

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

November 10, 2003

Re:

LOP Site ID# 2118 Clearwater Project No. ZP046B

USTCF Claim No. 014551

Dear Mr. Gholami:

The Clearwater Group (Clearwater) has prepared the following letter report of fourth quarter 2003 groundwater monitoring activities at the above referenced site. Groundwater monitoring was requested by the Alameda County Department of Environmental Health (ACDEH) 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

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Environmental Services

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Fivironmental Months

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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 6,000gallon gasoline USTs, two 4,000-gallon diesel USTs and one 300-gallon used oil UST (Figure 2.) 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.

In a letter dated May 10, 1999, the ACDEH 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. Less than 1,000 gallons of petroleumimpacted 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 remaining petroleum and methyl tertiary butyl ether (MTBE) contamination.

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 (Figure 2), and collect soil samples. Each of the three borings was converted to a groundwater monitoring well using clean, flush-threaded, 2-inch diameter polyvinyl chloride (PVC) well materials (**Table 1**.) Soil sample analytical results are included as **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. Initial groundwater samples collected from these wells contained 83,000 micrograms per liter (µg/L) to 250,000 µg/L total petroleum hydrocarbons as gasoline, (TPHg), and 33,000 µg/L to 400,000 µg/L MTBE (**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 ACDEH, in correspondence dated October 18, 2001, recommended that off-site monitoring wells not be installed for the time being. Instead, the ACDEH requested that further characterization of subsurface soils and groundwater on-site be completed prior to the installation of any off-site wells.

#### **Groundwater Monitoring Activities**

Groundwater Gauging and Sampling

On October 1, 2003, all three wells were monitored. An electronic water level indicator accurate to within  $\pm 0.01$  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

ZP046B QMR 3 November 2003



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 (Attachment 1.) All work was performed in accordance with Clearwater's Groundwater Monitoring and Sampling Field Procedures (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 8.36 (MW-1) to 15.99 (MW-2) feet bgs (Table 3.) Depth to water data combined with arbitrary well elevation data were used to generate a groundwater elevation map (Figure 3.) During this monitoring event, groundwater flow was found to be toward the east at a gradient of 0.084. Groundwater flow direction and gradient are generally consistent with observations from the previous groundwater monitoring event.

#### Groundwater Sample Analytical Results

Diesel-range hydrocarbons were detected in samples collected from all three groundwater monitoring wells. Concentrations of TPHd ranged from 370  $\mu$ g/L (MW-3) to 2,600  $\mu$ g/L (MW-1). MTBE was detected in samples collected from all three monitoring wells in concentrations ranging from 69,000  $\mu$ g/L (MW-1) to 620,000  $\mu$ g/L (MW-2). Laboratory detection limits were elevated in the samples analyzed for TPHg, BTEX, MTBE, ETBE, DIPE, TAME, and TBA due to the interference from high concentrations of MTBE. Laboratory analytical results are summarized in Table 3.

#### Conclusions and Recommendations

The results of the recent groundwater monitoring event confirm the presence of elevated concentrations of petroleum related hydrocarbons in the groundwater beneath the site. Concentrations of MTBE in the water samples collected from all wells have decreased since the last monitoring event. Previous investigations have indicated that some contaminated soil may remain underneath existing structures. To date, the extent of the dissolved-phase contaminant plume remains undefined. Clearwater recommends that further subsurface investigations be conducted both on- and off-site in order to



characterize and delineate the extent of the water-borne contaminant plume. Monitoring of the existing wells should continue throughout the investigative process.

#### Attachments

Figure 1: Site Location Map

Figure 2: Site Plan

Figure 3: Groundwater Elevation Map — 10/01/03

Table 1: Well Construction Data

Table 2: Soil Sample Analytical Data

Table 3: Groundwater Elevation and Analytic Data

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

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:

D. N. Peacock, Ph.D.

and

Reviewed by:

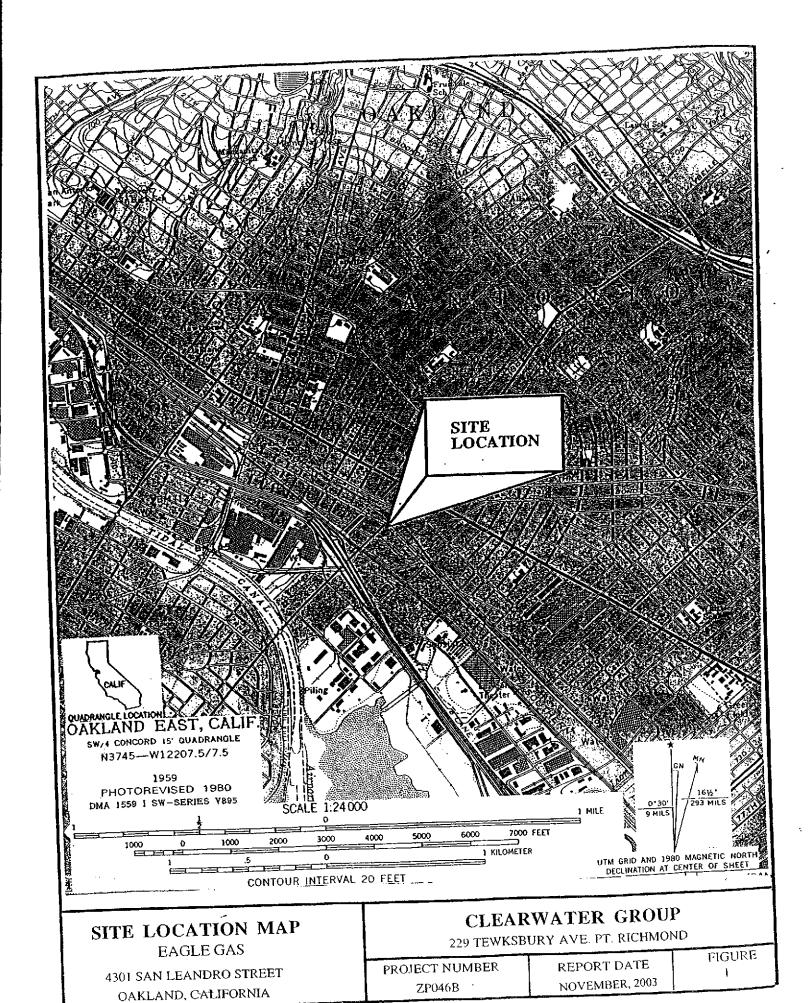
James A. Jacobs, A Chief Hydrogeolog

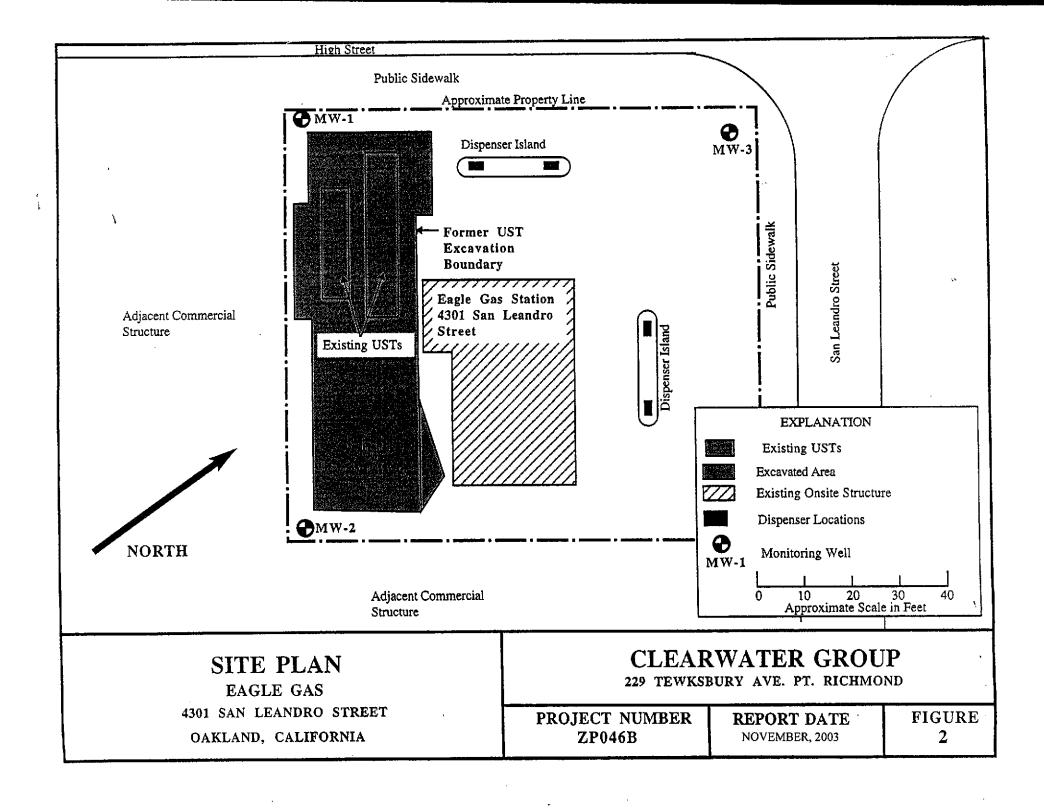
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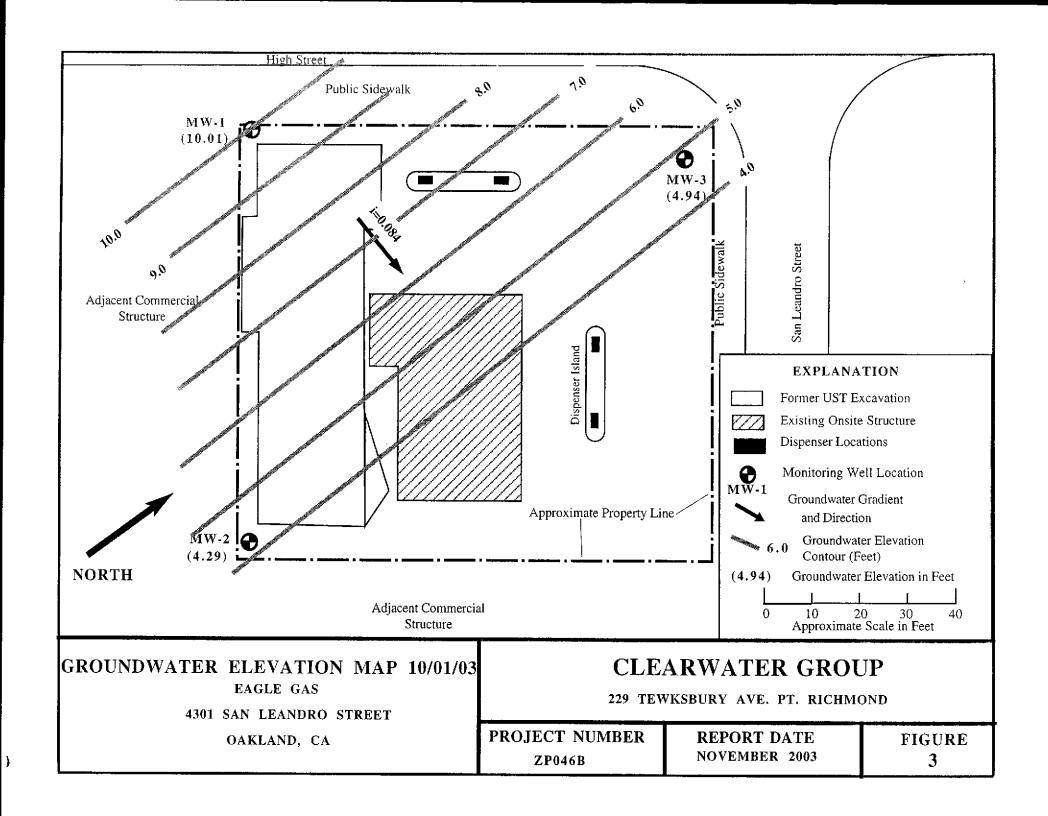
Jessica Chiaro, Project Scientist

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## **FIGURES**







## **TABLES**

#### Table 1 WELL CONSTRUCTION DATA

#### **Eagle Gas**

4301 San Leandro Street Oakland, California

Clearwater Group Project No. ZP046A

Well I.D.	Date Intstalled	Diameter	Borehole	Diameter	Interval	Pack	Bentonite Seal	
MW-1	9/26/00	(inches)	(feet) 25	(inches) 2	(feet) 10-25	(feet) 6-25	(feet) 3-6	(feet) 0-3
MW-2 MW-3	9/26/00 9/26/00	8 8	25 25	2 2	10-25 10-25	6-25 6-25	3-6 3-6	0-3 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	4/21/99	840	770	8.9	4.8	5.8	16	86						
CS2-7	4/21/99	1900	880	3.3	5.7	15	45	16						
CS3-7	4/22/99	780	1600	4.3	110	42	220	92						
CS5-6.5	4/22/99	33	20	0.22	1.8	0.54	3	52						
Stockpile 1	4/22/99	770	610	0.28	4.7	6.9	36	ND						
stockpile 2	4/22/99	670	480	0.23	2.3	3.9	18	ND						
CS4-13	4/22/00	ND	ND	ND	ND	ND	ND	0.08						
CS6-3	8/5/99	1300	4300	11	130	82	420	70						-++
CS7-3	8/5/99	200	50	ND	2.4	0.85	4	14				~~=		
CS8-3	8/5/99	3400	250	0.32	0.72	0.81	1	3.8						
CS9-3	8/5/99	1900	380	ND	ND	ND	ND	9.5						
CS10-3	8/5/99	350	930	ND	78	17	99	310						
CS11-3	8/5/99	5200	1400	3.2	13	25	90	62						
MW1-10'bgs	9/26/00	87	310	0.062	0.022	1.3	3.4	6.9	ND	ND	ND	ND	0.019	2.9
MW2-10'bgs	9/26/00	210	630	0.053	0.052	2	14	1.00	ND	ND	ND	ND	ND	3.5
MW3-10'bgs	9/26/00	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

EDB 1,2-DCA DIPE ETBE TAME

mg/Kg mg/Kg mg/Kg mg/Kg

Sample	Sample	TPHd	TPHg	В	Т	E	Х	MTBI
ID	Date	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/K
				_				
NOTES:								
TPHd	Total petro	leum hyd	rocarbon	s as diese	el by EPA	Method 8	015 (mod	lified)
TPHg	Total petro							
BTEX	Benzene, t							0B
MTBE	Methyl tert							
DIPE	Di-isopropy							
ETBE	Ethyl tertar							
TAME	Tertiary an					)B		
1,2-DCA	1,2-Dichlor	-	•					
EDB	Ethylene d							
TBA	Tertiary bu							
mg/Kg	miligrams į		_					
	no samples	s collecter	d. no data	a availabl	e			
ND	Not detecte					reporting	limit	
• • •	4010011	24 III 0011C	, on Li ation	IS UDOVC	abolatol y	reporting	41111111	

TBA

mg/Kg -

# TABLE 3 GOUNDWATER ELEVATIONS AND SAMPLE ANALYTICAL RESULTS Eagle Gas

### 4301 San Leandro Street

Oakland, California

Clearwater Group Project No. ZP046B

Sample	Sample	TOC	DTW	<b>GWE</b>	TPHd	TPHg	В	T	Ε	Х	MTBE	DIPE	ETBE	TAME	TBA
ID	Date	(feet)	(feet)	(feet)	$(\mu g/L)$	$(\mu g/L)$	(µg/L)	$(\mu g/L)$	$(\mu g/L)$	$(\mu g/L)$	(µg/L)	(µg/L)	(μg/L)	(µg/L)	(µg/L)
														<del> </del>	
MW-1	10/3/00	18.37		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 5/8/01	18.37 18.37	7.60 7.50	10.77	1,600*	51,000	270	<100	<100	<100	77,000	<5,000	<5,000	<5,000	<20,000
	8/3/01	18.37	7.50 7.09	10.87 11.28	470* 2,200*	36,000*	<100	<100	<100	<100	15,000	<5,000	<5,000	<5,000	<20,000
	7/1/03	18.37	7.59	10.78	3,000	19,000* <25,000	<50 <250	59 -250	<50	<50	96,000	<5,000	<5,000	<5,000	<20,000
	10/1/03	18.37		10.70	2,600	<20,000	<200	<250 <200	<250 <200	<250 <200	170,000	<250	<250	980	8700 45.000
	10, 1100	10.07	0.00	10.01	2,000	~20,000	~200	~200	<b>\200</b>	~200	69,000	<200	<200	270	15,000
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
MW-3	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							-	<b>\2,500</b>	~2,500	~2,500	<10,000
	1/26/01	18.98		5.60	900*	230,000	930	<500	<500	<500	330,000	<25,000	<25,000	<25,000	<100,000
	5/8/01		11.82		1,100*	95,000	840	<250	<250		•	•	-		·
	8/3/01				•	•				<250	390,000	<12,500	<12,500	<12,500	<50,000
			13.44		290*	30,000*	<50	51	<50	<50	270,000	<12,500	<12,500	<12,500	<50,000
	7/1/03		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

## TABLE 3 GOUNDWATER ELEVATIONS AND SAMPLE ANALYTICAL RESULTS

Eagle Gas

4301 San Leandro Street

Oakland, California

Clearwater Group Project No. ZP046B

Sample													ETBE		TBA
ID	Date	(feet)	(feet)	(feet)	(µg/L)	$(\mu g/L)$	(μg/L)	$(\mu g/L)$	(μg/L)	(µg/L)	(µg/L)	$(\mu g/L)$	(μg/L)	$(\mu g/L)$	$(\mu g/L)$

2 of 2

#### NOTES:

TOC Top of well casing referenced to arbitrary datum

DTW Depth to water

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

ETBE Ethyl tertary butyl ether by EPA Method 8260B

TAME Tertiary amyl methyl ether by EPA Method 8260B

TBA Tertiary butyl alcohol by EPA Method 8260B

(μg/L) Micrograms per liter

Not detected in concentrations above laboratory reporting limit

--- no samples collected, no data available

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

## **ATTACHMENTS**

#### WELL GAUGING/PURGING CALCULATIONS LEARWATER **DATA SHEET** Job No. Location 4301 San Lendro Street Date 229 Tewksbury Ave, Point Richmond, CA 94801 Phone: (510)307-9943 Fax: (510) 232-2823 1-10-1-05 ZP0468 Drums on Site @ TOD Drums on Site @TOA Tech(s): SR Soil: Water: 💍 Water: O Soil: 0 Notes CV P۷ SPL DTB DTW ST Diameter Well No (gal) (ft) (ft) (gal) (ft) (ft) (in) stripped bolt holes i 7.91 2.63 16.48 8,36 24.84 MU-1 4.37 1.45 911 15-99 MW-2 $\supset$ 25,10 4.47 9.36 1,49 14.04 23,40 MW-3 7

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

SHEET

Job No.: ZP	946B	Location: £	agle Gas	, Oakland	Date: /	0-1-03 Tech: <b>SR</b>
WELL No.	TIME	VOLUME (gal.)	. COND. (mS/cm)	TEMP. (deg. F.)	pН	
MW-1	1030	2.50	1084	69,4	6.89	Sample for:
Calc. purge	1033	5,00	1103	70,0	6.89	TPHg TPHd 8010
volume	1036	7.91	1097	69.5	6.89	BTEX) Other 5 OX/S
7.96						Purging Method:
						PVC bailer Pump
	COMMEN	rs: color, tu	rbidity, rech	arge, sheen		Sampling Method:
,	gray	low, god	of Sh	eln		Dedicated Disposable bailer
WELL No.	TIME	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	рН	
MW-3	1040	1.50	787	68,7	6.88	Sample for:
Calc. purge	1042	3,00	789	68.7	6,88	TPHg (TPHd) 8010
volume	1043	4,47	803	68.4	6-89	BTEX Other 5 0×15
4.47						Purging Method:
		÷				PVC bailer / Pump
	COMMENT	rs: color, tu	bidity, rech	arge, sheen		Sampling Method:
	9(a)	high,	100 , SI	reen		Dedicated / Disposable bailer
WELL No.	TIME	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pН	
Mw-2	1045	1.50	1107	64.8	6.88	Sample for:
Calc. purge	1647	3,00	1109	64.8	6.88	TPHg (TPHd) 8010
volume	1049	4.37	1107	64,7	6.88	BTEX Other 5 0 X VS
4.32	,	<u> </u>				Purging Method:
	,					PVC bailer / Pump
	COMMEN	IS: color, tu	rbidity, rech	arge, sheen		Sampling Method:
	gravy	(high)	Pos			Dedicated Disposable bailer

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: 10/7/2003

Jessica Chiaro Clearwater Group, Inc 229 Tewksbury Avenue Point Richmond, CA 94801

Subject: 3 Water Samples Project Name: NAZ Eagle Gas Project Number: ZP046B

Dear Ms. Chiaro,

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,

R P Furv



Date: 10/7/2003

Project Name: NAZ Eagle Gas

Project Number: **ZP046B** 

Sample: MW-1

Matrix: Water

Lab Number : 35214-01

Sample	Date	:10/1/2003	ļ

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 200	200	ug/L	EPA 8260B	10/6/2003
Toluene	< 200	200	ug/L	EPA 8260B	10/6/2003
Ethylbenzene	< 200	200	ug/L	EPA 8260B	10/6/2003
Total Xylenes	< 200	200	ug/L	EPA 8260B	10/6/2003
Methyl-t-butyl ether (MTBE)	69000	200	ug/L	EPA 8260B	10/6/2003
Diisopropyl ether (DIPE)	< 200	200	ug/L	EPA 8260B	10/6/2003
Ethyl-t-butyl ether (ETBE)	< 200	200	ug/L	EPA 8260B	10/6/2003
Tert-amyl methyl ether (TAME)	270	200	ug/L	EPA 8260B	10/6/2003
Tert-Butanol	15000	2000	ug/L	EPA 8260B	10/6/2003
TPH as Gasoline	< 20000	20000	ug/L	EPA 8260B	10/6/2003
Toluene - d8 (Surr)	95.9		% Recovery	EPA 8260B	10/6/2003
4-Bromofluorobenzene (Surr)	102		% Recovery	EPA 8260B	10/6/2003
TPH as Diesel	2600	50	ug/L	M EPA 8015	10/4/2003
Octacosane (Diesel Surrogate)	95.2		% Recovery	M EPA 8015	10/4/2003

Approved By: R P Furry

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



Date: 10/7/2003

Project Name : NAZ Eagle Gas

Project Number: **ZP046B** 

Sample: MW-2

Matrix : Water

Lab Number: 35214-02

Sample Date :10/1/2003

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 1000	1000	ug/L	EPA 8260B	10/3/2003
Toluene	< 1000	1000	ug/L	EPA 8260B	10/3/2003
Ethylbenzene	< 1000	1000	ug/l.	EPA 8260B	10/3/2003
Total Xylenes	< 1000	1000	ug/L	EPA 8260B	10/3/2003
Methyl-t-butyl ether (MTBE)	620000	2000	ug/L	EPA 8260B	10/6/2003
Diisopropyl ether (DIPE)	< 1000	1000	ug/L	EPA 8260B	10/3/2003
Ethyl-t-butyl ether (ETBE)	< 1000	1000	ug/L	EPA 8260B	10/3/2003
Tert-amyl methyl ether (TAME)	2700	1000	ug/L	EPA 8260B	10/3/2003
Tert-Butanol	< 20000	20000	ug/L	EPA 8260B	10/6/2003
TPH as Gasoline	< 100000	100000	ug/L	EPA 8260B	10/3/2003
Toluene - d8 (Surr)	97.1		% Recovery	EPA 8260B	10/3/2003
4-Bromofluorobenzene (Surr)	97.6		% Recovery	EPA 8260B	10/3/2003
TPH as Diesel	870	50	ug/L	M EPA 8015	10/4/2003
Octacosane (Diesel Surrogate)	106		% Recovery	M EPA 8015	10/4/2003

Approved By: R P Furry

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



Project Name : NAZ Eagle Gas

Project Number: **ZP046B** 

Matrix : Water

Lab Number: 35214-03

Report Number: 35214

Date: 10/7/2003

Sample: MW-3
Sample Date: 10/1/2003

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 200	200	ug/L	EPA 8260B	10/3/2003
Toluene	< 200	200	ug/L	EPA 8260B	10/3/2003
Ethylbenzene	< 200	200	ug/L	EPA 8260B	10/3/2003
Total Xylenes	< 200	200	ug/L	EPA 8260B	10/3/2003
Methyl-t-butyl ether (MTBE)	120000	500	ug/L	EPA 8260B	10/6/2003
Diisopropyl ether (DIPE)	< 200	200	ug/L	EPA 8260B	10/3/2003
Ethyl-t-butyl ether (ETBE)	< 200	200	ug/L	EPA 8260B	10/3/2003
Tert-amyl methyl ether (TAME)	1200	200	ug/L	EPA 8260B	10/3/2003
Tert-Butanol	< 5000	5000	ug/L	EPA 8260B	10/6/2003
TPH as Gasoline	< 20000	20000	ug/L	EPA 8260B	10/3/2003
Toluene - d8 (Surr)	98.8		% Recovery	EPA 8260B	10/3/2003
4-Bromofluorobenzene (Surr)	99.4		% Recovery	EPA 8260B	10/3/2003
TPH as Diesei	370	50	ug/L	M EPA 8015	10/4/2003
Octacosane (Diesel Surrogate)	108		% Recovery	M EPA 8015	10/4/2003

Approved By: R P Furry

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

Analyzed

Date: 10/7/2003

QC Report : Method Blank Data Project Name: NAZ Eagle Gas

Project Number: **ZP046B** 

Parameter	Measured Value	Method Reporti Limit		Analysis Method	Date Analyzed	Parameter	Measured Value	Method Reporting Limit Units	Analysis Method	Date Analyz
TPH as Diesel	< 50	50	ug/L	M EPA 8015	10/3/2003					
Octacosane (Diesel Surrogate)	98.9		%	M EPA 6015	10/3/2003					
Benzene	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Toluene	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					× .
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Methyl-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Diisopropyl ether (DIPE)	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Ethyl-t-butyl ether (ETBE)	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Tert-amyl methyl ether (TAME)	< 0.50	0.50	ug/L	EPA 8260B	10/3/2003					
Tert-Butanol	< 5.0	5.0	ug/L	EPA 8260B	10/3/2003					
TPH as Gasotine	< 50	50	ug/L	EPA 8260B	10/3/2003					
Toluene - d8 (Surr)	99.9		%	EPA 8260B	10/3/2003					
4-Bromofluorobenzene (Surr)	98.6		%	EPA 8260B	10/3/2003					
Benzene	< 0.50	0.50	ug/L	EPA 8260B	10/6/2003					
Toluene	< 0.50	0.50	ug/L	EPA 8260B	10/6/2003					
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	10/6/2003					
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	10/6/2003					
Methyl-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	10/8/2003					
Dilsopropyl ether (DIPE)	< 0.50	0.50	ug/L	EPA 8260B	10/6/2003					
Ethyl-t-butyl ether (ETBE)	< 0.50	0.50	ug/L	EPA 6260B	10/6/2003					
Tert-amyl methyl ether (TAME)	< 0.50	0.50	ug/L	EPA 8260B	10/6/2003					
Tert-Butanol	< 5.0	5.0	ug/L	EPA 8260B	10/6/2003					
TPH as Gasotine	< 50	50	ug/L	EPA 82608	10/6/2003					
Toluene - d8 (Surr)	96.9		%	EPA 8260B	10/8/2003					
4-Bromofluorobenzene (Surr)	104		%	EPA 8260B	10/6/2003					

Approved By: R P Furry

Date: 10/7/2003

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	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.		Relative	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
TPH as Diesel	Blank	<50	1000	1000	1030	1040	ug/L	M EPA 8015	10/3/03	103	104	1.17	70-130	25 🗼
Benzene	35202-04	26	39.3	39.4	63.4	60.7	ug/L	EPA 8260B	10/3/03	93.7	86.9	7.58	70-130	25
Toluene	35202-04	<0.50	39.3	39.4	41.4	40.9	ug/L	EPA 8260B	10/3/03	105	104	1.41	70-130	25
Tert-Butanol	35202-04	5.3	196	197	204	218	ug/L	EPA 8260B	10/3/03	101	108	6.26	70-130	25
Methyl-t-Butyl Eth	ner 35202-04	6.9	39.3	39.4	46.7	47.6	ug/L	EPA 8260B	10/3/03	101	103	1.84	70-130	25
Benzene	35246-14	<0.50	40.0	40.0	39.6	38.1	ug/L	EPA 8260B	10/6/03	98.9	95.2	3.81	70-130	25
Toluene	35246-14	<0.50	40.0	40.0	38.9	37.9	ug/L	EPA 8260B	10/6/03	97.2	94.8	2.45	70-130	25
Tert-Butanol	35246-14	<5.0	200	200	209	207	ug/L	EPA 8260B	10/6/03	104	103	1.10	70-130	25
Methyl-t-Butyl Eth	ner 35246-14	<0.50	40.0	40.0	38.6	38.5	ug/L	EPA 8260B	10/6/03	96.6	96.2	0.415	70-130	25

Approved By: R P Furry

Date: 10/7/2003

QC Report : Laboratory Control Sample (LCS)

Project Name: NAZ Eagle Gas

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	10/3/03	104	70-130	
Toluene	40.0	ug/L	EPA 8260B	10/3/03	107	70-130	
Tert-Butanol	200	ug/L	EPA 8260B	10/3/03	103	70-130	
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	10/3/03	96.8	70-130	
Benzene	40.0	ug/L	EPA 8260B	10/6/03	99.2	70-130	
Toluene	40.0	ug/L	EPA 8260B	10/6/03	97.0	70-130	
Tert-Butanol	200	ug/L	EPA 8260B	10/6/03	101	70-130	
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	10/6/03	96.3	70-130	

Approved By: R P Furry

KIFF				2795 2nd Street, Suite 300 Davis, CA 95616 Lab: 530.297.4800 Fax: 530.297.4808  California EDF Report?											Chain-of-Custody Record and Analysis Request													est	_					
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