1999, Clearwater, (formerly Artesian Environmental), oversaw the removal from the site of five underground storage tanks (UST) consisting of two 6,000-gallon gasoline USTs, two 4,000-gallon diesel USTs and one 300-gallon used oil UST. Field observations included detection of strong petroleum odors from soils near the former UST locations. A total of five-confirmation soil samples and three groundwater



samples were collected from the UST excavations. Laboratory analysis confirmed an unauthorized release of petroleum had occurred. Former UST excavation area is shown in Figure 2.

In a letter dated May 10, 1999, the ACEHS recommended that soil be remediated by over-excavation and that "as much groundwater as possible" be pumped from the excavation. Approximately 800 tons of petroleum-impacted soil was excavated and disposed of as Class II non-hazardous waste. Approximately 1,000 gallons of petroleum-impacted groundwater was pumped and removed from the excavation. Groundwater did not recharge after the initial pumping. Existing on- and off-site structures limited the amount of soil that could be safely excavated. Soil samples collected from the excavation walls and product piping trenches indicated some residual petroleum and methyl tertiary butyl ether (MTBE) concentrations.

On August 4 and 5, 1999, approximately 100 linear feet of product piping was removed. Vent piping from between the former USTs and the south corner of the on-site building was also removed. All piping was cut up and disposed of as scrap metal. On August 5, 1999, confirmation soil samples were collected along the piping trench. Six samples were collected from approximately three feet bgs. An additional four samples were collected, one for each of the four former fuel dispensers. Laboratory analytical results indicated the presence of hydrocarbon related contamination along the piping trenches.

On September 26, 2000 West Hazmat of Rancho Cordova, California, used a CME 75 drill rig to advance three borings to approximately 25 feet bgs and collect soil samples. Each of the three borings was converted to a groundwater-monitoring well (see Figure 2) using clean, flush-threaded, 2-inch diameter polyvinyl chloride (PVC) well materials. Wee construction data of these wells are presented in Table 1. Soil sample analytical results are listed in Table 2. On October 3 and 10, 2000, Clearwater surveyed the top of the casing elevations for each of the wells relative to an arbitrary datum, and developed the wells for monitoring purpose. Initial groundwater samples collected from these wells contained 83,000 micrograms per liter ( $\mu$ g/L) to 250,000  $\mu$ g/L total petroleum hydrocarbons as gasoline (TPHg) and 33,000  $\mu$ g/L to 400,000  $\mu$ g/L MTBE. The historical groundwater monitoring and sampling results are listed in Table 3.

On August 3, 2001 Clearwater submitted its Groundwater Monitoring Report, Second Quarter 2001, Sensitive Receptor Survey and Workplan for Continuing Investigation. It was determined at that time that there are no major ecological receptors, permanent surface waters or domestic-use wells within a 2,000-foot radius of the site. The proposed scope of the workplan included the installation of eight groundwater-monitoring wells around the site to delineate the water-borne MTBE plume. In response to Clearwater's workplan, the ACEHS, in correspondence dated October 18, 2001, recommended that off-site monitoring wells not be installed for the time being. Instead, the ACEHS requested that further characterization of subsurface soils and groundwater on-site be completed prior to the installation of any off-site wells.



Quarterly monitoring did not occur for a variety of reasons after the third quarter 2001 event. Quarterly monitoring resumed in July 2003 and has taken place every quarter since.

### **Groundwater Monitoring Activities**

### Groundwater Gauging and Sampling

On November 12, 2004 all three wells were monitored. An electronic water level indicator accurate to within ±0.01 feet was used to gauge depth to water. All wells were checked for the presence of Separate Phase Hydrocarbons (SPH) prior to purging. SPH were not found in any well. The wells were purged of groundwater until measurements of temperature, pH and conductivity stabilized, which occurred by approximately three wetted casing volumes. Depth to water and well purging information was recorded on Gauging Data/Purge Calculations and Purging Data sheets (see Attachment 1). All work was performed in accordance with Clearwater's Groundwater Monitoring and Sampling Field Procedures (see Attachment 2).

Purging devices were decontaminated between wells in an Alconox® wash followed by double rinsing in clean tap water to prevent cross-contamination. Purge water and rinseate were contained in labeled 55-gallons drums and removed from the site for future disposal.

Following recovery of water levels to at least 80% of their static levels, groundwater samples were collected from the monitoring wells using disposable polyethylene bailers. Samples were labeled, documented on a chain-of-custody form, and placed on ice in a cooler for transport to the project laboratory.

### Laboratory Analysis

Groundwater samples were analyzed by Kiff Analytical LLC, a California Department of Health Services certified laboratory, located in Davis, California. Analyses were conducted by EPA Method 8260B for TPHg, for benzene, toluene, ethylbenzene, and xylenes (BTEX), and for the oxygenates MTBE, di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), and tertiary butyl alcohol (TBA). Analyses for total petroleum hydrocarbons as diesel (TPHd) were conducted by EPA Method 8015M. Complete laboratory analytical reports including chain-of-custody forms are included in Attachment 3.

### **Groundwater Monitoring Results**

### Groundwater Elevation and Flow

Depths to water ranged from approximately 9.25 feet (MW-1) to 15.49 (MW-2) feet bgs (see Table 3). Depth to water data combined with the surveyed top of casing data were used to generate a groundwater elevation contour map (Figure 3.) During this monitoring

ZP046B QMR 3 December 2004



event, groundwater flow was in a generally southeasterly direction with a gradient of approximately 0.020 ft/ft. Groundwater gradient is generally consistent with observations from the previous groundwater-monitoring event. Groundwater flow for the last monitoring event was in a southerly direction, approximately 45 degrees to the west of this monitoring event's flow direction.

### Groundwater Sample Analytical Results

Diesel-range hydrocarbons were detected in samples collected from all three groundwater-monitoring wells. Concentrations of TPHd ranged from 120 µg/L (MW-3) to 3,500 µg/L (MW-1). MTBE was detected in samples collected from all three monitoring wells in concentrations ranging from 25,000 µg/L (MW-1) to 700,000 µg/L (MW-2). Detections of TAME were reported this quarter in all three wells with concentrations ranging from 150 µg/L (MW-1) to 2,800 µg/L (MW-2). Samples collected from MW-1, MW-2, and MW-3 contained reportable concentrations of TBA at a concentration of 160,000 µg/L, 25,000J µg/L and 6,000 µg/L, respectively. Groundwater sample from MW-3 did not have reportable TBA concentration during the third quarter 2004. TBA concentration from MW-2 may be biased and are flagged with a "J" because a fraction of MTBE (typically less than 1%) converts to TBA during the analysis of water samples. This effect is significant in samples that contain MTBE/TBA in ratios of over 20:1. Laboratory analytical results are listed in Table 3 and also shown on Figure 4.

### **Conclusions and Recommendations**

The results of this groundwater-monitoring event confirm the presence of elevated MTBE concentrations in the groundwater beneath the site. However, they are consistently in a decreasing trend. Concentration of TBA in MW-1 is generally higher than concentrations observed in MW-2 and MW-3. Concentrations of TPHd and TPHg are relatively low and also decreasing in all three wells. BTEX concentrations are lower than reporting limits. Previous investigations have indicated that some contaminated soil may remain underneath existing structures. To date, the extent of the dissolved-phase concentrations remain undefined on site. Clearwater recommends that interim site remediation should be implemented as soon as possible; and further subsurface investigations, both on- and off-site, should be considered in order to delineate the extent of residual MTBE plume. Monitoring of the existing wells should continue.

On January 9, 2004, after completing its review of the Third Quarter 2003 Groundwater Monitoring Report, ACEHS requested a work plan be prepared that addressed additional on-site and off-site subsurface investigations and the extent of groundwater impact on site. Clearwater, then, submitted an Interim Remedial Action Plan (IRAP) on January 14, 2004. Clearwater is still waiting on the review and approval to execute this work plan. Clearwater is aware that not all the vertical and lateral extent of groundwater impact, both on-site and off-site, has been identified. Nonetheless, through discussions between Clearwater and our client, our client wishes that an interim remedial action be conducted



at the site as soon as possible. As such, an interim remedial measure was proposed in the work plan submitted to the ACEHS on January 14, 2004.

### **Figures**

Figure 1: Site Location Map

Figure 2: Site Plan

Figure 3: Groundwater Elevation Map - 11/12/04 Figure 4: Dissolved Hydrocarbon Map - 11/12/04

### **Tables**

Table 1: Well Construction Data

Table 2: Soil Sample Analytical Data

Table 3: Groundwater Elevations and Sample Analytical Results

### **Attachments**

Attachment 1: Well Gauging Data/Purge Calculations, Purging Data
Attachment 2: Groundwater Monitoring and Sampling Field Procedures
Attachment 3: Laboratory Analytical Reports and Chain-of-Custody Form

Cc: Mr. Muhammad Jamil 40092 Davis Street Fremont, CA 94538

> Mr. Amir Gholami Hazardous Materials Specialist Alameda County Environmental Health Services Environmental Protection Division 1131 Harbor Bay Parkway, Suite 250 Alameda, CA 94502-6577

San Francisco Bay Regional Water Quality Control Board 1515 Clay Street, Suite 1400 Oakland, CA 94612



### Certification

This report was prepared under the supervision of a professional Registered Geologist in the State of California. All statements, conclusions and recommendations are based solely upon published results from previous consultants, field observations by Clearwater and laboratory analyses performed by a State of California certified laboratory related to the work performed by Clearwater.

Information and interpretation presented herein are for the sole use of the client and regulating agency. The information and interpretation contained in this document should not be relied upon by a third party.

The service provided by Clearwater has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of this profession currently practicing under similar conditions in the area of the site. No other warranty, expressed or implied, is made.

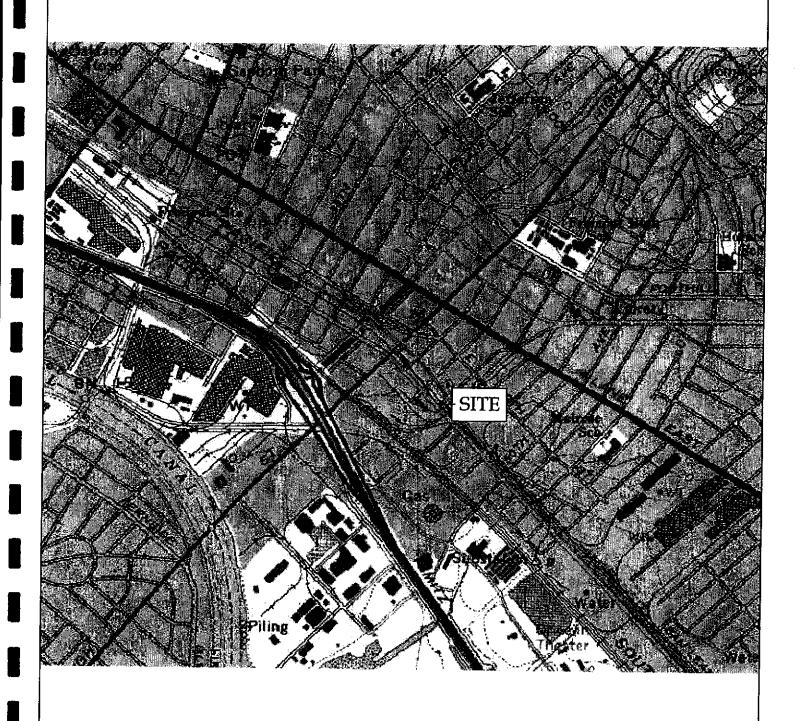
Prepared by:

Jim Ho, Ph.D., CGWP Principal Engineer Reviewed by:

James A. Jacobs, R.G.

Chief Hydrogeologist

# **Figures**



NOT TO SCALE



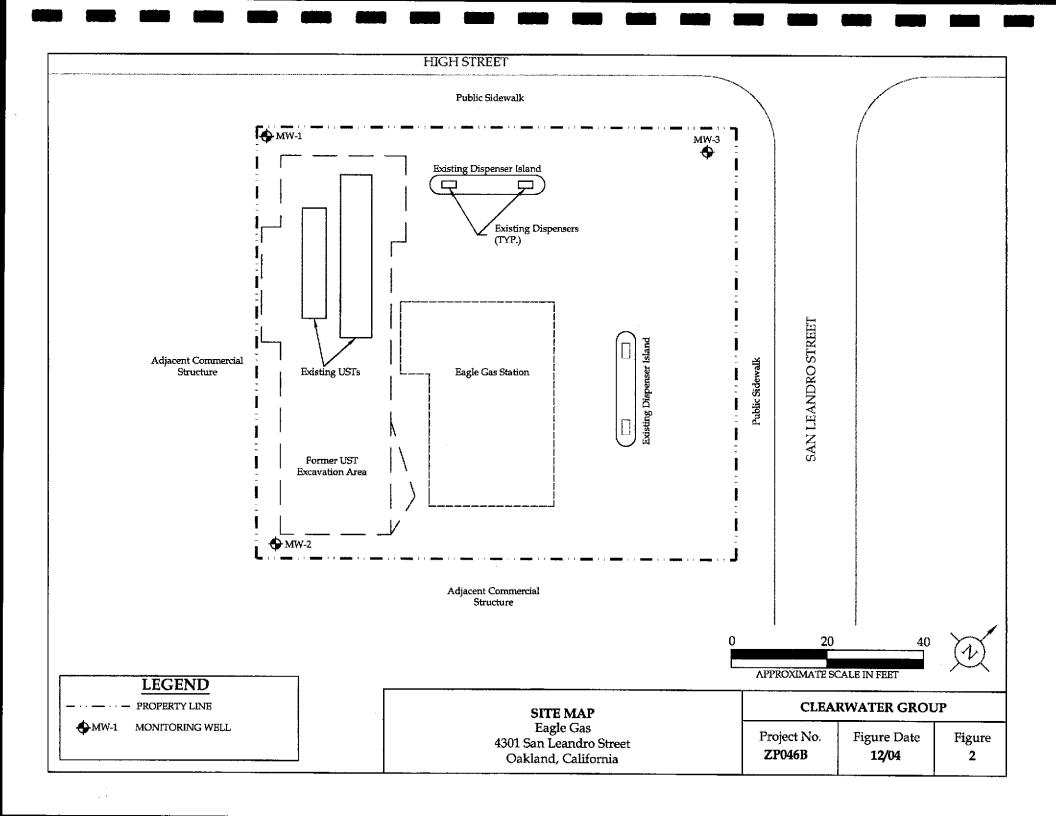
SITE LOCATION MAP

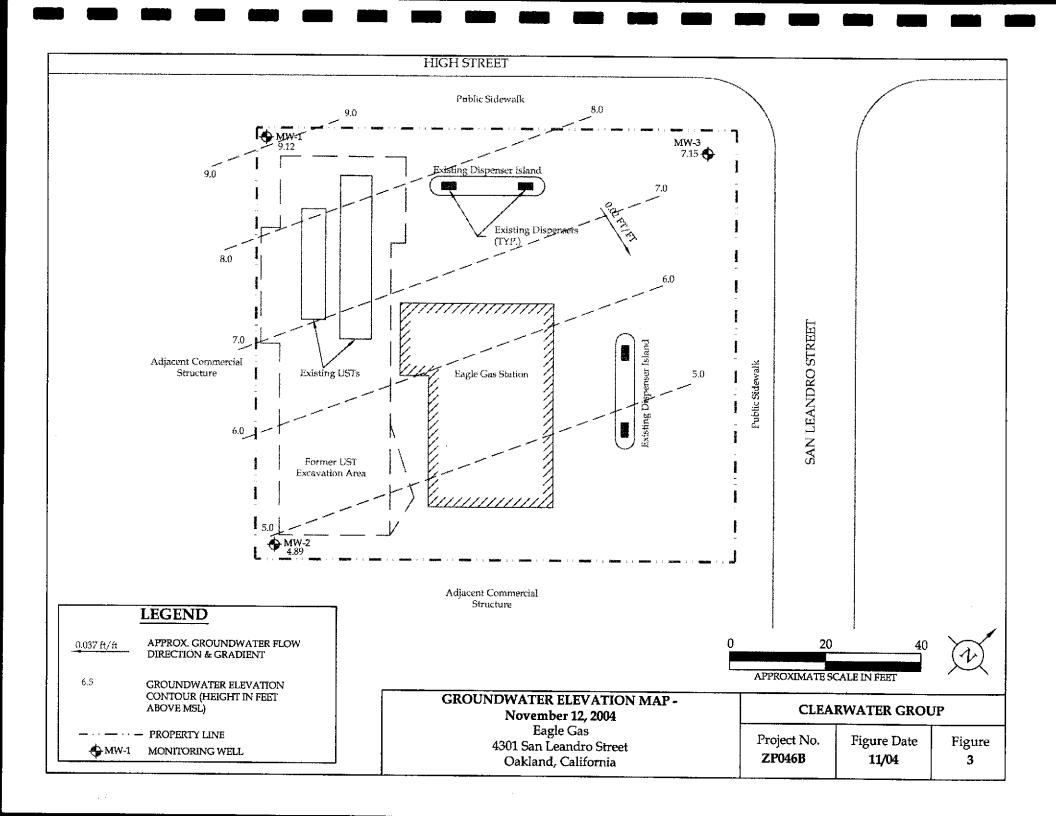
Eagle Gas 4301 San Leandro Street Oakland, California **CLEARWATER GROUP** 

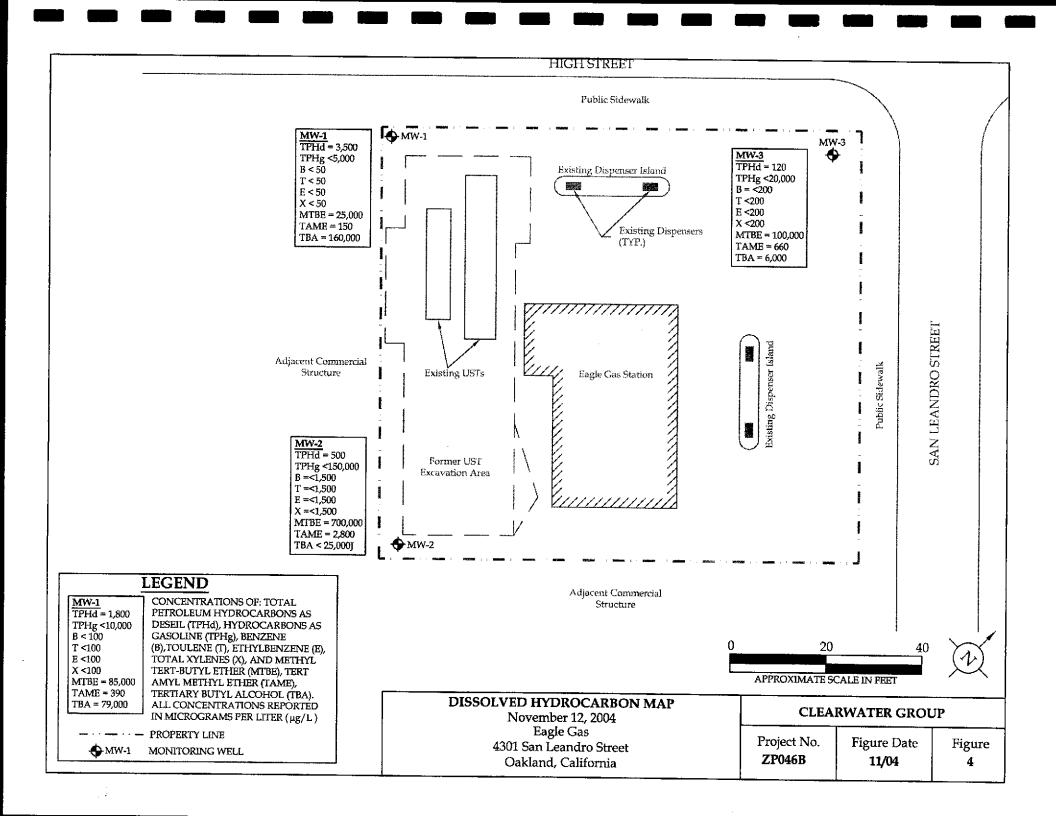
Project No. **ZP046B** 

Figure Date 1/04

Figure 1







# **Tables**

## Table 1 WELL CONSTRUCTION DATA

### Eagle Gas

4301 San Leandro Street Oakland, California

Clearwater Group Project No. ZP046A

Well I.D.	Date Intstalled	Borehole Diameter (inches)		Casing Diameter (inches)		Filter Pack (feet)	Bentonite Seal (feet)	Cement (feet)
MW-1	9/26/2000	8	25	2	10-25	6-25	3-6	0-3
MW-2	9/26/2000	8	25	2	10-25	6-25	3-6	0-3
MW-3	9/26/2000	8	25	2	10-25	6-25	3-6	0-3

TABLE 2
SOIL SAMPLE ANALYTICAL RESULTS
Eagle Gas
4301 San Leandro Street
Oakland, California
Clearwater Group Project No. ZP046B

Sample ID	Sample Date	TPHd mg/Kg	TPHg mg/Kg	B mg/Kg	T mg/Kg	E mg/Kg	X mg/Kg	MTBE mg/Kg	EDB mg/Kg	1,2-DCA mg/Kg	DIPE mg/Kg	ETBE mg/Kg	TAME mg/Kg	TBA mg/Kg
CS1-7	4/21/1999	840	770	8.9	4.8	5.8	16	86						
CS2-7	4/21/1999	1900	880	3.3	5.7	15	45	16	~					
CS3-7	4/22/1999	780	1600	4.3	110	42	220	92	<b></b>					*==
CS5-6.5	4/22/1999	33	20	0.22	1.8	0.54	3	52						
Stockpile 1	4/22/1999	770	610	0.28	4.7	6.9	36	ND						
stockpile 2	4/22/1999	670	480	0.23	2.3	3.9	18	ND						
CS4-13	4/22/2000	ND	ND	ND	ND	ND	ND	0.08						
CS6-3	8/5/1999	1300	4300	11	130	82	420	70						
CS7-3	8/5/1999	200	50	ND	2.4	0.85	4	14						
CS8-3	8/5/1999	3400	250	0.32	0.72	0.81	1	3.8						
CS9-3	8/5/1999	1900	380	ND	ND	ND	ND	9.5		***				
CS10-3	8/5/1999	350	930	ND	78	17	99	310			~~=			
CS11-3	8/5/1999	5200	1400	3.2	13	25	90	62						
MW1-10'bgs		87	310	0.062	0.022	1.3	3.4	6.9	ND	ND	ND	ND	0.019	2.9
MW2-10'bgs		210	630	0.053	0.052	2	14	1.00	ND	ND	ND	ND	ND	3.5
MW3-10'bgs	9/26/2000	ND	32	ND	ND	ND	ND	4.5	ND	ND	ND	ND	0.043	0.58

TABLE 2 SOIL SAMPLE ANALYTICAL RESULTS Eagle Gas 4301 San Leandro Street Oakland, California

Clearwater Group Project No. ZP046B

2 of 2

Sample	Sample	TPHd	TPHg	B	T	E	X	MTBE	EDB	1,2-DCA	DIPE	ETBE	TAME	TBA
ID	Date	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
NOTES: TPHd TPHg BTEX MTBE DIPE ETBE TAME 1,2-DCA EDB TBA mg/Kg ND	Total petro Total petro Benzene, t Methyl tert Di-isopropy Ethyl tertar Tertiary an 1,2-Dichlor Ethylene d Tertiary bu miligrams p no samples Not detected	leum hyd oluene, e iary butyl yl ether by y butyl et nyl methyl oethane b ibromide i tyl alcoho per kilogra s collected	rocarbon: thylbenze ether by EPA Me her by EF I ether by by EPA M by EPA M I by EPA am d, no data	s as gaso ene, total EPA Met ethod 826 PA Metho EPA Me lethod 82 Method 8 Method 8	line by Ef xylenes b hod 8260l 0B d 8260B thod 8260 60B 860B	PA Method y EPA Me B PB	d 8260B ethod 8260	,						

12/13/2004

TABLE 3
GROUNDWATER ELEVATIONS AND SAMPLE ANALYTICAL RESULTS

Eagle Gas

4301 San Leandro Street

Oakland, California

Clearwater Group Project No. ZP046B

Sample	Sample	TOC	DTW	GWE	TPHd	TPHg	В	Т	Ε	X	MTBE	DIPE	ETBE	TAME	TBA
ID	Date	(feet)	(feet)	(feet)	(µg/L)	$(\mu g/L)$	$(\mu g/L)$	$(\mu g/L)$	$(\mu g/L)$	(µg/L)	$(\mu g/L)$	$(\mu g/L)$	(µg/L)	$(\mu g/L)$	(µg/L)
					-						·				
MW-1	10/3/00	18.37	8.96	9.41	460	93,000	<500	<500	<500	<500	130,000	<10,000	<10,000	<10,000	<2,000
	10/27/00	18.37	7.27	11.1											
	1/26/01	18.37	7.60	10.77	1,600*	51,000	270	<100	<100	<100	77,000	<5,000	<5,000	<5,000	<20,000
	5/8/01	18.37	7.50	10.87	470*	36,000*	<100	<100	<100	<100	15,000	<5,000	<5,000	<5,000	<20,000
	8/3/01	18.37	7.09	11.28	2,200*	19,000*	<50	59	<50	<50	96,000	<5,000	<5,000	<5,000	<20,000
	7/1/03	18.37	7.59	10.78	3,000	<25,000	<250	<250	<250	<250	170,000	<250	<250	980	8700
	10/1/03	18.37	8.36	10.01	2,600	<20,000	<200	<200	<200	<200	69,000	<200	<200	270	15,000
	2/13/04	18,37	8.80	9.57	1,800	<10,000	<100	<100	<100	<100	85,000	<100	<100	390	79,000
	5/17/04	18.37	10.92	7.45	5,400	<15,000	<150	<150	<150	<150	60,000	<150	<150	260	160,000
	8/6/04	18.37	7.76	10.61	510	<10,000	<100	<100	<100	<100	26,000	<100	<100	100	250,000
	11/12/04	18.37	9.25	9.12	3,500	<5,000	<50	<50	<50	<50	25,000	<50	<50	150	160,000
MW-2	10/3/00	20.28	20.26	0.02	210	250,000	<1,250	<1,250	<1,250	<1,250	400,000	<25,000	<25,000	<25,000	<100,000
	10/27/00	20.28	13.88	6.40											
	1/26/01	20.28	12.10	8.18	6,000*	740,000	3,800	<500	940	1,600	1,000,000	<50,000	<50,000	<50,000	<200,000
	5/8/01	20,28	12.05	8.23	2,100*	140,000	2,800	<250	780	640	840,000	<50,000	<50,000	<50,000	<200,000
	8/3/01	20.28	13,30	6.98	2,600*	42,000*	1,100	63	230	130	880,000	<25,000	<25,000	<25,000	<100,000
	7/1/03	20.28	14.98	5.30	2,200	<200,000	<2,000	<2,000	<2,000	<2,000	790,000	<2,000	<2,000	3,400	<20,000
	10/1/03	20.28	15.99	4.29	870	<100,000	<1,000	<1,000	<1,000	<1,000	620,000	<1,000	<1,000	2,700	<20,000
	2/13/04	20.28	13.88	6.40	1200	<20,000	860	<200	260	<200	710,000	<200	<200	2,000	<25,000
	5/17/04	20.38	14.68	5.70	2,500	<50000	860	<500	<500	<500	760,000	<500	<500	2,500	13000J
	8/6/04	20,38	15.36	5.02	420	<50000	590	<500	<500	<500	810,000	<500	<500	3,600	17,000J
	11/12/04	20.38	15.49	4.89	500	<150,000	<1500	<1500	<1500	<1500	700,000	<1500	<1500	2800	25,000J

## TABLE 3 GROUNDWATER ELEVATIONS AND SAMPLE ANALYTICAL RESULTS Eagle Gas

### 4301 San Leandro Street

Oakland, California

Clearwater Group Project No. ZP046B

Sample ID	Sample Date	TOC (feet)	DTW (feet)	GWE (feet)	TPHd (μg/L)	TPHg (µg/L)	Β (μg/L)	Τ (μ <b>g/L</b> )	E (µg/L)	X (μg/L)	MTBE (μg/L)	DIPE (μg/L)	ETBE (μg/L)	TAME (µg/L)	TBA (µg/L)
мw-з	10/3/00	18.98			120	8,300	<500	<500	<500	<500	33.000	<2,500	<2,500	<2.500	<10.000
	10/27/00	18.98	18.75	0.23							,				
	1/26/01	18,98	13.38	5.60	900*	230,000	930	<500	<500	<500	330,000	<25,000	<25,000	<25.000	<100.000
	5/8/01	18.98	11.82	7,16	1,100*	95,000	840	<250	<250	<250	390,000	<12,500	<12,500	<12,500	<50,000
	8/3/01	18.98	13.44	5.54	290*	30,000*	<50	51	<50	<50	270,000	<12,500	<12,500	<12,500	<50,000
	7/1/03	18.98	12.67	6.31	620	<50,000	<500	<500	<500	<500	230,000	<500	<500	1,800	<5,000
	10/1/03	18.98	14.04	4.94	370	<20,000	<200	<200	<200	<200	120,000	<200	<200	1,200	<5,000
	2/13/04	19.98	12.20	7.78	430	<20,000	280	<200	<200	<200	210,000	<200	<200	1,200	<5000
	5/17/04	19.98	11.87	8.11	920	<25,000	<250	<250	<250	<250	150,000	<250	<250	1,100	5600J
	8/6/04	19.98	13.07	6.91	78	<20,000	<200	<200	<200	<200	110,000	<200	<200	760	<2,500
	11/12/04	19.98	12.83	7.15	120	<20,000	<200	<200	<200	<200	100,000	<200	<200	660	6,000

### **NOTES:**

TOC	Top of well casing referenced to arbitrary datum
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DTW Depth to water

### (µg/L) Micrograms per liter

Not detected in concentrations above laboratory reporting limit

GWE Groundwater elevation

TPHd Total petroleum hydrocarbons as diesel by EPA Method 8015 (modified)

TPHg Total petroleum hydrocarbons as gasoline by EPA Method 8260B

BTEX Benzene, toluene, ethylbenzene, total xylenes by EPA Method 8260B

MTBE Methyl tertiary butyl ether by EPA Method 8260B

DIPE Di-isopropyl ether by EPA Method 8260B

TAME Tertiary amyl methyl ether by EPA Method 8260B

TBA Tertiary butyl alcohol by EPA Method 8260B

<sup>---</sup> no samples collected, no data available

Laboratory note: "Results within quantitation range; chromatographic pattern not typical of fuel"

# **Attachments**

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220 %	`	<u> </u>	d. CA 94801	Jaie .			I Pa	1 4) 1, 13
Phone: (5	10)307-9943	oint Richmon Fax: (510	232-2823	11/2/84/	41461		W)(X	
Tech(s):		Dn	ıms on Site	@TOA'		Drums on Si	te @ TOD	
RODUE	y Bu	pey:	Soil:	Water	0	Soil:	W	ater: 5
Well No	Diameter	DTB	DTW	ST	cv	PV	SPL	· Notes
1,00,00	(in)	(ft)	(ft) **	(ft)	(gal)	(gal)	(ft)	
inla	12	24.5	925	15.27	2,44	7.32	,	
7/10	5	247	15:44	9, 27	1.48	4,44	1	
MWZ	2	73 1	19 12	10.23	1.63	4.91		
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Explanation:

DTB = Depth to Bottom

DTW = Depth to Water

ST = Saturated Thickness (DTB-DTW)

CV = Casing Volume (ST x cf)

PV = Purge Volume (standard 3 x CV, well development 10 x CV)

SPL = Thickness of Separate Phase Liquid

Conversion Factors (cf)

2-inch diameter well cf=0.16 gal/ft 4-inch diameter well cf=0.65 gal/ft

6-inch diameter well cf=1.44 gal/ft

				•		
•			4/30/PI	URGING	GDATA NOJEO 57	SHEET OF
Job No-Z	270462	Location		AND, C	A Date	
	<u> </u>					1 Joerny
WELL No.	TIME	VOLUN (gal.)			1	200
T/M/	1136.1	1 2 3	1110	7 / 10	1 1	
1/(W-	11119	3 200	111	1 DX	0 6.6	Sample for: \$015 M
Calc. purge	1/47	7 4.0	. \\ > 0	5 69	16.6	b TPHe TPHd 8010
volume	1157	7.80	2 1,725	693	3 6.6	(BTEX) Other 5 945 82604
7,32	38					Purging Methode DROKA A
i eg	*	8,			<b>*</b>	PVC bailer / Pump R
<u>{</u>	COMME	VIS: color,	turbidity, re	charge, shee	en	Sampling Method:
-	CEA	2,/ai	90003	steen,	Bior	Dedicated Disposable bailer
NASSEE T	950 AT	your a	, , , , , , , , , , , , , , , , , , ,		·	
WELL No.	TIME	VOLUMI (gal.)	ECOND. (mŠ/cm)	TEMP. (deg. F.)	pH	1215
Mil	1257	1/.00	787	67.2	16.59	Sample for:
Calc. purge	1210	3.00	1788	125	63	TPH <sub>8</sub> TPH <sub>4</sub> 8010
volume	1212	(0)	709	627	1	BTEX Other 500 K SO 60 B
4.91			101	- CCS/	16,00	1900
						Purging Method: DISPOSALE
	<u> </u>	<u>.</u>	Э.	<u> </u>	<u> </u>	PVC bailer / Purny 32/1/1/
	COMMENT	S: color, tu	rbidity, rech	arge, sheen		Sampling Method:
	CILAR	7/DW,	9000	10 Stel	W	Dedicated Disposable bailer
WELL	TIME	VOLUME	COND.	tan oo	. **	1020
No.	IIMB	(gal.)	(mS/cm)	TEMP. * (deg. F.)	pН	1250
MW-2	12)4	1.00	1111	656	636	Sample for:
Calc. purge	1223	3,00	1110	ixb	652	TPHg TPHd 8010
olume .	1200	4,50	11)0	26	100	BTEX Other 5 ONES STADES
4,44	્યાર			2312	- Ci	Purging Method: Dix Os (1)
<del></del>	**			3		PVC bailer / PumpBAI
<b>, L</b>	COMMENTS	S color first	aidity rock-	ran abasa		
ſ	10 12 4	, color, tan	Autry, rechai	rge, sneen	1	Sampling Method:
·	(15 HA	y low,	you) I	10 She21	OPOF	Dedicated / Disposable bailer
		•	. •		<b>14</b>	

CLEARWATER GROUP, 229 Tewksbury Ave., Point Richmond, California 94801 Phone: 510-307-9943 Fax: 510-232-2823

### CLEARWATER GROUP

### **Groundwater Monitoring and Sampling Field Procedures**

### **Groundwater Monitoring**

Prior to beginning, a decontamination area is established. Decontamination procedures consist of scrubbing downhole equipment in an Alconox® solution wash (wash solution is pumped through any purging pumps used), and rinsing in a first rinse of potable water and a second rinse of potable water or deionized water if the latter is required. Any non-dedicated down hole equipment is decontaminated prior to use.

Prior to purging and sampling a well, the static water level is measured to the nearest 0.01 feet with an electronic water sounder. Depth to bottom is typically measured once per year, at the request of the project manager, and during Clearwater's first visit to a site. If historical analytical data are not available, with which to establish a reliable order of increasing well contamination, the water sounder and tape will be decontaminated between each well. If floating separate-phase hydrocarbons (SPH) are suspected or observed, SPH is collected using a clear, open-ended product bailer, and the thickness is measured to the nearest 0.01 feet in the bailer. SPH may alternatively be measured with an electronic interface probe. Any monitoring well containing a measurable thickness of SPH before or during purging is not additionally purged and no sample is collected from that well. Wells containing a hydrocarbon sheen are sampled unless otherwise specified by the project manager. Field observations such as well integrity as well as water level measurements and floating product thicknesses are noted on the Gauging Data/Purge Calculations form.

### Well Purging

Each monitoring well to be sampled is purged using either a PVC bailer or a submersible pump. Physical parameters (pH, temperature and conductivity) of the purge water are monitored during purging activities to assess if the water sample collected is representative of the aquifer. If required, parameters such as dissolved oxygen, turbidity, salinity etc. are also measured. Samples are considered representative if parameter stability is achieved. Stability is defined as a change of less than 0.25 pH units, less than 10% change in conductivity in micro mhos, and less than 1.0 degree centigrade (1.8 degrees Fahrenheit) change in temperature. Parameters are measured in a discreet sample decanted from the bailer separately from the rest of the purge water. Parameters are measured at least four times during purging; initially, and at volume intervals of one well volume. Purging continues until three well casing volumes have been removed or until the well completely dewaters. Wells which dewater or demonstrate a slow recharge, may be sampled after fewer than three well volumes have been removed. Well purging information is recorded on the Purge Data sheet. All meters used to measure parameters are calibrated daily. Purge water is sealed, labeled, and stored on site in D.O.T.-approved 55-gallon drums. After being chemically profiled, the water is removed to an appropriate disposal facility by a licensed waste hauler.

#### Groundwater Sample Collection

Groundwater samples are collected immediately after purging or, if purging rate exceeds well recharge rate, when the well has recharged to at least 80% of its static water level. If recharge is extremely slow, the well is allowed to recharge for at least two hours, if practicable, or until sufficient volume has accumulated for sampling. The well is sampled within 24 hours of purging or repurged. Samples are collected using polyethylene bailers, either disposable or dedicated to the well. Samples being analyzed for compounds most sensitive to volatilization are collected first. Water samples are placed in appropriate laboratory-supplied containers, labeled, documented on a chain of custody form and placed on ice in a cooler for transport to a state-certified analytical laboratory. Analytical detection limits match or surpass standards required by relevant local or regional guidelines.

### Quality Assurance Procedures

To prevent contamination of the samples, Clearwater personnel adhere to the following procedures in the field:

- A new, clean pair of latex gloves are put on prior to sampling each well.
- Wells are gauged, purged and groundwater samples are collected in the expected order of increasing degree of contamination based on historical analytical results.
- All purging equipment will be thoroughly decontaminated between each well, using the procedures previously
  described at the beginning of this section.
- During sample collection for volatile organic analysis, the amount of air passing through the sample is minimized. This helps prevent the air from stripping the volatiles from the water. Sample bottles are filled by slowly running the sample down the side of the bottle until there is a convex meniscus over the mouth of the bottle. The lid is carefully screwed onto the bottle such that no air bubbles are present within the bottle. If a bubble is present, the cap is removed and additional water is added to the sample container. After resealing the sample container, if bubbles still are present inside, the sample container is discarded and the procedure is repeated with a new container.

Laboratory and field handling procedures may be monitored, if required by the client or regulators, by including quality control (QC) samples for analysis with the groundwater samples. Examples of different types of QC samples are as follows:

- Trip blanks are prepared at the analytical laboratory by laboratory personnel to check field handling procedures.
   Trip blanks are transported to the project site in the same manner as the laboratory-supplied sample containers to be filled. They are not opened, and are returned to the laboratory with the samples collected. Trip blanks are analyzed for purgable organic compounds.
- Equipment blanks are prepared in the field to determine if decontamination of field sampling equipment has been effective. The sampling equipment used to collect the groundwater samples is rinsed with distilled water which is then decanted into laboratory-supplied containers. The equipment blanks are transported to the laboratory, and are analyzed for the same chemical constituents as the samples collected at the site.
- Duplicates are collected at the same time that the standard groundwater samples are being collected and are
  analyzed for the same compounds in order to check the reproducibility of laboratory data. They are typically
  only collected from one well per sampling event. The duplicate is assigned an identification number that will
  not associate it with the source well.

Generally, trip blanks and field blanks check field handling and transportation procedures. Duplicates check laboratory procedures. The configuration of QC samples is determined by Clearwater depending on site conditions and regulatory requirements.



Date: 11/22/2004

Dave Mog Clearwater Group, Inc. 229 Tewksbury Avenue Point Richmond, CA 94801

Subject: 3 Water Samples

Project Name: NAZ EAGLE GAS

Project Number: ZP046B

Dear Mr. Mog,

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,



Date: 11/22/2004

Subject : Project Name : 3 Water Samples NAZ EAGLE GAS

Project Number :

ZP046B

### **Case Narrative**

Tert-Butanol results for sample MW-2 may be biased slightly high and are flagged with a 'J'. A fraction of MtBE (typically less than 1%) converts to Tert-Butanol during the analysis of water samples. We consider this conversion effect to be mathematically significant in samples that contain MtBE/Tert-Butanol in ratios of over 20:1.

Approved By:

Jde Kiff



Date: 11/22/2004

Project Name: NAZ EAGLE GAS

Project Number: ZP046B

Sample: MW-1

Matrix: Water

Lab Number: 41011-01

Sample Date :11/12/2004

Sample Date :11/12/2004		Method			
Parameter	Measured Value	Reporting Limit	Units	Analysis Method	Date Analyzed
Веплепе	< 50	50	ug/L	EPA 8260B	11/19/2004
Toluene	< 50	50	ug/L	EPA 8260B	11/19/2004
Ethylbenzene	< 50	50	ug/L	EPA 8260B	11/19/2004
Total Xylenes	< 50	50	ug/L	EPA 8260B	11/19/2004
Methyl-t-butyl ether (MTBE)	25000	50	ug/L	EPA 8260B	11/19/2004
Diisopropyl ether (DIPE)	< 50	50	ug/L	EPA 8260B	11/19/2004
Ethyl-t-butyl ether (ETBE)	< 50	50	ug/L	EPA 8260B	11/19/2004
Tert-amyl methyl ether (TAME)	150	50	ug/L	EPA 8260B	11/19/2004
Tert-Butanol	160000	250	ug/L	EPA 8260B	11/19/2004
TPH as Gasoline	< 5000	5000	ug/L	EPA 8260B	11/19/2004
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	11/19/2004
4-Bromofluorobenzene (Surr)	101		% Recovery	EPA 8260B	11/19/2004
TPH as Diesel	3500	50	ug/L	M EPA 8015	11/17/2004
Octacosane (Diesel Surrogate)	98.0		% Recovery	M EPA 8015	11/17/2004

Approved By:

Joel Kiff

2795 2nd St., Suite 300 Davis, CA 95616 530-297-4800



Date: 11/22/2004

Project Name: NAZ EAGLE GAS

Project Number: **ZP046B** 

Sample: MW-2

Matrix: Water

Lab Number : 41011-02

Sample Date :11/12/2004

Parameter	Measured Value	Method Reporting	l Inita	Analysis	Date
raianietei	value	Limit	Units	Method	Analyzed
Benzene	< 1500	1500	ug/L	EPA 8260B	11/18/2004
Toluene	< 1500	1500	ug/L	EPA 8260B	11/18/2004
Ethylbenzene	< 1500	1500	ug/L	EPA 8260B	11/18/2004
Total Xylenes	< 1500	1500	ug/L	EPA 8260B	11/18/2004
Methyl-t-butyl ether (MTBE)	700000	1500	ug/L	EPA 8260B	11/18/2004
Diisopropyl ether (DIPE)	< 1500	1500	ug/L	EPA 8260B	11/18/2004
Ethyl-t-butyl ether (ETBE)	< 1500	1500	ug/L	EPA 8260B	11/18/2004
Tert-amyl methyl ether (TAME)	2800	1500	ug/L	EPA 8260B	11/18/2004
Tert-Butanol	25000 J	7000	ug/L	EPA 8260B	11/18/2004
TPH as Gasoline	< 150000	150000	ug/L	EPA 8260B	11/18/2004
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	11/18/2004
4-Bromofluorobenzene (Surr)	89.7		% Recovery	EPA 8260B	11/18/2004
TPH as Diesel	500	50	ug/L	M EPA 8015	11/17/2004
Octacosane (Diesel Surrogate)	109		% Recovery	M EPA 8015	11/17/2004

Approved By:

Joel Kiff

2795 2nd St., Suite 300 Davis, CA 95616 530-297-4800



Date: 11/22/2004

Project Name: NAZ EAGLE GAS

Project Number: **ZP046B** 

Sample: MW-3

Matrix: Water

Lab Number: 41011-03

Sample Date :11/12/2004

Sample Date : 17/12/2004		Method			
Parameter	Measured Value	Reporting Limit	Units	Analysis <b>M</b> ethod	Date Analyzed
Benzene	< 200	200	ug/L	EPA 8260B	11/18/2004
Toluene	< 200	200	ug/L	EPA 8260B	11/18/2004
Ethylbenzene	< 200	200	ug/L	EPA 8260B	11/18/2004
Total Xylenes	< 200	200	ug/L	EPA 8260B	11/18/2004
Methyl-t-butyl ether (MTBE)	100000	200	ug/L	EPA 8260B	11/18/2004
Diisopropyl ether (DIPE)	< 200	200	ug/L	EPA 8260B	11/18/2004
Ethyl-t-butyl ether (ETBE)	< 200	200	ug/L	EPA 8260B	11/18/2004
Tert-amyl methyl ether (TAME)	660	200	ug/L	EPA 8260B	11/18/2004
Tert-Butanol	6000	900	ug/L	EPA 8260B	11/18/2004
TPH as Gasoline	< 20000	20000	ug/L	EPA 8260B	11/18/2004
Toluene - d8 (Surr)	99.0		% Recovery	EPA 8260B	11/18/2004
4-Bromofluorobenzene (Surr)	91.9		% Recovery	EPA 8260B	11/18/2004
TPH as Diesel	120	50	ug/L	M EPA 8015	11/17/2004
Octacosane (Diesel Surrogate)	105		% Recovery	M EPA 8015	11/17/2004

Approved By:

Joel Kiff

2795 2nd St., Suite 300 Davis, CA 95616 530-297-4800

Date: 11/22/2004

QC Report : Method Blank Data

Project Name: NAZ EAGLE GAS

Project Number: ZP046B

	Measured	Method Measured Reporting			Acces to a to		
Parameter	Value	Limit	Units	Analysis Method	Date <u>Analyzed</u>		
TPH as Diesel	< 50	50	ug/L	M EPA 8015	11/17/2004		
Octacosane (Diesel Surrogate)	98.4		%	M EPA 8015	11/17/2004		
Benzene	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Toluene	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Methyl-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Diisopropyl ether (DIPE)	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Ethyl-t-butyl ether (ETBE)	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Tert-amyi methyl ether (TAME)	< 0.50	0.50	ug/L	EPA 8260B	11/19/2004		
Tert-Butanol	< 5.0	5.0	ug/L	EPA 8260B	11/19/2004		
TPH as Gasoline	< 50	50	ug/L	EPA 8260B	11/19/2004		
Toluene - d8 (Surr)	102		%	EPA 8260B	11/19/2004		
4-Bromofluorobenzene (Surr)	97.7		%	EPA 8260B	11/19/2004		
Benzene	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Toluene	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Methyf-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Diisopropyl ether (DIPE)	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Ethyl-t-butyl ether (ETBE)	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Tert-amyl methyl ether (TAME)	< 0.50	0.50	ug/L	EPA 8260B	11/18/2004		
Tert-Butanol	< 5.0	5.0	ug/L	EPA 8260B	11/18/2004		
TPH as Gasoline	< 50	50	ug/L	EPA 8260B	11/18/2004		
Toluene - d8 (Surr)	102		%	EPA 8260B	11/18/2004		
4-Bromofluorobenzene (Surr)	88.5		%	EPA 8260B	11/18/2004		

Measured Reporting Analysis Date
Parameter Value Limit Units Method Analyzed

Approved By:

oel Kiff

KIFF ANALYTICAL, LLC

2795 2nd St, Suite 300 Davis, CA 95616 530-297-4800

Date: 11/22/2004

Project Name : NAZ EAGLE GAS

QC Report : Matrix Spike/ Matrix Spike Duplicate

Project Number: **ZP046B** 

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	e Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicat Spiked Sample Percent Recov.	Relative	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
TPH as Diesel	Blank	<50	1000	1000	1090	1040	ug/L	M EPA 8015	11/17/04	109	104	4.80	70-130	25
Benzene	41026-09	<0.50	40.0	40.0	42.4	40.0	ug/L	EPA 8260B	11/19/04	106	100	5.85	70-130	25
Toluene	41026-09	<0.50	40.0	40.0	43.4	41.0	ug/L	EPA 8260B	11/19/04	108	102	5.61	70-130	25
Tert-Butanol	41026-09	<5.0	200	200	211	211	ug/L	EPA 8260B	11/19/04	106	105	0.172	70-130	25
Methyl-t-Butyl Ethe	rr 41026-09	<0.50	40.0	40.0	38.4	37.6	ug/L	EPA 8260B	11/19/04	96.1	93.9	2.29	70-130	25
Benzene	40968-04	<0.50	40.0	40.0	42.0	40.8	ug/L	EPA 8260B	11/18/04		102	2.80	70-130	25
Toluene	40968-04	<0.50	40.0	40.0	41.0	39.8	ug/L	EPA 8260B	11/18/04		99.5	3.04	70-130	25
Tert-Butanol	40968-04	<5.0	200	200	192	191	ug/L	EPA 8260B	11/18/04		95.4	0.863	70-130	25
Methyl-t-Butyl Ethe	r 40968-04	1.0	40.0	40.0	37.7	38.7	ug/L	EPA 8260B	11/18/04		94.2	2.59	70-130	25

Approved By: Joe Kiff 1

KIFF ANALYTICAL, LLC

2795 2nd St, Suite 300 Davis, CA 95616 530-297-4800

Date: 11/22/2004

Project Name: NAZ EAGLE GAS

QC Report : Laboratory Control Sample (LCS)

Project Number: ZP046B

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Benzene	40.0	ug/L	EPA 8260B	11/19/04	102	70-130
Toluene	40.0	ug/L	EPA 8260B	11/19/04	107	70-130
Tert-Butanol	200	ug/L	EPA 8260B	11/19/04	101	70-130
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	11/19/04	99.0	70-130
Benzene	40.0	ug/L	EPA 8260B	11/18/04	101	70-130
Toluene	40.0	ug/L	EPA 8260B	11/18/04	99.4	70-130
Tert-Butanol	200	ug/L	<b>EP</b> A 8260B	11/18/04	99.3	70-130
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	11/18/04	85.0	70-130

Approved By:

Joe Kiff

KIFF			2795 2nd Street, Suite 300																											
			Davis, CA 95616																											
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Project Content Plan												Lab No. <u>41011</u>										Page / of )								
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