

GETTLER-RYAN INC.

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TRANSMITTAL

TO: Mr. Dave DeWitt
ConocoPhillips
76 Broadway
Sacramento, CA 95818

DATE: August 28, 2003
PROJECT NO. 140175.08
SUBJECT: ConocoPhillips (76) Station
4186
Livermore, California

From: Jeremy Smith

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	8/28/03	Ozone Microsparge System Semi-Annual Status Report

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COMMENTS:

Dave- Here is the System Status Report for Station 4186.

Alameda County

SEP 04 2003

Environmental Health

Signed: _____



COPIES TO:

Ms. Eva Chu, Alameda County Environmental Health Services
1131 Harbor Bay Parkway, Alameda, CA 94502

Ms. Carol Mahoney, Zone 7 Water Agency
5997 Parkside Drive, Pleasanton, CA 94588



GETTLER - RYAN INC.

August 28, 2003

Mr. David DeWitt
ConocoPhillips
76 Broadway
Sacramento, CA 95818

Alameda County
SEP 04 2003
Environmental Health

**RE: Ozone Microsparge Remedial System Semi-Annual Status Report
ConocoPhillips (76) Service Station No. 4186
1771 First Street, Livermore, California**

At the request of ConocoPhillips, Gettler-Ryan Inc. (GR), has prepared this report documenting the status of operation during the months from January 2003 through June 2003 of an ozone microsparge remedial system, installed at the site (Figure 1) to address petroleum hydrocarbon impacted groundwater. The remedial system was placed into operation on December 19, 2001. The system injects a mixture of ozone and air into the eight sparge points at the site (Figure 2). A description of the installation and startup of the remedial system can be found in GR's report *Groundwater Monitoring Well and Ozone Microsparge System Installation Report*, dated February 6, 2002.

The primary concerns at this site are Total Petroleum Hydrocarbons as gasoline (TPHg), benzene, methyl tertiary butyl ether (MtBE), and tert-Butyl Alcohol (TBA). Groundwater sampling began at the site in 1998 after the installation of monitoring wells U-1 through U-3. In February 2001, GR installed two offsite wells U-4 and U-5. Onsite wells U-6 and U-7 were subsequently added during the system installation activities in December 2001. The quarterly sampling event before beginning the ozone sparge system was in October 2001, while the last quarterly sampling event used in this evaluation was in May 2003. The original laboratory data reports for the quarterly events are included in the quarterly groundwater monitoring and sampling reports previously submitted under separate cover, and are not included in this report. A summary table of historical analytical results is presented in Table 1 and 2.

Ozone Micro Sparging - System Overview

The ozone sparge system, manufactured by KVA, was placed into operation on December 19, 2001, and is designed to cycle the ozone/oxygen injection between the 8-points. Ozone microsparging is a process where ozone in air is introduced into the groundwater at low flow rates (2-6 cubic feet per minute) through specially designed microporous plastic spargers to create "microbubbles". As these microbubbles rise within the column of water, the dissolved volatile organic compounds (VOCs) are rapidly oxidized. The schedule is currently set to cycle through each point 16 times per day, for between 5 and 15 minutes per point per cycle. The schedule can be varied as part of the system evaluation process.

Groundwater Sampling

In order to evaluate system effectiveness, periodic sampling of selected groundwater monitoring wells has been performed at the site. Wells U-3 and U-6 were selected for sampling and have been sampled on a monthly basis starting in June of 2003. Well U-3 is adjacent to the underground storage tanks (USTs) and well U-6 is downgradient of the USTs. Well U-3 is within the treatment area and the zone of influence of one or more sparge points. Wells U-3 and U-6 are approximately 110 feet apart. Well U-3 has extensive historical sampling data prior to the system activation. This well was installed in 1998 and has been sampled quarterly since that time.

Groundwater samples from the wells at the site were analyzed for TPHg by either EPA Method 8015 modified or Method 8260, benzene, toluene, ethylbenzene, and total xylenes (BTEX), MtBE, and tertiary butyl alcohol (TBA) by EPA Method 8260 or Method 8021. Groundwater analytical results for the wells are presented in Tables 1 and 2. Charts of groundwater concentrations over time for wells U-1, U-3, U-6, and U-7 are presented on Figures 3, 4, 5, and 6. If an analyte was reported as not detected, a value of one half the detection limit was utilized during chart preparation. The complete laboratory analytical report and chain of custody record for the June 19, 2003 monthly groundwater sampling event is attached in Appendix A.

OBSERVATIONS

TPHg Concentrations

Figures 3, 4, 5, and 6 illustrate the TPHg concentrations from quarterly and monthly sampling from select wells (U-1, U-3, U-6, and U-7) from October 2001 (U-1 and U-3) and January 2002 (U-6 and U-7) through June 2003. The TPHg concentrations reported in U-1 have historically been below detection limits. However, since the system startup on December 19, 2001, U-1 has been reported to contain detectable concentrations of TPHg on two occasions. During the most recent sampling events (December 30, 2003 and May 2, 2003), the TPHg concentration has returned to below detection limits. The TPHg concentration in U-3 has shown an increase from 6,100 ppb on October 8, 2001 to 13,000 ppb on June 19, 2003, however the TPHg concentration has been decreasing since December 2002. U-6 and U-7 were installed at the same time as the system; therefore, they were not sampled until after the system was running at the site. The initial TPHg concentration on January 3, 2002 was 5,000 ppb in U-6 and dropped to 68 ppb on June 19, 2003. This represents a 99% decrease in concentration over the time period. The initial TPHg concentration in U-7 on January 3, 2002 was 3,100 ppb and 3,000 ppb on May 2, 2003. This represents a 3% decrease in concentration over the time period.

Benzene Concentrations

Figures 3, 4, 5, and 6 illustrate the benzene concentrations from quarterly and monthly sampling from select wells (U-1, U-3, U-6, and U-7) from October 2001 (U-1 and U-3) and January 2002 (U-6 and U-7) through June 2003. Benzene has historically not been detected in U-1. The benzene concentration reported in U-3 was 500 ppb on October 8, 2001 and on June 19, 2003, 230 ppb. This represents a decrease of 54%. The benzene concentration in U-6 has declined from 36 ppb on January 3, 2002 to below laboratory detection limits (0.50 ppb) on June 19, 2003. The benzene concentration in U-7 has declined from 93 ppb on January 3, 2002 to 17 ppb on May 2, 2003. This represents a greater than 98% decrease in well U-6 and an 82% decrease in well U-7 over the time period.

MtBE Concentrations

Figures 3, 4, 5, and 6 also illustrate the MtBE concentrations from quarterly and monthly sampling from select wells (U-1, U-3, U-6, and U-7) from October 2001 (U-1 and U-3) and January 2002 (U-6 and U-7) through June 2003. The MtBE concentration was reported at <5 ppb in U-1 on October 8, 2001 and at 50 ppb on May 2, 2003. The MtBE concentration in U-3 was reported as 22,000 ppb on October 8, 2001, and 20,000 ppb on June 19, 2003. This represents a decrease of 9%. The MtBE concentration in U-6 was reported as below detection limits (10 ppb) on January 3, 2002 and at 50 ppb on June 19, 2003. The MtBE concentration in U-7 was reported as 130 ppb on January 3, 2001, and 42 ppb on May 2, 2003. This represents a decrease of 68%.

TBA Concentrations

TBA has historically been detected in well U-3 since October 20, 2000. TBA is a known daughter product of MtBE degradation. Although concentrations of TBA have historically fluctuated in well U-3, an overall decline in concentrations has been observed since April 5, 2002. TBA has decreased by 62% since April 5, 2002. Figure 4 illustrates the TBA concentrations from October 8, 2002 through June 19, 2003.

DISCUSSION OF RESULTS

Initially, there were increases in petroleum hydrocarbon concentrations in the groundwater in three of the wells selected for system progress monitoring (U-1, U-3, and U-7). This is believed to be due to the desorption of hydrocarbons from soil caused by the aggressive mechanical scrubbing action of the microbubbles. In terms of overall treatment, this desorption is necessary to achieve effective, long-term treatment.

The ozone treatment appears to be effective at decreasing TPHg, benzene and MtBE concentrations in the groundwater beneath the site. All three constituents have decreased in MW-7. Benzene has decreased in U-3, U-6, and U-7 over the evaluation period. MtBE has decreased by 32% and 68% in U-3 and U-7, respectively, during the evaluation period. However, some concentrations have increased, probably due to the continued desorption of hydrocarbons from the soil.

The other onsite wells have demonstrated reductions in hydrocarbon concentrations following the system installation. Concentrations of TPHg, benzene, and MtBE in well U-2 have been reduced to below laboratory detection limits. Wells U-4 and U-5 have also exhibited decreases in MtBE concentrations during the evaluation period of 52% and 66%, respectively.

CONCLUSIONS AND RECOMMENDATIONS

The results of the concentration versus time charts show that hydrocarbon concentrations have declined in some wells and increased in others during the remedial system operation. Overall, the ozone sparging system is demonstrating to be successful in reducing petroleum concentrations in the groundwater at this site. This includes TPHg, benzene, MtBE, and TBA which are the compounds of primary concern. The initial increases in petroleum concentrations that have been observed, primarily in impacted soil areas, have been and are expected to be short term followed by continuous concentration decreases. It is believed that these increases are due to accelerated desorption caused by the aggressive mechanical scrubbing action of the microbubbles. Although contaminant concentrations initially increase, overall this process will accelerate the long term remediation of the site.

Based on the presence of fine grained soils beneath the site, observed during drilling activities, GR anticipates that the completion of the remedial activities may take longer than those observed at other sites underlain by coarser sediments.

During the fourth quarter of 2002, the system had several mechanical failures causing the system to run only periodically during the fourth quarter 2002. GR installed a new compressor in January 2003 and repaired the other mechanical problems. GR will continue to perform operation and maintenance checks on the system on a twice-monthly basis.

The current ozone injection addresses the dissolved impact onsite and also acts as a barrier to mitigate any continuing migration of dissolved hydrocarbons offsite. Treatment directly offsite is not feasible due to the proximity of First Street, however two offsite wells (U-4 and U-5) exist offsite downgradient across First Street and will continue to be sampled on a quarterly basis.

The ozone microsparge system will continue to operate for at least the next year. In order to gain a better understanding of groundwater conditions beneath the site, groundwater samples from wells

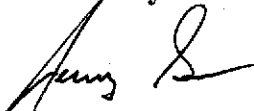
U-3 and U-6 will continue to be collected on a monthly basis. An additional semi-annual status report will be prepared after receipt and review of an additional six months of groundwater data.

System Information

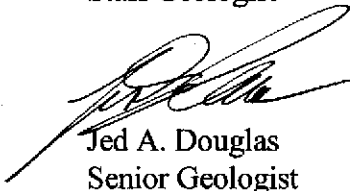
Startup Date: December 19, 2001
Months of Operation: 18
Number of ozone injection points: 8 (SP-1 through SP-8)
Monthly groundwater sampling: U-3 and U-6

If you have any questions or comments concerning the contents of the report, please feel free to contact either of us at 707.789.3255.

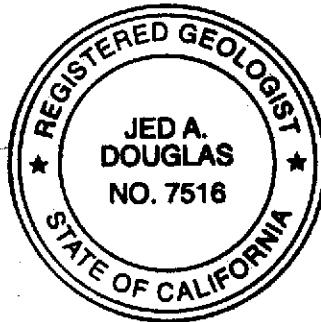
Sincerely,
Gettler-Ryan Inc.



Jeremy A. Smith
Staff Geologist



Jed A. Douglas
Senior Geologist
R.G. No. 7516



Attachments:

- Table 1: Groundwater Monitoring Data and Analytical Results
- Table 2: Groundwater Analytical Results – Oxygenate Compounds
- Figure 1: Vicinity Map
- Figure 2: Site Plan
- Figure 3: Chart of Groundwater Concentration versus Time, U-1
- Figure 4: Chart of Groundwater Concentration versus Time, U-3
- Figure 5: Chart of Groundwater Concentration versus Time, U-6
- Figure 6: Chart of Groundwater Concentration versus Time, U-7
- Appendix A: Laboratory Analytical Results and Chain of Custody Records

Table 1
Groundwater Monitoring Data and Analytical Results
 Tosco (Unocal) Service Station #4186
 1771 First Street
 Livermore, California

WELL ID/ TOC* (ft.)	DATE	DTW (ft.)	S.I. (ft.lgs)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
U-1										
478.27	07/13/98	23.28	14.0-34.0	454.99	ND	ND	ND	ND	ND	ND
	10/07/98	26.43		451.84	ND	ND	ND	ND	ND	ND
	01/15/99	30.42		447.85	ND	ND	ND	ND	1.1	7.3
	04/14/99	24.21		454.06	ND	ND	ND	ND	ND	160
	07/19/99	27.10		451.17	ND	ND	ND	ND	ND	92
	10/12/99	29.40		448.87	ND	ND	ND	ND	ND	37
	01/24/00	27.90		450.37	ND	ND	ND	ND	ND	28
	04/10/00	26.16		452.11	ND	ND	0.930	ND	ND	ND
	07/17/00	28.04		450.23	ND	ND	ND	ND	ND	160
	10/02/00	28.41		449.86	ND	ND	ND	ND	ND	120
	01/08/01	28.68		449.59	ND	ND	ND	ND	ND	103
	04/03/01	25.74		452.53	ND	ND	ND	ND	ND	55.1
	07/02/01	30.67		447.60	ND	ND	ND	ND	ND	ND
NP	10/08/01	33.13		445.14	<50	<0.50	<0.50	<0.50	<0.50	<5.0
	01/03/02	27.67		450.60	160 ^o	<0.50	0.51	<0.50	0.69	31
	04/05/02	29.40		448.87	<50	<0.50	<0.50	<0.50	<0.50	60
	07/02/02 ¹⁰	31.17		447.10	1,100	<0.50	1.7	0.73	130	35
	10/01/02 ¹⁰	33.00		445.27	120	<0.50	<0.50	<0.50	8.8	28
	12/30/02 ¹⁰	22.03		456.24	<50	<0.50	<0.50	<0.50	1.2	90
	05/02/03 ¹⁰	24.13		454.14	<50	<0.50	<0.50	<0.50	<1.0	50
U-2										
477.44	07/13/98	23.52	13.0-33.0	453.92	1,200	130	12	62	180	1,100
	10/07/98	25.31		452.13	ND	ND	ND	ND	ND	160
	01/15/99	30.22		447.22	ND	ND	ND	ND	ND	280
	04/14/99	24.50		452.94	ND	ND	ND	ND	ND	460
	07/19/99	28.54		448.90	ND	ND	ND	ND	ND	220
	10/12/99	30.48		446.96	ND	ND	ND	ND	ND	160
	01/24/00	24.52		452.92	ND	ND	ND	ND	ND	150
	04/10/00	23.68		453.76	ND	ND	ND	ND	ND	177

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WELL ID/ TOC* (ft.)	DATE	DTW (ft.)	S.I. (ft.bgs)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
U-2 (cont)	07/17/00	28.35	13.0-33.0	449.09	ND	ND	ND	ND	ND	62.7
	10/02/00	28.72		448.72	ND	ND	ND	ND	ND	52
	01/08/01	29.11		448.33	ND	ND	ND	ND	ND	57.3
	04/03/01	25.95		451.49	ND	ND	ND	ND	ND	30.2
	07/02/01	29.01		448.43	ND	ND	ND	ND	ND	16
	10/08/01	30.94		446.50	<50	<0.50	<0.50	<0.50	<0.50	82
	01/03/02	27.33		450.11	260 ⁴	7.7	11	1.7	15	42
	04/05/02	30.02		447.42	<50	<0.50	<0.50	<0.50	<0.50	25
	07/02/02 ¹⁰	31.23		446.21	<50	<0.50	<0.50	<0.50	<1.0	<0.50
	10/01/02 ¹⁰	32.00		445.44	<50	<0.50	0.62	<0.50	<1.0	<2.0
	12/30/02 ¹⁰	22.32		455.12	<50	<0.50	<0.50	<0.50	<1.0	<2.0
	05/02/03 ¹⁰	25.92		451.52	<50	<0.50	<0.50	<0.50	<1.0	<2.0
	U-3 478.46	07/13/98		23.82	14.0-34.0	454.64	70,000	3,100	5,500	2,700
10/07/98		25.64	452.82	54,000		5,000	1,100	3,100	14,000	6,100
01/15/99		30.92	447.54	41,000 ¹		3,100	ND ²	1,800	3,800	15,000
04/14/99		24.48	453.98	33,000		86	290	2,200	7,800	39,000
07/19/99		28.46	450.00	48,000		3,900	2,500	3,600	14,000	12,000/16,000 ³
10/12/99		30.39	448.07	35,000 ⁴		4,200	ND ²	2,300	1,800	22,000/8,300 ⁵
01/24/00		23.43	455.03	13,000 ⁴		260	ND ²	770	3,200	53,000/42,000 ³
04/10/00		23.31	455.15	35,200 ⁴		1,070	241	2,820	8,850	35,600/40,900 ³
07/17/00		27.53	450.93	29,000 ⁴		3,570	525	3,180	5,660	22,500/21,000 ³
10/02/00		28.19	450.27	11,000 ⁴		2,100	31	2,000	780	25,000/28,000 ^{3,6}
01/08/01		29.85	448.61	33,600 ⁴		3,060	427	3,040	4,190	24,700/30,900 ³
04/03/01		24.98	453.48	5,390 ⁴		660	10.8	304	356	15,200/19,300 ⁵
07/02/01		31.35	447.11	13,000 ⁴		1,200	58	1,300	930	25,000/26,000 ³
NP 10/08/01		32.69	445.77	6,100 ⁴		500	<10	570	130	23,000/22,000 ³
01/03/02		23.73	454.73	9,900 ⁴		700	130	24	1,000	14,000/12,000 ³
04/05/02	28.27	450.19	9,800	1,100	180	220	1,400	16,000/30,000 ³		
07/02/02 ¹⁰	29.71	448.75	<25,000	<250	<250	<250	<500	12,000		

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U-3 (cont)	10/01/02 ¹⁰	31.18	14.0-34.0	447.28	<25,000	<250	<250	<250	<500	12,000
	12/30/02 ¹⁰	21.62		456.84	23,000	330	170	870	4,900	18,000
	05/02/03 ¹⁰	23.11		455.35	19,000	280	<50	880	1,500	15,000
U-4 476.93	04/03/01 ⁷	31.63	35.0-45.0	445.30	ND	ND	ND	ND	ND	37.8/38.2 ³
	07/02/01	37.96		438.97	ND	ND	ND	ND	ND	ND/5.3 ³
	10/08/01	44.24		432.69	NOT SAMPLED DUE TO INSUFFICIENT WATER					--
	01/03/02	36.15		440.78	100 ⁹	<0.50	<0.50	<0.50	<0.50	10/8.5 ³
	04/05/02	37.64		439.29	<50	0.50	<0.50	<0.50	<0.50	4.1
	07/02/02 ¹⁰	36.85		440.08	67 ¹¹	<0.50	<0.50	<0.50	<1.0	12
	10/01/02 ¹⁰	38.54		438.39	<50	<0.50	<0.50	<0.50	<1.0	9.8
	12/30/02 ¹⁰	32.64		444.29	<50	<0.50	<0.50	<0.50	<1.0	25
	05/02/03 ¹⁰	31.40		445.53	<50	<0.50	<0.50	<0.50	<1.0	4.1
	U-5 476.51	04/03/01 ⁷	31.75	37.0-47.0	444.76	ND	ND	0.728	ND	0.993
07/02/01		38.68		437.83	ND	ND	ND	ND	ND	88/94 ³
NP 10/08/01		46.31		430.20	<50	<0.50	<0.50	<0.50	<0.50	37/54 ³
01/03/02		36.55		439.96	<50	<0.50	0.59	<0.50	0.91	51/53 ³
04/05/02		37.83		438.68	<50	<0.50	<0.50	<0.50	<0.50	37
07/02/02 ¹⁰		36.92		439.59	<50	<0.50	<0.50	<0.50	<1.0	43
10/01/02		INACCESSIBLE - TRUCK PARKED OVER WELL				--	--	--	--	--
12/30/02		INACCESSIBLE - VEHICLE PARKED OVER WELL				--	--	--	--	--
05/02/03 ¹⁰		31.55		444.96	<50	<0.50	<0.50	<0.50	<1.0	18

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WELL ID/ TOC* (fL)	DATE	DTW (ft.)	S.I. (ft.bgs)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
U-6										
478.38	01/03/02 ⁷	33.99	--	444.39	5,000 ⁸	36	<25	260	450	<250/<10 ³
	04/05/02	36.18		442.20	1,300	16	<5.0	54	<5.0	<25
	07/02/02 ¹⁰	36.33		442.05	1,100	1.4	<0.50	16	<1.0	0.94
	10/01/02 ¹⁰	37.70		440.68	2,000	5.4	<0.50	62	<1.0	2.6
	12/30/02 ¹⁰	31.63		446.75	130	<0.50	<0.50	2.3	<1.0	<2.0
	05/02/03 ¹⁰	31.49		446.89	150	<0.50	<0.50	1.8	1.7	82
U-7										
478.74	01/03/02 ⁷	32.43	--	446.31	3,100 ⁸	93	<10	35	73	140/130 ³
	04/05/02	34.06		444.68	630	22	0.53	2.6	<0.50	45
	07/02/02 ¹⁰	35.28		443.46	1,100	21	<0.50	6.9	<1.0	60
	10/01/02 ¹⁰	37.70		441.04	1,700	11	<0.50	3.1	<1.0	25
	12/30/02 ¹⁰	31.93		446.81	4,600	41	5.3	32	13	34
	05/02/03 ¹⁰	31.81		446.93	3,000	17	2.7	14	5.1	42
TRIP BLANK										
	07/13/98	--	--	--	ND	ND	ND	ND	ND	ND
	10/07/98	--		--	ND	ND	ND	ND	ND	ND
	01/15/99	--		--	ND	ND	ND	ND	ND	ND
	04/14/99	--		--	ND	ND	ND	ND	ND	ND
	07/19/99	--		--	ND	ND	ND	ND	ND	ND
	10/12/99	--		--	ND	ND	ND	ND	ND	ND
	01/24/00	--		--	ND	ND	ND	ND	ND	ND
	04/10/00	--		--	ND	ND	ND	ND	ND	ND
	07/17/00	--		--	ND	ND	ND	ND	ND	ND
	10/02/00	--		--	ND	ND	ND	ND	ND	ND
	01/08/01	--		--	ND	ND	ND	ND	ND	ND
	04/03/01	--		--	ND	ND	ND	ND	ND	ND
	07/02/01	--		--	ND	ND	ND	ND	ND	ND

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WELL ID/ TOC* (ft.)	DATE	DTW (ft.)	S.I. (ft.bgs)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
TRIP BLANK	10/08/01	--	--	--	<50	<0.50	<0.50	<0.50	<0.50	<5.0
(cont)	01/03/02	--	--	--	<50	<0.50	<0.50	<0.50	<0.50	<5.0
	04/05/02	--	--	--	<50	<0.50	<0.50	<0.50	<0.50	<2.5
QA	07/02/02 ¹⁰	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<0.50
	10/01/02 ¹⁰	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<2.0
	12/30/02 ¹⁰	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<2.0
	05/02/03 ¹⁰	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<2.0

Table 1
Groundwater Monitoring Data and Analytical Results
 Tosco (Unocal) Service Station #4186
 1771 First Street
 Livermore, California

EXPLANATIONS:

TOC = Top of Casing
 (ft.) = Feet
 DTW = Depth to Water
 S. I. = Screen Interval
 (ft.bgs) = Feet Below Ground Surface
 GWE = Groundwater Elevation
 (msl) = Mean sea level

TPH-G = Total Petroleum Hydrocarbons as Gasoline
 B = Benzene
 T = Toluene
 E = Ethylbenzene
 X = Xylenes
 MTBE = Methyl tertiary butyl ether
 (ppb) = Parts per billion

ND = Not Detected
 -- = Not Measured/Not Analyzed
 NP = No Purge
 QA = Quality Assurance/Trip Blank

- * TOC elevations are relative to msl in feet. The benchmark used was a City of Livermore survey monument at First & "Q" Streets, (Benchmark Elevation = 469.246 feet, msl). Wells U-6 and U-7 were surveyed on January 16, 2002, using the previous benchmark.
- 1 Laboratory report indicates gasoline and unidentified hydrocarbons C6-C12.
- 2 Detection limit raised. Refer to analytical reports.
- 3 MTBE by EPA Method 8260.
- 4 Laboratory report indicates gasoline C6-C12.
- 5 MTBE by EPA Method 8260 analyzed past EPA recommended holding time.
- 6 Laboratory report indicates the sample was analyzed within holding time. Re-analysis for confirmation or dilution was performed past the recommend holding time.
- 7 Well development performed.
- 8 Laboratory report indicates weathered gasoline C6-C12.
- 9 Laboratory report indicates unidentified hydrocarbons C6-C12.
- 10 TPH-G, BTEX and MTBE by EPA Method 8260.
- 11 Laboratory report indicates hydrocarbon reported in the gasoline range does not match our gasoline standard.

Table 2
Groundwater Analytical Results - Oxygenate Compounds
 Tosco (Unocal) Service Station #4186
 1771 First Street
 Livermore, California

WELL ID	DATE	ETHANOL (ppb)	TBA (ppb)	MTBE (ppb)	DIPE (ppb)	ETBE (ppb)	TAME (ppb)	1,2-DCA (ppb)	EDB (ppb)
U-1	10/02/00	--	ND	--	--	--	--	--	--
	07/02/02	--	--	35	--	--	--	--	--
	10/01/02	--	--	28	--	--	--	--	--
	12/30/02	--	--	90	--	--	--	--	--
	05/02/03	--	--	50	--	--	--	--	--
U-2	10/02/00	--	ND	--	--	--	--	--	--
	07/02/02	--	--	<0.50	--	--	--	--	--
	10/01/02	--	--	<2.0	--	--	--	--	--
	12/30/02	--	--	<2.0	--	--	--	--	--
	05/02/03	--	--	<2.0	--	--	--	--	--
U-3	07/19/99	--	--	16,000	--	--	--	--	--
	10/12/1999	--	--	8,300	--	--	--	--	--
	01/24/00	--	--	42,000	--	--	--	--	--
	04/10/00	--	--	40,900	--	--	--	--	--
	07/17/00	--	--	21,000	--	--	--	--	--
	10/02/00	--	63,000	28,000	--	--	--	--	--
	01/08/01	ND ¹	49,300	30,900	ND ¹	ND ¹	ND ¹	ND ¹	ND ¹
	04/03/01 ²	ND ¹	22,200	19,300	ND ¹	ND ¹	ND ¹	ND ¹	ND ¹
	07/02/01	ND ¹	27,000	26,000	ND ¹	ND ¹	ND ¹	ND ¹	ND ¹
	10/08/01	<140,000	33,000	22,000	<290	<290	<290	<290	<290
	01/03/02	<50,000	17,000	12,000	<100	<100	<100	<100	<100
	04/05/02	<25,000	66,000	30,000	<100	<100	<100	<100	<100
	07/02/02	<13,000	47,000	12,000	<500	<250	<250	<250	<250
	10/01/02	<250,000	<50,000	12,000	<1,000	<1,000	<1,000	<1,000	<1,000
	12/30/02	<100,000	23,000	18,000	<400	<400	<400	<400	<400
05/02/03	<50,000	25,000	15,000	<200	<200	<200	<200	<200	

Table 2
Groundwater Analytical Results - Oxygenate Compounds
 Tosco (Unocal) Service Station #4186
 1771 First Street
 Livermore, California

WELL ID	DATE	ETHANOL (ppb)	TBA (ppb)	MTBE (ppb)	DIPE (ppb)	ETBE (ppb)	TAME (ppb)	1,2-DCA (ppb)	EDB (ppb)
U-4	04/03/01	ND	ND	38.2	ND	ND	ND	ND	ND
	07/02/01	ND	ND	5.3	ND	ND	ND	ND	ND
	01/03/02	<500	<20	8.5	<1.0	<1.0	<1.0	<1.0	<1.0
	07/02/02	--	--	12	--	--	--	--	--
	10/01/02	--	--	9.8	--	--	--	--	--
	12/30/02	--	--	25	--	--	--	--	--
	05/02/03	--	--	4.1	--	--	--	--	--
U-5	04/03/01	ND	ND	55.4	ND	ND	ND	ND	ND
	07/02/01	ND	ND	94	ND	ND	ND	ND	ND
	10/08/01	<1,000	<100	54	<2.0	<2.0	<2.0	<2.0	<2.0
	01/03/02	<500	<20	53	<1.0	<1.0	<1.0	<1.0	<1.0
	07/02/02	--	--	43	--	--	--	--	--
	10/01/02	INACCESSIBLE - TRUCK PARKED OVER WELL			--	--	--	--	--
	12/30/02	INACCESSIBLE - VEHICLE PAEKED OVER WELL			--	--	--	--	--
05/02/03	--	--	18	--	--	--	--	--	
U-6	01/03/02	<5,000	<200	<10	<10	<10	<10	<10	<10
	07/02/02	--	--	0.94	--	--	--	--	--
	10/01/02	--	--	2.6	--	--	--	--	--
	12/30/02	--	--	<2.0	--	--	--	--	--
	05/02/03	--	--	82	--	--	--	--	--
U-7	01/03/02	<500	30	130	<1.0	<1.0	<1.0	<1.0	<1.0
	07/02/02	--	--	60	--	--	--	--	--
	10/01/02	--	--	25	--	--	--	--	--
	12/30/02	--	--	34	--	--	--	--	--
	05/02/03	--	--	42	--	--	--	--	--

Table 2
Groundwater Analytical Results - Oxygenate Compounds
Tosco (Unocal) Service Station #4186
1771 First Street
Livermore, California

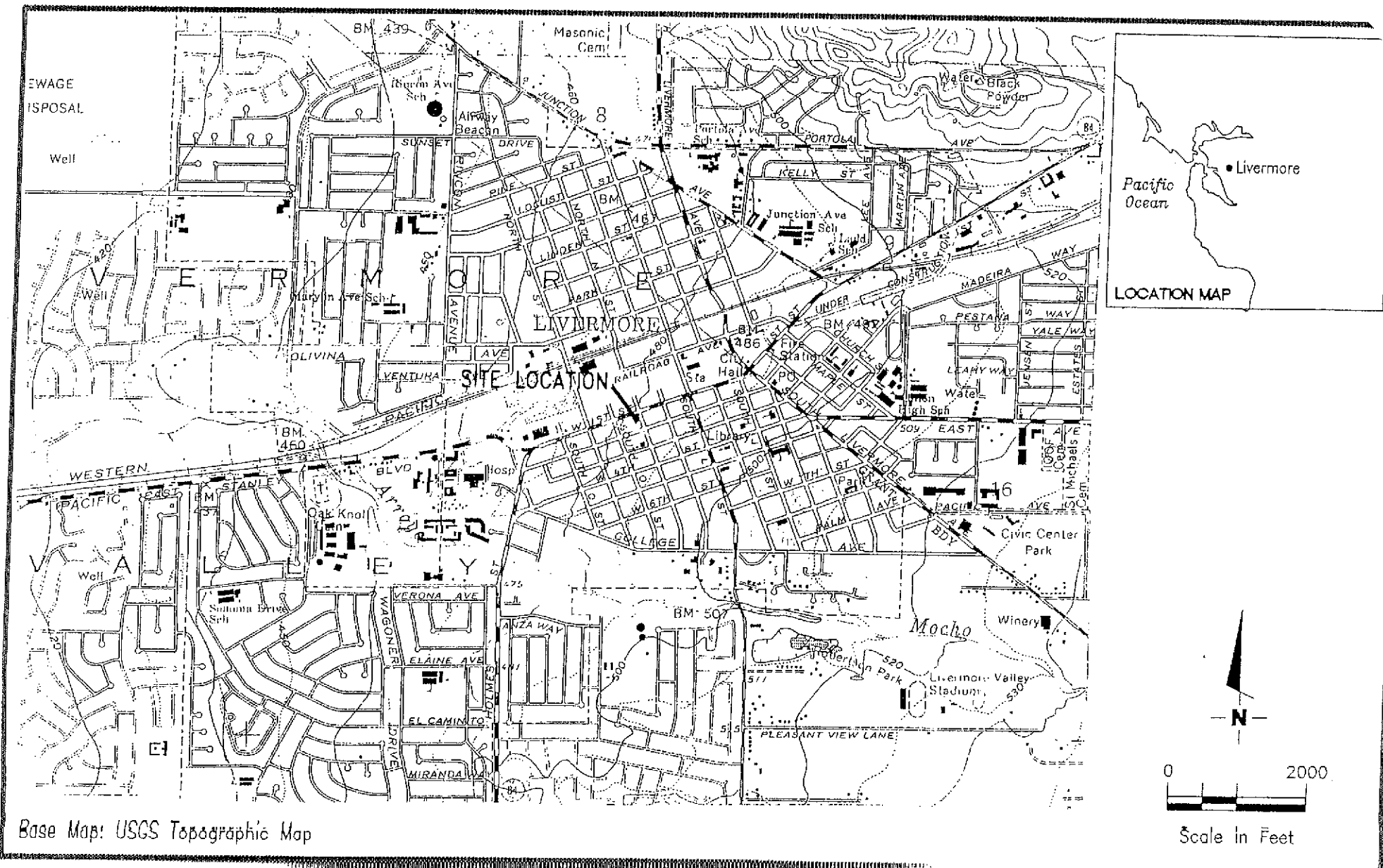
EXPLANATIONS:

TBA = Tertiary butyl alcohol
MTBE = Methyl tertiary butyl ether
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
EDB = 1,2-Dibromoethane
1,2-DCA = 1,2-Dichloroethane
(ppb) = Parts per billion
ND = Not Detected
-- = Not Analyzed

- ¹ Detection limit raised. Refer to analytical reports.
- ² Laboratory report indicates this sample was analyzed outside of the EPA recommended holding time.

ANALYTICAL METHOD:

EPA Method 8260 for Oxygenate Compounds

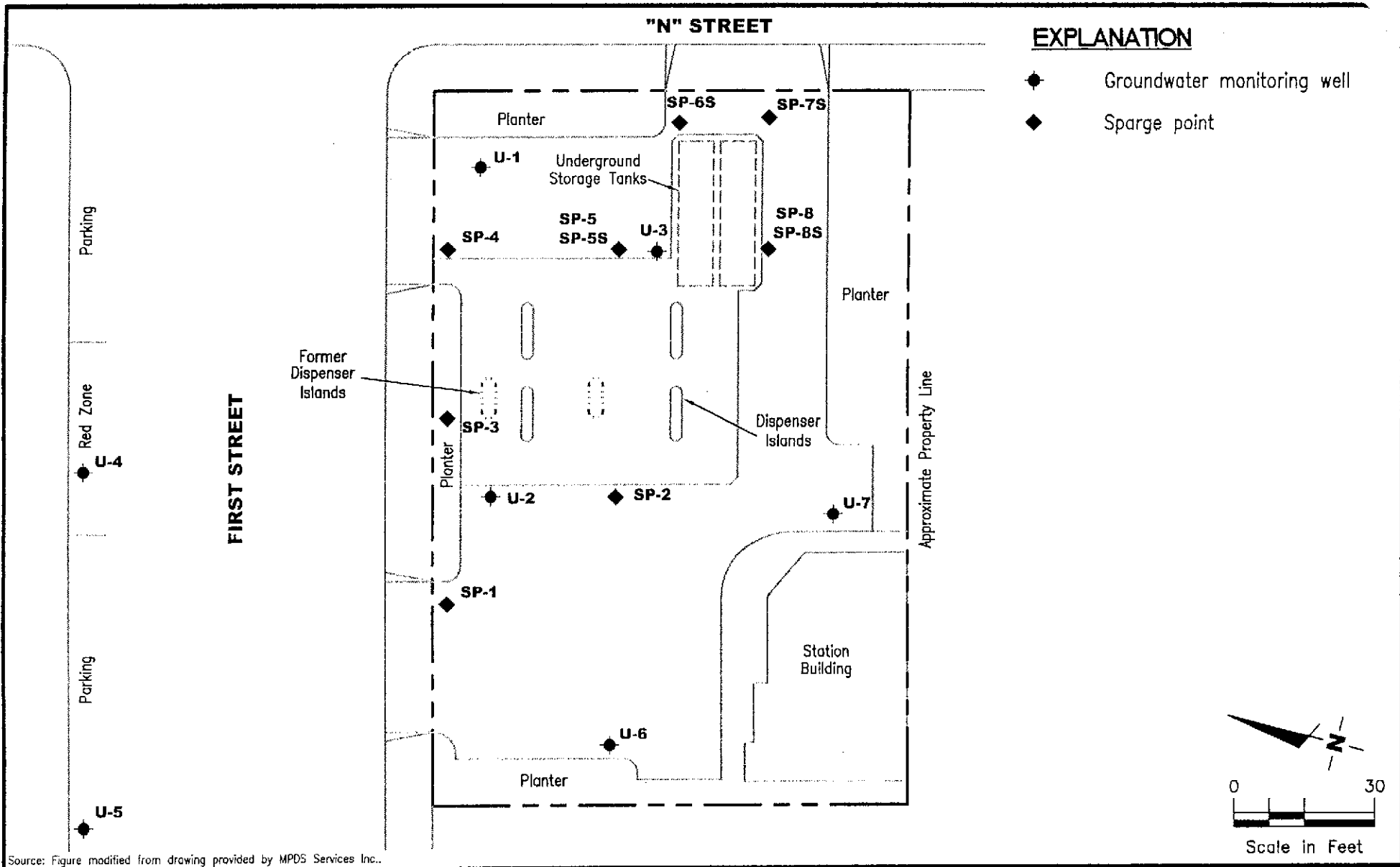


Gettler - Ryan Inc.
 6747 Sierra Ct., Suite J (925) 551-7555
 Dublin, CA 94568

VICINITY MAP
 Tosco 76 Service Station No. 4186
 1771 First Street
 Livermore, California

FIGURE
1

JOB NUMBER 140175 REVIEWED BY DATE 4/00 REVISED DATE



GETTLER - RYAN INC.
 6747 Sierra Ct., Suite J
 Dublin, CA 94568 (925) 551-7555

SITE PLAN
 Tosco (76) Service Station No. 4186
 1771 First Street
 Livermore, California

FIGURE

2

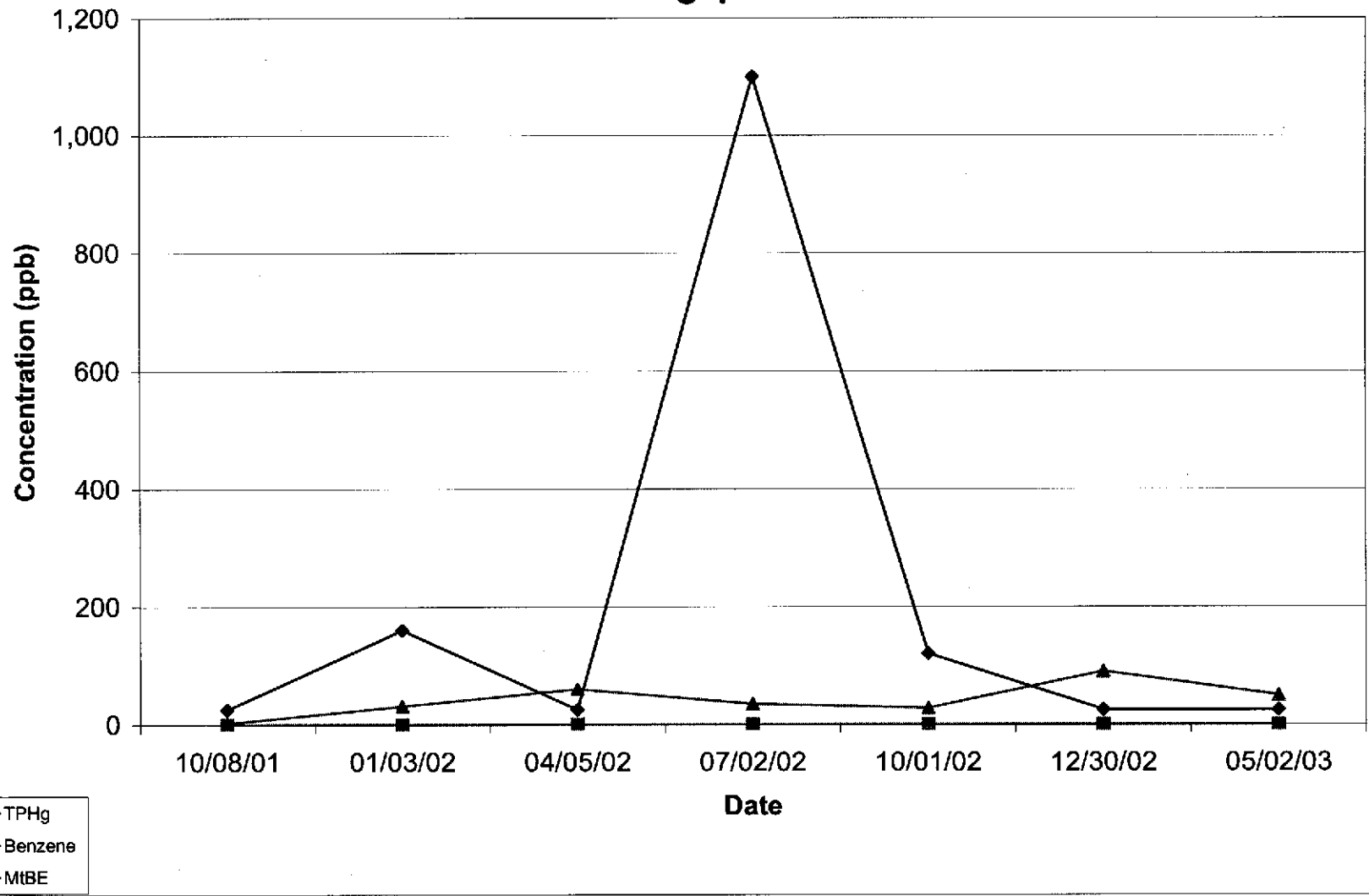
PROJECT NUMBER
140175

REVIEWED BY

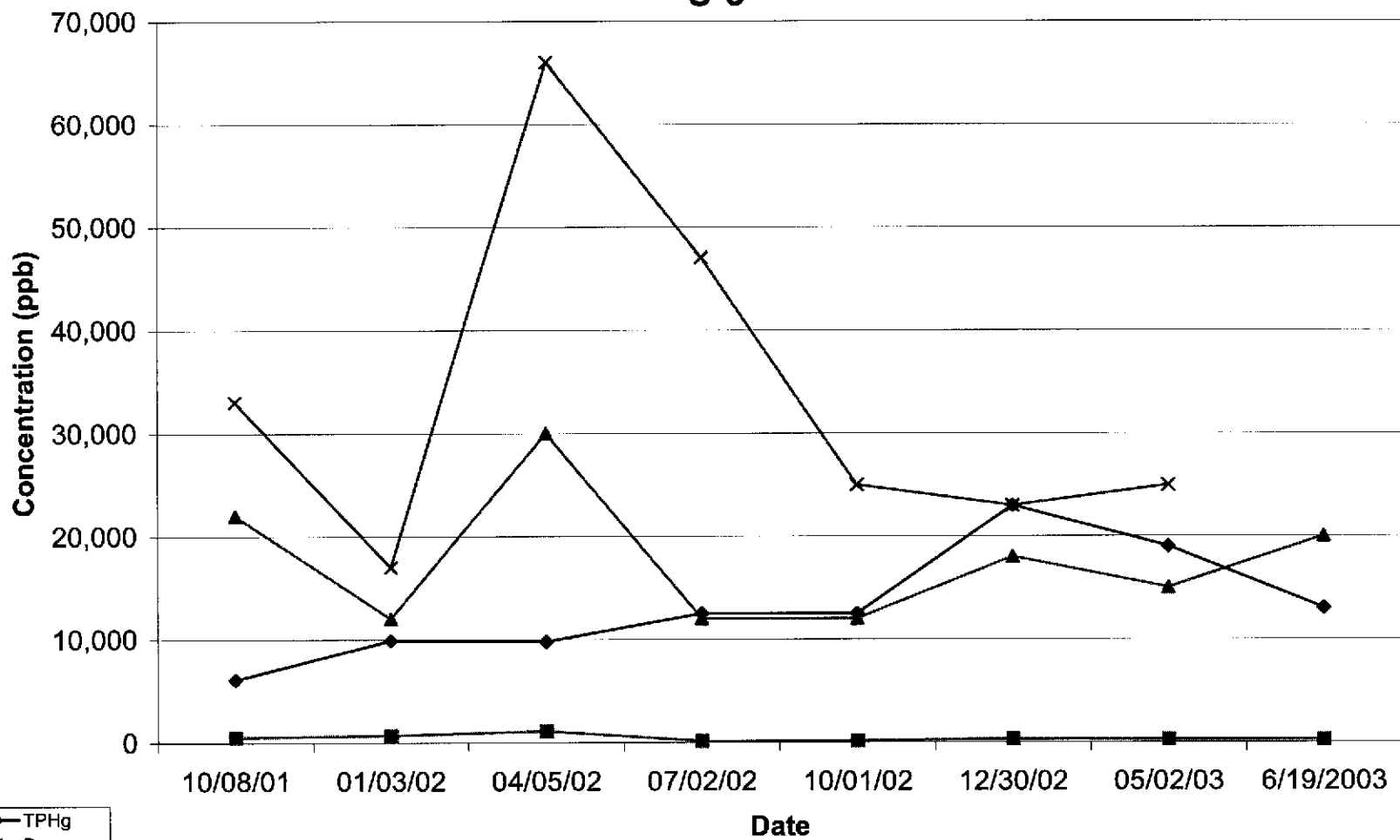
DATE
12/01

REVISED DATE

**Figure 3 - Tosco Station No. 4186, Livermore, CA
Groundwater Concentration Versus Time
U-1**

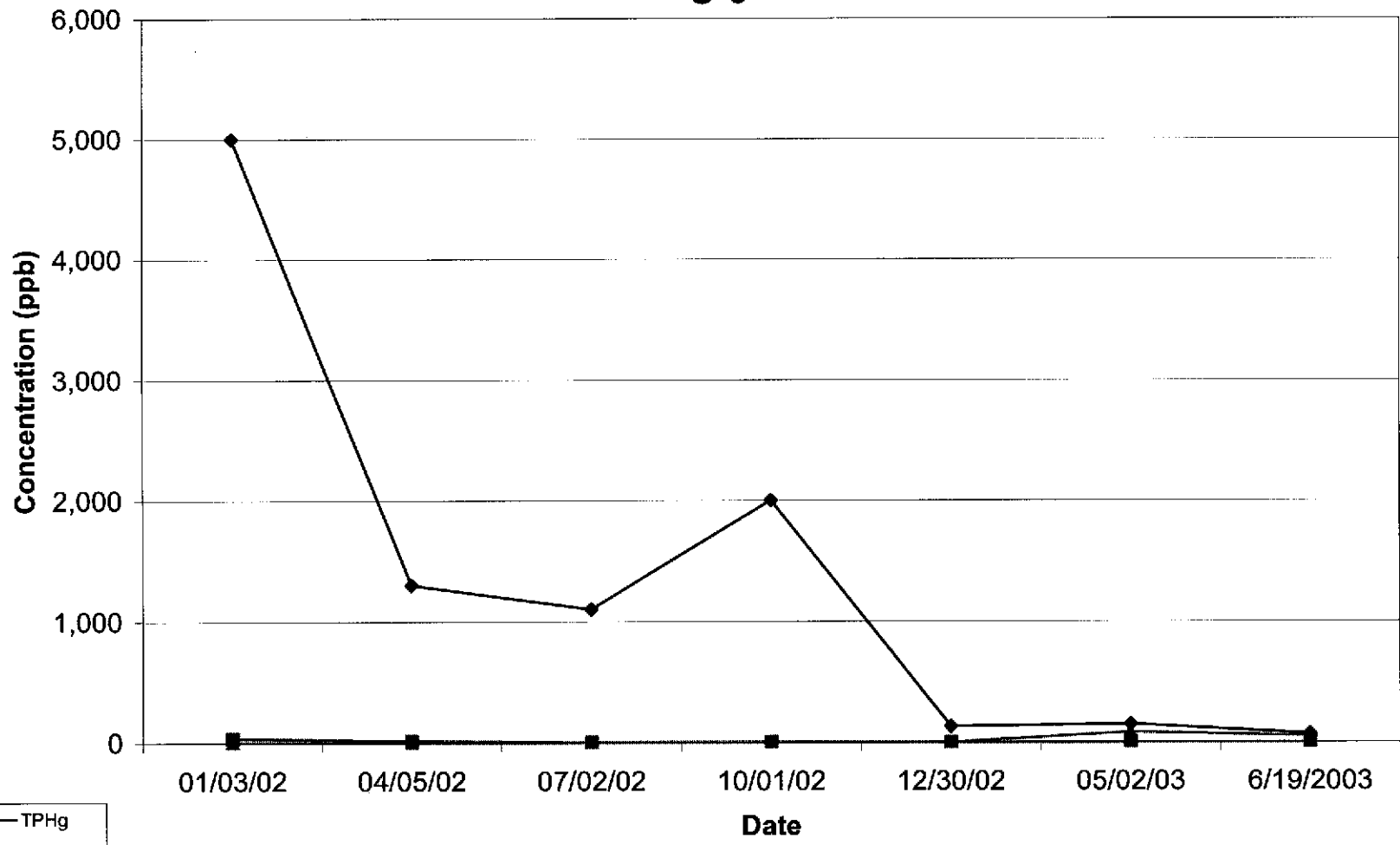


**Figure 4 - Tosco Station No. 4186, Livermore, CA
Groundwater Concentration Versus Time
U-3**



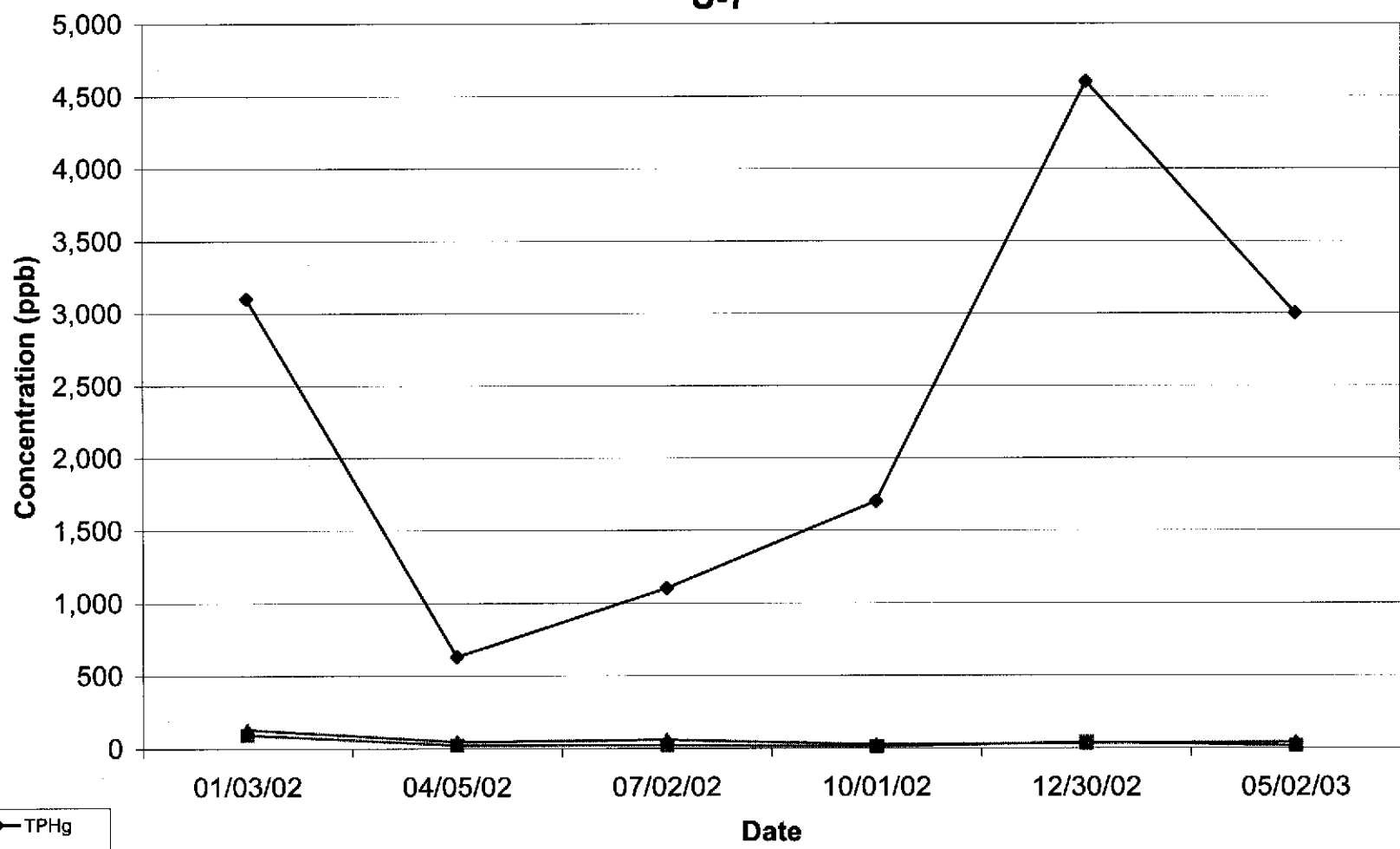
- ◆ TPHg
- Benzene
- ▲ MtBE
- ✕ TBA

**Figure 5 - Tosco Station No. 4186, Livermore, CA
Groundwater Concentration Versus Time
U-6**



- TPHg
- Benzene
- ▲ MtBE

**Figure 6 - Tosco Station No. 4186, Livermore, CA
Groundwater Concentration Versus Time
U-7**



◆ TPHg
■ Benzene
▲ MtBE

APPENDIX A

LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY RECORDS

Gettler Ryan

June 29, 2003

6747 Sierra Court Suite J
Dublin, CA 94568

Attn.: Eric Janzen
Project: Tosco #4186
Site: 1771 First Street, Livermore

Dear Mr. Janzen:

Attached is our report for your samples received on 06/20/2003 16:58
This report has been reviewed and approved for release. Reproduction of this report
is permitted only in its entirety.

Please note that any unused portion of the samples will be discarded after
08/04/2003 unless you have requested otherwise.

We appreciate the opportunity to be of service to you. If you have any questions,
please call me at (925) 484-1919.

You can also contact me via email. My email address is: tgranicher@stl-inc.com

Sincerely,



Tod Granicher
Project Manager

Fuel Oxygenates by 8260B

Gettler Ryan
Attn.: Eric Janzen

6747 Sierra Court Suite J
Dublin, CA 94568
Phone: (925) 551-7444 Fax: (925) 551-7888
Project: Tosco #4186

Received: 06/20/2003 16:58
Site: 1771 First Street, Livermore

Samples Reported

Sample Name	Date Sampled	Matrix	Lab #
4186 U6	06/19/2003 15:12	Water	1
4186 U3	06/19/2003 15:17	Water	2

Fuel Oxygenates by 8260B

Gettler Ryan

Attn.: Eric Janzen

6747 Sierra Court Suite J

Dublin, CA 94568

Phone: (925) 551-7444 Fax: (925) 551-7888

Project: Tosco #4186

Received: 06/20/2003 16:58

Site: 1771 First Street, Livermore

Prep(s): 5030B	Test(s): 8260B
Sample ID: 4186 U3	Lab ID: 2003-06-0682 - 2
Sampled: 06/19/2003 15:17	Extracted: 6/27/2003 00:43
Matrix: Water	QC Batch#: 2003/06/26-02.65
Analysis Flag: o (See Legend and Note Section)	

Compound	Conc.	RL	Unit	Dilution	Analyzed	Flag
Gasoline	13000	10000	ug/L	200.00	06/27/2003 00:43	
Methyl tert-butyl ether (MTBE)	20000	100	ug/L	200.00	06/27/2003 00:43	
Benzene	230	100	ug/L	200.00	06/27/2003 00:43	
Toluene	ND	100	ug/L	200.00	06/27/2003 00:43	
Ethylbenzene	220	100	ug/L	200.00	06/27/2003 00:43	
Total xylenes	1600	200	ug/L	200.00	06/27/2003 00:43	
Surrogates(s)						
1,2-Dichloroethane-d4	93.1	76-114	%	200.00	06/27/2003 00:43	
Toluene-d8	95.9	88-110	%	200.00	06/27/2003 00:43	

Severn Trent Laboratories, Inc.

STL San Francisco * 1220 Quarry Lane, Pleasanton, CA 94566

Tel 925 484 1919 Fax 925 484 1096 * www.stl-inc.com * CA DHS ELAP# 2496

06/27/2003 14:30

Fuel Oxygenates by 8260B

Gettler Ryan
Attn.: Eric Janzen

6747 Sierra Court Suite J
Dublin, CA 94568
Phone: (925) 551-7444 Fax: (925) 551-7888
Project: Tosco #4186

Received: 06/20/2003 16:58
Site: 1771 First Street, Livermore

Batch QC Report		
Prep(s): 5030B		Test(s): 8260B
Method Blank	Water	QC Batch # 2003/06/26-02.65
MB: 2003/06/26-02.65-050		Date Extracted: 06/26/2003 22:07

Compound	Conc.	RL	Unit	Analyzed	Flag
Gasoline	ND	50	ug/L	06/26/2003 22:07	
Methyl tert-butyl ether (MTBE)	ND	0.5	ug/L	06/26/2003 22:07	
Benzene	ND	0.5	ug/L	06/26/2003 22:07	
Toluene	ND	0.5	ug/L	06/26/2003 22:07	
Ethylbenzene	ND	0.5	ug/L	06/26/2003 22:07	
Total xylenes	ND	1.0	ug/L	06/26/2003 22:07	
Surrogates(s)					
1,2-Dichloroethane-d4	95.8	76-114	%	06/26/2003 22:07	
Toluene-d8	99.2	88-110	%	06/26/2003 22:07	

Fuel Oxygenates by 8260B

Gettler Ryan
Attn.: Eric Janzen

6747 Sierra Court Suite J
Dublin, CA 94568
Phone: (925) 551-7444 Fax: (925) 551-7888
Project: Tosco #4186

Received: 06/20/2003 16:58
Site: 1771 First Street, Livermore

Batch QC Report										
Prep(s): 5030B								Test(s): 8260B		
Laboratory Control Spike				Water			QC Batch # 2003/06/26-02.65			
LCS	2003/06/26-02.65-049			Extracted: 06/26/2003			Analyzed: 06/26/2003 21:23			
LCSD	2003/06/26-02.65-002			Extracted: 06/26/2003			Analyzed: 06/26/2003 21:45			
Compound	Conc. ug/L		Exp.Conc.	Recovery %		RPD	Ctrl.Limits %		Flags	
	LCS	LCSD		LCS	LCSD		%	Rec.	RPD	LCS
Methyl tert-butyl ether (MTBE)	33.6	35.8	25.0	134.4	143.2	6.3	65-165	20		
Benzene	25.6	25.6	25.0	102.4	102.4	0.0	69-129	20		
Toluene	25.3	26.3	25.0	101.2	105.2	3.9	70-130	20		
Surrogates(s)										
1,2-Dichloroethane-d4	482	491	500	96.4	98.2		76-114	0		
Toluene-d8	453	484	500	90.6	96.8		88-110	0		

Fuel Oxygenates by 8260B

Gettler Ryan
Attn.: Eric Janzen

6747 Sierra Court Suite J
Dublin, CA 94568
Phone: (925) 551-7444 Fax: (925) 551-7888
Project: Tosco #4186

Received: 06/20/2003 16:58
Site: 1771 First Street, Livermore

Legend and Notes

Analysis Flag

o

Reporting limits were raised due to high level of analyte present in the sample.

Result Flag

g

Hydrocarbon reported in the gasoline range does not match our gasoline standard.

75354

ConocoPhillips

2003-06-0682

Chain-of-Custody-Record



Consultant Name: GETTLER-RYAN INC.
 Address: 6747 SIERRA COURT, SUITE J, DUBLIN, CA 94568
 Project Contact: Eric Janzen ejanzen@grine.com
 (Phone) 925-551-7555 (Fax) 925-551-7888

ConocoPhillips Project Manager: David DeWitt
 Site # 4186 Project Name: 1771 1st Street
Livermore, California
 Laboratory Name: STL
 Laboratory Service Order: _____
 Laboratory Service Code: _____
 QC Data: Level D Level C Level B Level A

Sampler: Eric Janzen

Turnaround Time: 0 Work Days 5 Work Days 3 Work Days
 2 Work Days 1 Work Day 2-8 hours

Sample ID	Date/Time	Matrix (G: Soil, A: Air, W: Water, C: Coal)	Number of Containers	Container Type	Laboratory Sample ID	State Method: <input type="checkbox"/> CA <input type="checkbox"/> OR <input type="checkbox"/> WA <input type="checkbox"/> NV Series <input type="checkbox"/> CO <input type="checkbox"/> UT <input type="checkbox"/> ID										Comments			
						Analyses Requested													
						TPH-G, BTEX, MTBE (8015+8021)	TPH-G/BTEX (8015 + 8021)	TPH Diesel (8015)	EPA B2605 limited TPH TPH-G, BTEX, MTBE										
4186 U6	14 June 03 1512	GW	3	VOA					X										Results due on or before
4186 U3	19 June 03 1517	GW	1	VOA					X										Relinquish 2003 by 1700.
																			No EDF

Relinquished By (Signature) <i>[Signature]</i>	Organization GR	Date/Time 11 June 03 1621	Received By (Signature) <i>[Signature]</i>	Organization GR	Date/Time 6/20/03	iced (Y/N) Y
Relinquished By (Signature) <i>[Signature]</i>	Organization GR	Date/Time 6/20/03	Received By (Signature) <i>[Signature]</i>	Organization STL-SF	Date/Time 6/20/03	iced (Y/N) Y
Relinquished By (Signature) <i>[Signature]</i>	Organization STL-SF	Date/Time 6/20/03	Received For Laboratory By (Signature) <i>[Signature]</i>	Organization STL-SF	Date/Time 6/20/03 1658	iced (Y/N) Y

4.5"