


CLEARWATER
G R O U P
Environmental Services

12096

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

June 16, 2004

Re: Groundwater Monitoring Report, Second Quarter 2004
Eagle Gas Station
4301 San Leandro Street
Oakland, California 94601
LOP Site ID# 2118
Clearwater Project No. ZP046B
USTCF Claim No. 014551

Alameda County
JUN 23 2004
Environmental Health

Dear Mr. Gholami:

The Clearwater Group (Clearwater) has prepared the following letter report of second quarter 2004 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

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 (**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 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 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 ($\mu\text{g/L}$) to 250,000 $\mu\text{g/L}$ total petroleum hydrocarbons as gasoline, (TPHg), and 33,000 $\mu\text{g/L}$ to 400,000 $\mu\text{g/L}$ 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 May 17, 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 (**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 10.92 (MW-2) to 14.68 (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 in a generally southerly direction with a gradient of 0.022 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 southeasterly direction, approximately 45 degrees to the north of this monitoring events 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 920 µg/L (MW-3) to 5,400 µg/L (MW-1). MTBE was detected in samples collected from all three monitoring wells in concentrations ranging from 60,000 µg/L (MW-1) to 760,000 µg/L (MW-2). Detections of TAME were reported this quarter in all three wells with concentrations ranging from 260 µg/L (MW-1) to 2,500 µg/L (MW-2). Samples collected from MW-1, 2, and 3 contained reportable concentrations of TBA at a concentration of 160,000 µg/L, 13,000J µg/L and 5,600J µg/L respectively. Tert-Butanol results for samples MW-2 and MW-3 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. Samples collected from MW-2 contained reportable concentrations of benzene (860 µg/L). Laboratory analytical results are summarized in **Table 3** and shown on **Figure 4**.

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 TPHd increased in all three wells this monitoring period from the previous event. Concentrations of MTBE in MW-1 and MW-2 returned to levels more consistent with previous reports. Concentration of TBA in MW-1 doubled this



monitoring event from the previous 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

Figures

- Figure 1: Site Location Map
- Figure 2: Site Plan
- Figure 3: Groundwater Elevation Map - 4/17/04
- Figure 4: Dissolved Hydrocarbon Map - 4/17/04

Tables

- Table 1: Well Construction Data
- Table 2: Soil Sample Analytical Data
- Table 3: Groundwater Elevation and Analytical Data

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

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

Certification

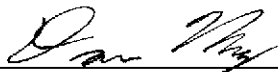
This report was prepared under the supervision of a professional Registered Geologist in the State of California. All statements, conclusions and recommendations are based solely upon published results from previous consultants, field observations by Clearwater and laboratory analyses performed by a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

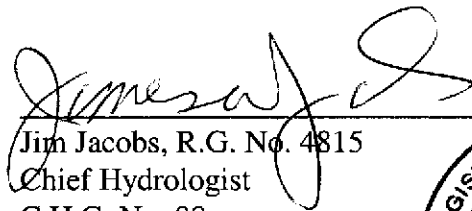
The service provided by Clearwater has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of this profession currently practicing under similar conditions in the area of the site. No other warranty, expressed or implied, is made.

Prepared by:

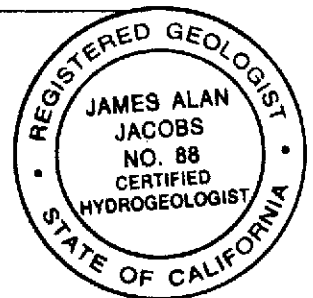
Reviewed by:



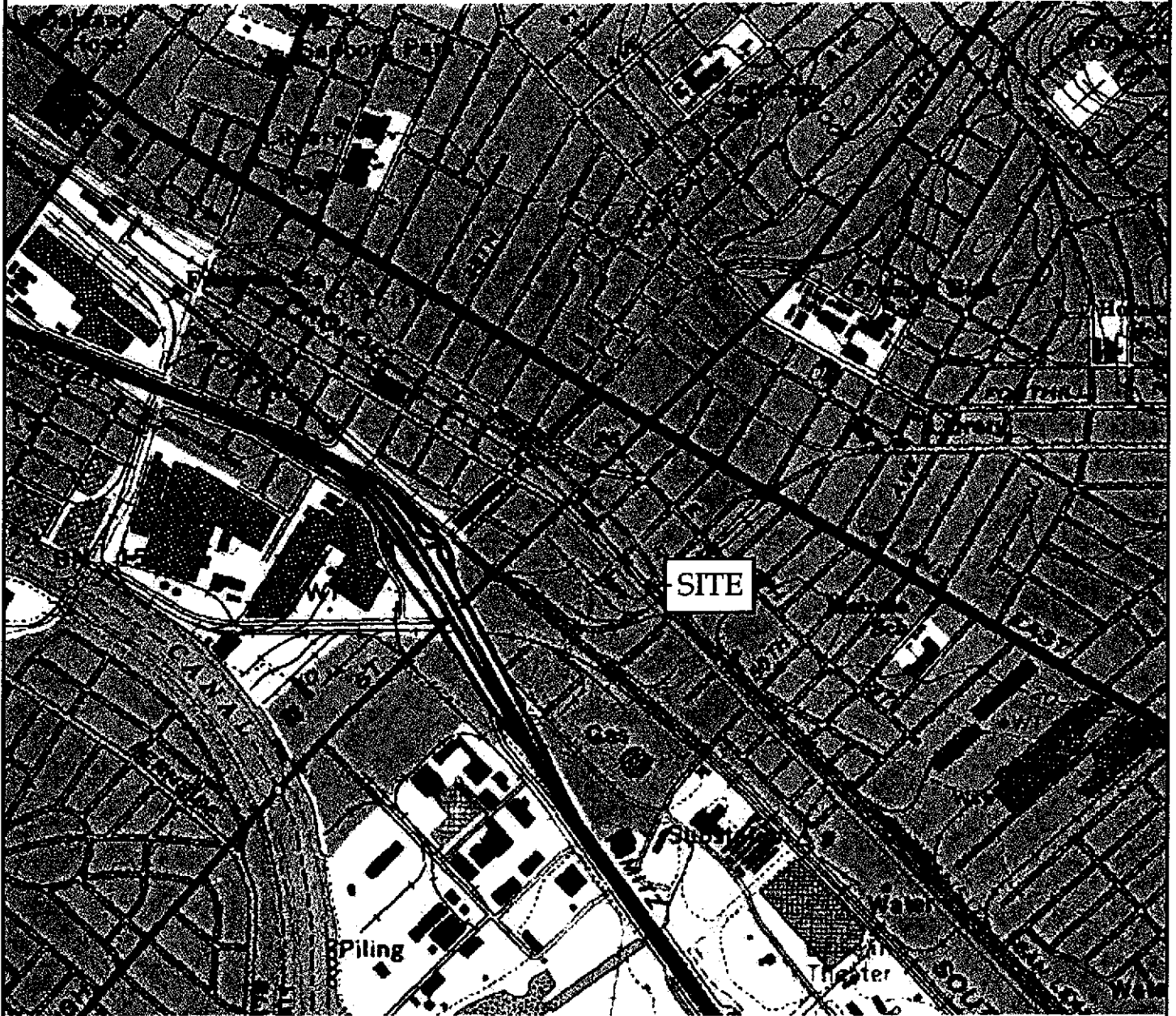
David Mog, P.E. No. C39782
Principal Engineer



Jim Jacobs, R.G. No. 4815
Chief Hydrologist
C.H.G. No. 88



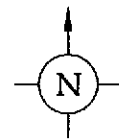
Figures



SITE

Piling

Theater



NOT TO SCALE

SITE LOCATION MAP
Eagle Gas
4301 San Leandro Street
Oakland, California

CLEARWATER GROUP

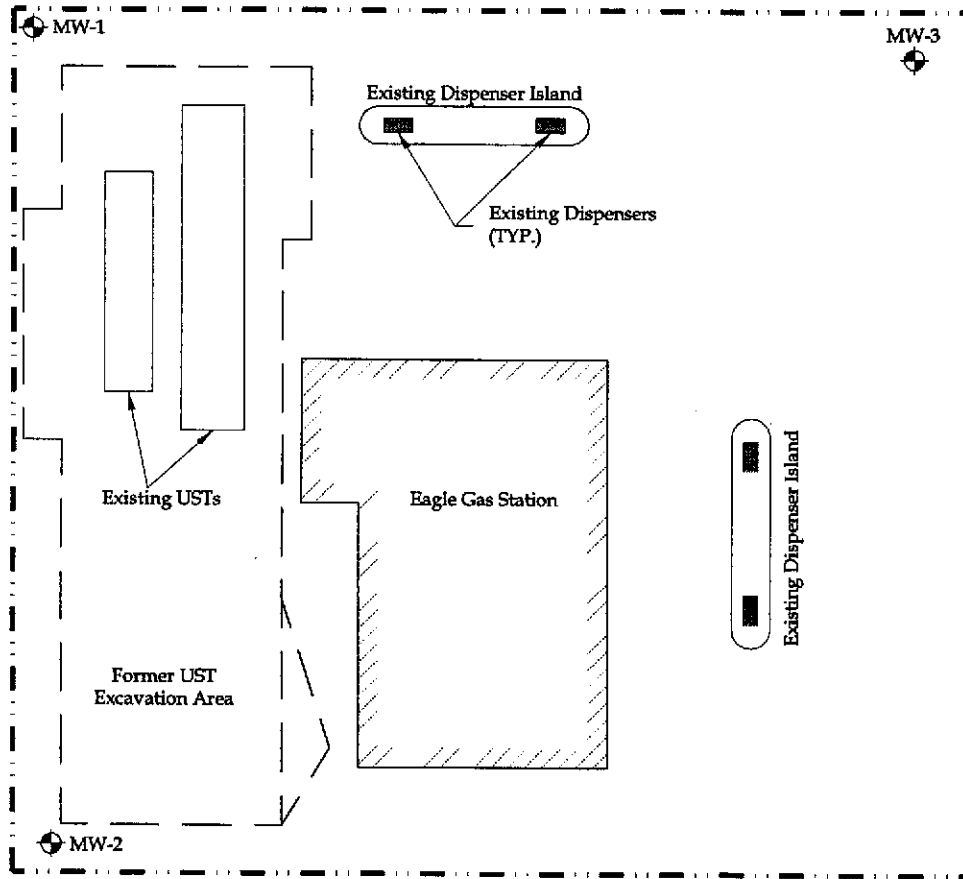
Project No.
ZP046B

Figure Date
1/04

Figure
1

HIGH STREET

Public Sidewalk



Adjacent Commercial Structure

Existing USTs

Former UST Excavation Area

Eagle Gas Station

Existing Dispenser Island

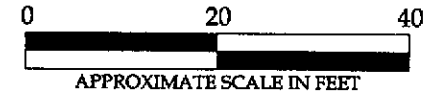
Existing Dispensers (TYP.)

Existing Dispenser Island

Public Sidewalk

SAN LEANDRO STREET

Adjacent Commercial Structure



LEGEND

- PROPERTY LINE
- ⊕ MW-1 MONITORING WELL

SITE MAP
 Eagle Gas
 4301 San Leandro Street
 Oakland, California

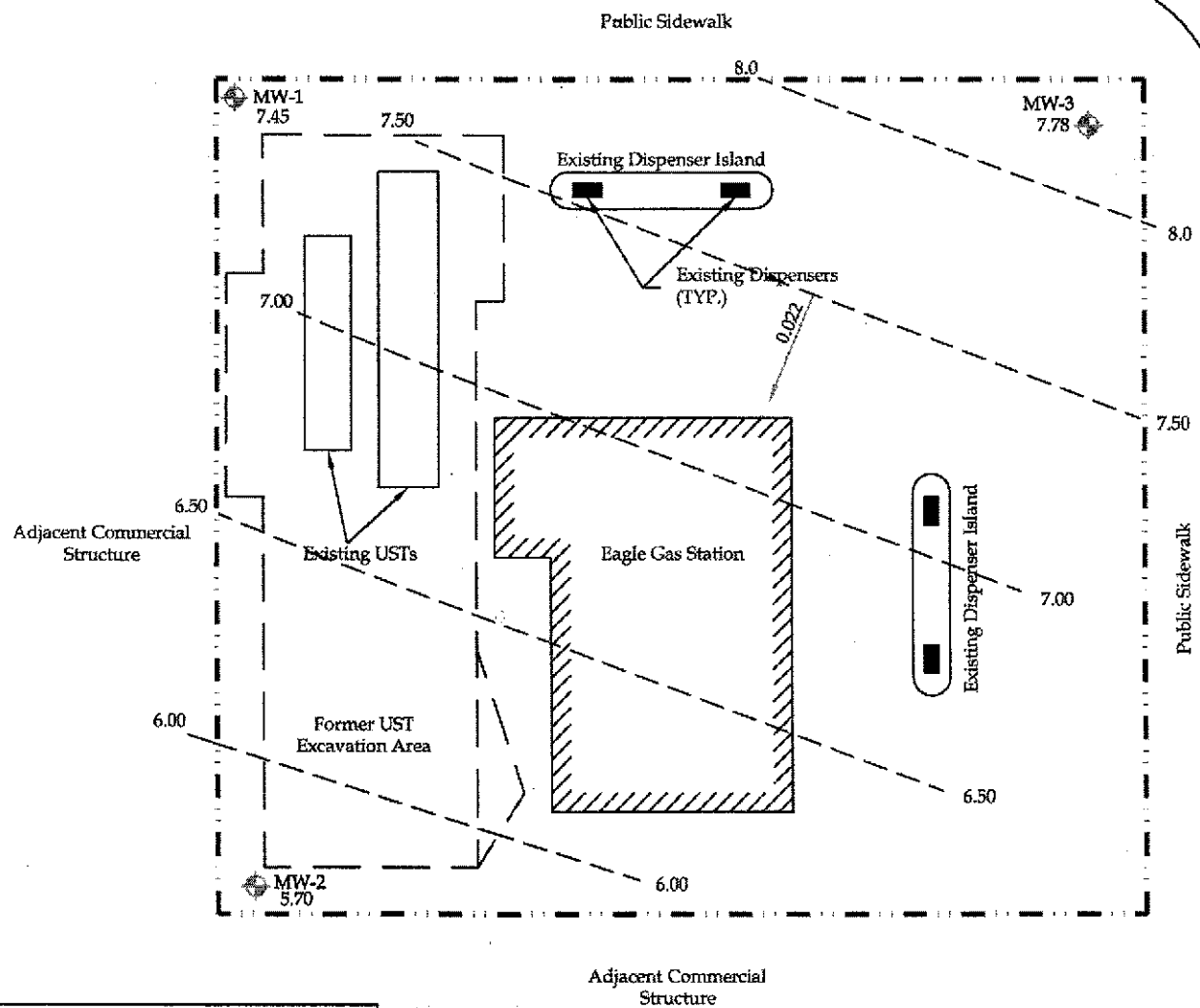
CLEARWATER GROUP

Project No.
 ZP046B

Figure Date
 4/01

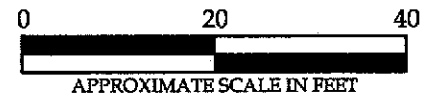
Figure
 2

HIGH STREET



LEGEND

- 0.037 ft/ft APPROX. GROUNDWATER FLOW DIRECTION & GRADIENT
- 6.5 GROUNDWATER ELEVATION CONTOUR (HEIGHT IN FEET ABOVE MSL)
- PROPERTY LINE
- ⊕ MW-1 MONITORING WELL



GROUNDWATER ELEVATION MAP

Eagle Gas
 4301 San Leandro Street
 Oakland, California

CLEARWATER GROUP

Project No.
 ZP046B

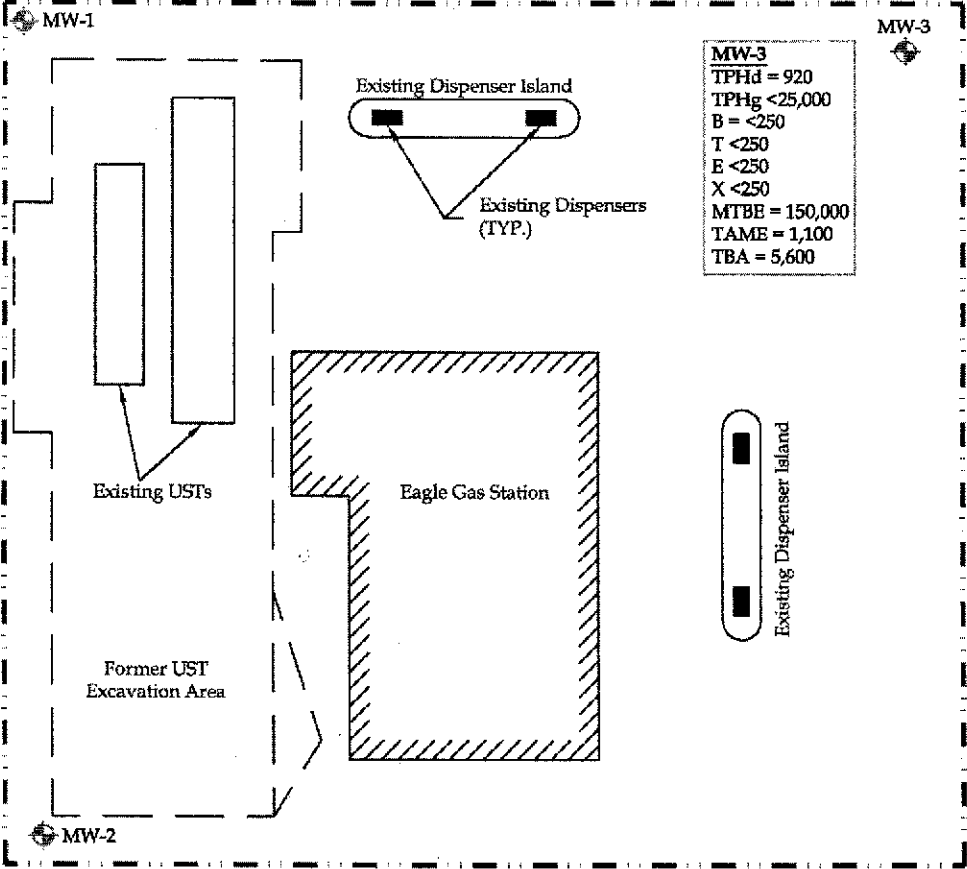
Figure Date
 6/04

Figure
 3

HIGH STREET

Public Sidewalk

MW-1
 TPHd = 5,400
 TPHg <15,000
 B < 150
 T <150
 E <150
 X <150
 MTBE = 60,000
 TAME = 260
 TBA = 160,000



MW-3
 TPHd = 920
 TPHg <25,000
 B = <250
 T <250
 E <250
 X <250
 MTBE = 150,000
 TAME = 1,100
 TBA = 5,600

Adjacent Commercial Structure

MW-2
 TPHd = 2,500
 TPHg <50,000
 B = 860
 T <500
 E = <500
 X <500
 MTBE = 760,000
 TAME = 2,500
 TBA < 13,000

Former UST Excavation Area

Eagle Gas Station

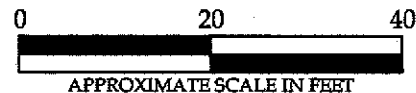
Adjacent Commercial Structure

LEGEND

MW-1
 TPHd = 1,800
 TPHg <10,000
 B < 100
 T <100
 E <100
 X <100
 MTBE = 85,000
 TAME = 390
 TBA = 79,000

CONCENTRATIONS OF: TOTAL PETROLEUM HYDROCARBONS AS DESEIL (TPHd), HYDROCARBONS AS GASOLINE (TPHg), BENZENE (B), TOULENE (T), ETHYLBENZENE (E), TOTAL XYLENES (X), AND METHYL TERT-BUTYL ETHER (MTBE), TERT AMYL METHYL ETHER (TAME), TERTIARY BUTYL ALCOHOL (TBA). ALL CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (µg/L)

--- PROPERTY LINE
 MW-1 MONITORING WELL



DISSOLVED HYDROCARBON MAP

Eagle Gas
 4301 San Leandro Street
 Oakland, California

CLEARWATER GROUP

Project No.
ZP046B

Figure Date
6/04

Figure
4

Tables

Table 1
WELL CONSTRUCTION DATA
Eagle Gas
 4301 San Leandro Street
 Oakland, California
 Clearwater Group Project No. ZP046A

Well I.D.	Date Installed	Borehole Diameter (inches)	Depth of Borehole (feet)	Casing Diameter (inches)	Screened Interval (feet)	Filter Pack (feet)	Bentonite Seal (feet)	Cement (feet)
MW-1	9/26/00	8	25	2	10-25	6-25	3-6	0-3
MW-2	9/26/00	8	25	2	10-25	6-25	3-6	0-3
MW-3	9/26/00	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	4/21/99	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

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
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NOTES:

- 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 tertiary butyl ether by EPA Method 8260B
- TAME Tertiary amyl methyl ether by EPA Method 8260B
- 1,2-DCA 1,2-Dichloroethane by EPA Method 8260B
- EDB Ethylene dibromide by EPA Method 8260B
- TBA Tertiary butyl alcohol by EPA Method 8260B
- mg/Kg milligrams per kilogram
- no samples collected, no data available
- ND Not detected in concentrations above laboratory reporting limit

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)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	DIPE (µg/L)	ETBE (µg/L)	TAME (µg/L)	TBA (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
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
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	---	---	---	---	---	---	---	---	---	---	---
	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

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)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	DIPE (µg/L)	ETBE (µg/L)	TAME (µg/L)	TBA (µg/L)
	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

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 tertiary 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

CLEARWATER GROUP

229 Tewksbury Ave, Point Richmond, CA 94801
 Phone: (510)307-9943 Fax: (510) 232-2823

WELL GAUGING/PURGING CALCULATIONS DATA SHEET

Date: 5/17 Job No.: ZP0463 Location: 1301 SAN LEANDRO ST., OAKLAND, CA

Tech(s): Rodney Berry

Drums on Site @ TOA: 1/3
 Soil: 0 Water: DRUM

Drums on Site @ TOD: 1/2
 Soil: 0 Water: 1/2 DRUM

Well No	Diameter (in)	DTB (ft)	DTW (ft)	ST (ft)	CV (gal)	PV (gal)	SPL (ft)	Notes
MW1	2	24.52	10.92	13.6	2.17	6.52		
MW2	2	24.78	14.68	10.1	1.61	4.84		
MW3	2	23.13	11.87	11.26	1.80	5.40		

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

PURGING DATA

SHEET 1 OF 10

Job No.: EPD46B Location: 4301 SAN LEANDRO ST OAKLAND, CA Date: 5/17/04 Tech: RODNEY BERRY

1145

WELL No.	TIME	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	
MW-1	1122	1	1390	67.1	6.76	Sample for:
Calc. purge	1127	3	1389	67.1	6.73	TPHg (circled) TPHd (circled) 8010
volume	1133	6.52	1389	67.1	6.72	BTEX (circled) Other 50xys EPA 8260B
<u>6.52</u>						Purging Method:
						PVC bailer / Pump (circled)
COMMENTS: color, turbidity, recharge, sheen						Sampling Method:
<u>CLEAR, low, good, odor, sheen</u>						Dedicated / Disposable bailer (circled)

1215

WELL No.	TIME	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	
MW-3	1156	1	714	74.0	7.02	Sample for:
Calc. purge	1203	3	722	73.5	7.02	TPHg (circled) TPHd (circled) 8010
volume	1208	5.40	618	72.5	7.02	BTEX (circled) Other 50xys EPA 8260B
<u>5.40</u>						Purging Method:
						PVC bailer / Pump (circled)
COMMENTS: color, turbidity, recharge, sheen						Sampling Method:
<u>CLEAR, low, good, no sheen</u>						Dedicated / Disposable bailer (circled)

1245

WELL No.	TIME	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	
MW-2	1233	1	1330	68.9	6.82	Sample for:
Calc. purge	1227	2	1335	68.3	6.83	TPHg (circled) TPHd (circled) 8010
volume	1236	4.84	1330	67.4	6.84	BTEX (circled) Other 50xys EPA 8260B
<u>4.84</u>						Purging Method:
						PVC bailer / Pump (circled)
COMMENTS: color, turbidity, recharge, sheen						Sampling Method:
<u>CLEAR, low, poor, no sheen, odor</u>						Dedicated / Disposable bailer (circled)

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 dewater. 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.



Report Number : 38365

Date : 5/26/2004

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,



Jbel Kiff



Report Number : 38365

Date : 5/26/2004

Subject : 3 Water Samples
Project Name : NAZ EAGLE GAS
Project Number : ZP046B

Case Narrative

Tert-Butanol results for samples MW-2 and MW-3 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:

A handwritten signature in black ink, appearing to read "Joel Kiff".

Joel Kiff



Report Number : 38365

Date : 5/26/2004

Project Name : NAZ EAGLE GAS

Project Number : ZP046B

Sample : MW-1

Matrix : Water

Lab Number : 38365-01

Sample Date :5/17/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 150	150	ug/L	EPA 8260B	5/22/2004
Toluene	< 150	150	ug/L	EPA 8260B	5/22/2004
Ethylbenzene	< 150	150	ug/L	EPA 8260B	5/22/2004
Total Xylenes	< 150	150	ug/L	EPA 8260B	5/22/2004
Methyl-t-butyl ether (MTBE)	60000	150	ug/L	EPA 8260B	5/22/2004
Diisopropyl ether (DIPE)	< 150	150	ug/L	EPA 8260B	5/22/2004
Ethyl-t-butyl ether (ETBE)	< 150	150	ug/L	EPA 8260B	5/22/2004
Tert-amyl methyl ether (TAME)	260	150	ug/L	EPA 8260B	5/22/2004
Tert-Butanol	160000	700	ug/L	EPA 8260B	5/22/2004
TPH as Gasoline	< 15000	15000	ug/L	EPA 8260B	5/22/2004
Toluene - d8 (Surr)	95.8		% Recovery	EPA 8260B	5/22/2004
4-Bromofluorobenzene (Surr)	97.5		% Recovery	EPA 8260B	5/22/2004
TPH as Diesel	5400	50	ug/L	M EPA 8015	5/25/2004
Octacosane (Diesel Surrogate)	97.4		% Recovery	M EPA 8015	5/25/2004

Approved By:

Joel Kiff



Report Number : 38365

Date : 5/26/2004

Project Name : NAZ EAGLE GAS

Project Number : ZP046B

Sample : MW-2

Matrix : Water

Lab Number : 38365-02

Sample Date :5/17/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	860	500	ug/L	EPA 8260B	5/22/2004
Toluene	< 500	500	ug/L	EPA 8260B	5/22/2004
Ethylbenzene	< 500	500	ug/L	EPA 8260B	5/22/2004
Total Xylenes	< 500	500	ug/L	EPA 8260B	5/22/2004
Methyl-t-butyl ether (MTBE)	760000	2000	ug/L	EPA 8260B	5/24/2004
Diisopropyl ether (DIPE)	< 500	500	ug/L	EPA 8260B	5/22/2004
Ethyl-t-butyl ether (ETBE)	< 500	500	ug/L	EPA 8260B	5/22/2004
Tert-amyl methyl ether (TAME)	2500	500	ug/L	EPA 8260B	5/22/2004
Tert-Butanol	13000 J	2500	ug/L	EPA 8260B	5/22/2004
TPH as Gasoline	< 50000	50000	ug/L	EPA 8260B	5/22/2004
Toluene - d8 (Surr)	95.2		% Recovery	EPA 8260B	5/22/2004
4-Bromofluorobenzene (Surr)	98.2		% Recovery	EPA 8260B	5/22/2004
TPH as Diesel	2500	50	ug/L	M EPA 8015	5/25/2004
Octacosane (Diesel Surrogate)	108		% Recovery	M EPA 8015	5/25/2004

Approved By:


Joel Kiff



Report Number : 38365

Date : 5/26/2004

Project Name : NAZ EAGLE GAS

Project Number : ZP046B

Sample : MW-3

Matrix : Water

Lab Number : 38365-03

Sample Date :5/17/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 250	250	ug/L	EPA 8260B	5/22/2004
Toluene	< 250	250	ug/L	EPA 8260B	5/22/2004
Ethylbenzene	< 250	250	ug/L	EPA 8260B	5/22/2004
Total Xylenes	< 250	250	ug/L	EPA 8260B	5/22/2004
Methyl-t-butyl ether (MTBE)	150000	250	ug/L	EPA 8260B	5/22/2004
Diisopropyl ether (DIPE)	< 250	250	ug/L	EPA 8260B	5/22/2004
Ethyl-t-butyl ether (ETBE)	< 250	250	ug/L	EPA 8260B	5/22/2004
Tert-amyl methyl ether (TAME)	1100	250	ug/L	EPA 8260B	5/22/2004
Tert-Butanol	5600 J	1500	ug/L	EPA 8260B	5/22/2004
TPH as Gasoline	< 25000	25000	ug/L	EPA 8260B	5/22/2004
Toluene - d8 (Surr)	95.6		% Recovery	EPA 8260B	5/22/2004
4-Bromofluorobenzene (Surr)	97.2		% Recovery	EPA 8260B	5/22/2004
TPH as Diesel	920	50	ug/L	M EPA 8015	5/25/2004
Octacosane (Diesel Surrogate)	111		% Recovery	M EPA 8015	5/25/2004

Approved By:

Joel Kiff

Report Number : 38365

Date : 5/26/2004


QC Report : Method Blank Data

Project Name : **NAZ EAGLE GAS**

Project Number : **ZP046B**

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
TPH as Diesel	< 50	50	ug/L	M EPA 8015	5/22/2004
Octacosane (Diesel Surrogate)	89.0		%	M EPA 8015	5/22/2004
Benzene	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Toluene	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Methyl-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Diisopropyl ether (DIPE)	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Ethyl-t-butyl ether (ETBE)	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Tert-amyl methyl ether (TAME)	< 0.50	0.50	ug/L	EPA 8260B	5/24/2004
Tert-Butanol	< 5.0	5.0	ug/L	EPA 8260B	5/24/2004
TPH as Gasoline	< 50	50	ug/L	EPA 8260B	5/24/2004
Toluene - d8 (Surr)	101		%	EPA 8260B	5/24/2004
4-Bromofluorobenzene (Surr)	99.7		%	EPA 8260B	5/24/2004
Benzene	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Toluene	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Ethylbenzene	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Total Xylenes	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Methyl-t-butyl ether (MTBE)	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Diisopropyl ether (DIPE)	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Ethyl-t-butyl ether (ETBE)	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Tert-amyl methyl ether (TAME)	< 0.50	0.50	ug/L	EPA 8260B	5/21/2004
Tert-Butanol	< 5.0	5.0	ug/L	EPA 8260B	5/21/2004
TPH as Gasoline	< 50	50	ug/L	EPA 8260B	5/21/2004
Toluene - d8 (Surr)	94.5		%	EPA 8260B	5/21/2004
4-Bromofluorobenzene (Surr)	97.4		%	EPA 8260B	5/21/2004

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
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Approved By:  _____
 Joel Kiff

Report Number : 38365

Date : 5/26/2004

QC Report : Matrix Spike/ Matrix Spike Duplicate

Project Name : **NAZ EAGLE GAS**

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.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
TPH as Diesel	Blank	<50	1000	1000	924	890	ug/L	M EPA 8015	5/22/04	92.4	89.0	3.74	70-130	25
Benzene	38404-02	<0.50	40.0	40.0	37.6	36.6	ug/L	EPA 8260B	5/24/04	93.9	91.6	2.44	70-130	25
Toluene	38404-02	<0.50	40.0	40.0	37.4	37.2	ug/L	EPA 8260B	5/24/04	93.4	93.1	0.288	70-130	25
Tert-Butanol	38404-02	<5.0	200	200	184	185	ug/L	EPA 8260B	5/24/04	92.1	92.6	0.538	70-130	25
Methyl-t-Butyl Ether	38404-02	<0.50	40.0	40.0	39.7	40.0	ug/L	EPA 8260B	5/24/04	99.2	99.9	0.724	70-130	25
Benzene	38392-03	<0.50	40.0	40.0	41.9	41.4	ug/L	EPA 8260B	5/21/04	105	104	1.12	70-130	25
Toluene	38392-03	<0.50	40.0	40.0	39.0	38.0	ug/L	EPA 8260B	5/21/04	97.5	95.1	2.49	70-130	25
Tert-Butanol	38392-03	5.3	200	200	215	213	ug/L	EPA 8260B	5/21/04	105	104	0.864	70-130	25
Methyl-t-Butyl Ether	38392-03	<0.50	40.0	40.0	42.7	42.7	ug/L	EPA 8260B	5/21/04	107	107	0.120	70-130	25

KIFF ANALYTICAL, LLC

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

Approved By:  Joel Kiff

Report Number : 38365

QC Report : Laboratory Control Sample (LCS)

Date : 5/26/2004

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	5/24/04	93.3	70-130
Toluene	40.0	ug/L	EPA 8260B	5/24/04	94.7	70-130
Tert-Butanol	200	ug/L	EPA 8260B	5/24/04	92.7	70-130
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	5/24/04	99.8	70-130
Benzene	40.0	ug/L	EPA 8260B	5/21/04	104	70-130
Toluene	40.0	ug/L	EPA 8260B	5/21/04	97.6	70-130
Tert-Butanol	200	ug/L	EPA 8260B	5/21/04	101	70-130
Methyl-t-Butyl Ether	40.0	ug/L	EPA 8260B	5/21/04	106	70-130

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Approved By:


Joel Kiff

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

