

April 4, 2007

Mr. Keith Woodburne, R.G.  
Senior Project Geologist  
TRC Solutions, Inc.  
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Concord, CA 94520

**RECEIVED**  
  
10:43 am, Nov 03, 2008  
  
Alameda County  
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Project No. 328-A

**First Quarter 2007**  
**Ozone Injection System O&M Report**  
**76 Service Station No. 1871**  
96 MacArthur Boulevard  
Oakland, California


Dear Mr. Woodburne:


Environ Strategy Consultants, Inc. is pleased to submit this ozone injection system operation and maintenance (O&M) report for 76 Service Station No. 1871, located at 96 MacArthur Boulevard, Oakland, California. An ozone injection system was started on June 23, 2003 to remediate hydrocarbon-impacted groundwater.

Type of Remediation System:	Ozone Injection System
Operation Data During: Reporting Period: Jan. 1, 2007 – Mar. 31, 2007	Operated 83 days during the period Hours of Operation: 570
System Operation Data Since Startup: June 23, 2003	Total Hours of Operation: 12,398
Note: System down time occurred throughout the first quarter due to tripped ozone sensor and a rainbird malfunction.	

Environ Strategy appreciates the opportunity to be of service. If you have any questions or require additional information regarding this report, please do not hesitate to call us at (949) 581-3222.

Respectfully submitted,

  
Hung Tran  
Staff Engineer

  
Jinghui Niu, P.E.  
Principal Engineer



**First Quarter 2007 O&M Report**

**76 Service Station No. 1871**

April 4, 2007

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Attachments: Figure - Site Plan

Table 1 - Ozone Injection - System Operation Data

Table 2 - Ozone Injection - Groundwater Monitoring Data

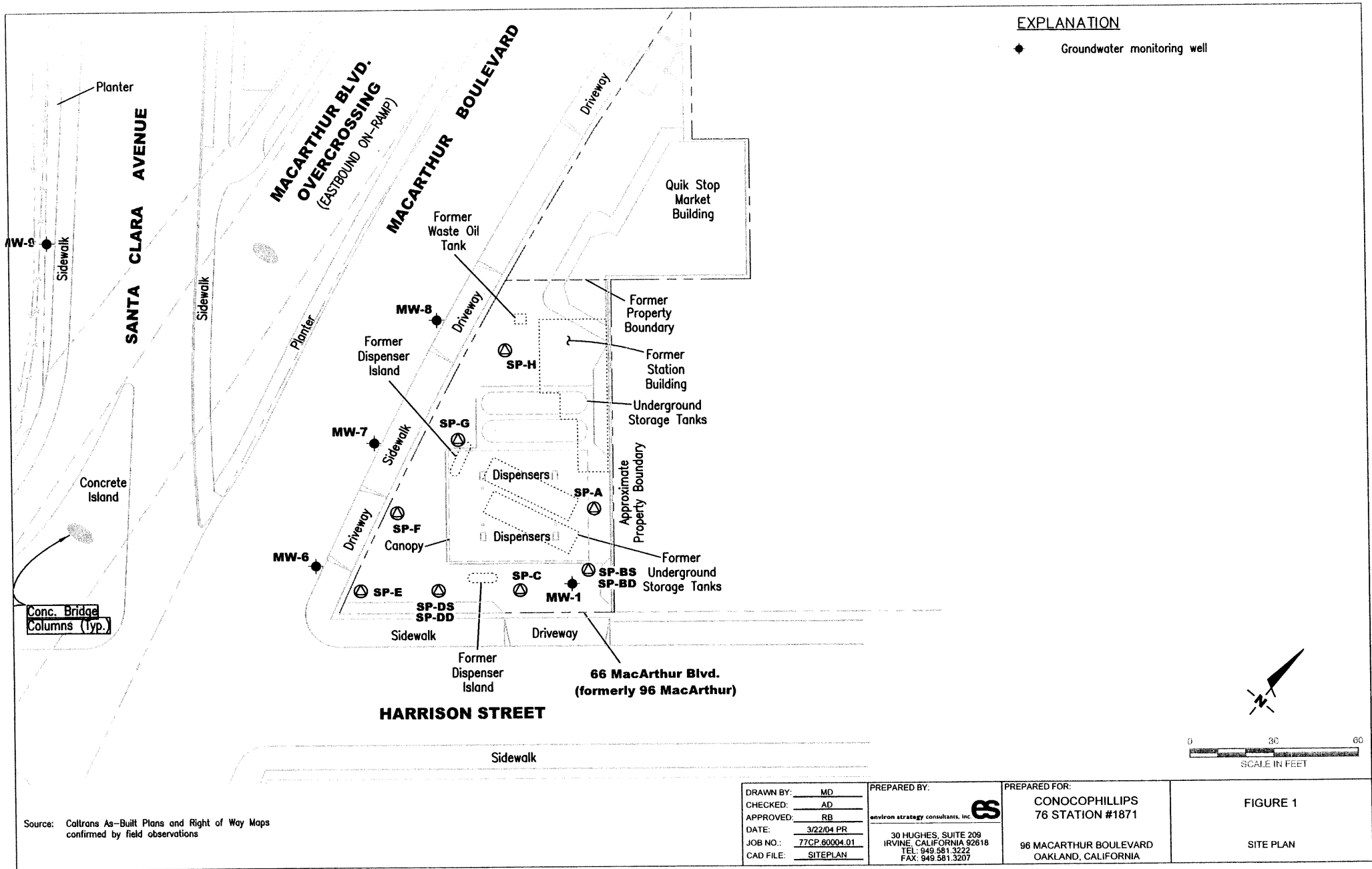
Graph 1 - MW-1 TPHg, Benzene, and MtBE Groundwater Concentrations

Graph 2 - MW-7 TPHg, Benzene, and MtBE Groundwater Concentrations

Appendix A – Field Notes

cc: Eric Hetrick, ConocoPhillips Company (electronic copy)

**Figure**



## **Tables**

**Table 1**  
**Ozone Injection - System Operation Data**  
76 Service Station No. 1871  
96 MacArthur Blvd., Oakland, California  
Page 1 of 3

Date	Notes	OZONE SPARGE SYSTEM						OZ-1	OZ-2	OZ-3	OZ-4	OZ-5	OZ-6	OZ-7	OZ-8	OZ-9	OZ-10
		System Status (On/Off)		Hourmeter Reading	Period Online Factor	Cumulative Online Factor	Ozone Injected (lbs)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)
		Arrival	Departure														
6/23/03		On	On	8807.26	--	0.95	--	20	18	19	20	21	23	20	26	14	26
7/16/03		Off	On	8850.46	0.09	0.91	0.39	27	18	31	40	28	29	31	38	24	25
8/30/03		On	On	9180.61	0.35	0.86	2.97	17	15	17	19	19	19	20	26	19	26
9/18/03		On	On	9327.43	0.37	0.84	1.32	13.5	14.7	17.0	16.3	16.0	19.7	16.8	19.8	15.7	20
10/16/03		On	On	--	--	0.84	--	27.0	19.5	40.8	39.0	40.8	38.5	34.2	46.4	24.2	39.8
11/17/03		On	On	9696.55	0.29	0.81	--	11.0	20.0	17.0	18.0	17.5	17.0	16.0	21.0	51.0	22.0
12/5/03		On	On	9804.98	0.29	0.80	0.98	33.0	21.0	44.0	40.0	43.0	39.0	33.5	44.0	26.0	33.0
1/16/04		On	On	10471.28	0.76	0.79	6.00	12.5	11.0	18.5	16.5	17.5	17.0	16.0	20.0	16.0	20.0
2/3/04		On	On	10727.69	0.68	0.79	2.31	12.3	11.5	18.2	16.5	18.2	17.3	16.0	19.0	16.0	18.2
3/24/04		On	On	11424.95	0.66	0.78	6.28	31.0	18.3	37.5	26.0	34.0	33.2	32.3	41.5	23.0	31.0
4/14/04		On	On	11676.10	0.57	0.77	2.26	32.0	19.0	38.7	26.0	37.7	37.1	32.8	41.8	23.8	29.5
4/15/04	a	On	On	11685.29	0.44	0.77	0.08	--	--	--	--	--	--	--	--	--	--
4/16/04	a	On	On	11693.80	0.41	0.77	0.08	--	--	--	--	--	--	--	--	--	--
4/19/04	a	On	On	11742.90	0.78	0.77	0.44	--	--	--	--	--	--	--	--	--	--
4/23/04	a	On	On	11773.10	0.36	0.77	0.27	--	--	--	--	--	--	--	--	--	--
5/4/04		Off	On	11837.70	0.28	0.76	0.58	32.2	20.5	39.4	36.2	38.1	32.0	33.5	60.0	25.8	33.1
5/11/04		On	On	11950.51	0.77	0.76	1.02	32.5	20.0	38.5	29.8	38.8	39.5	34.8	60.0	23.5	35.9
6/14/04	b,c	On	On	12464.64	0.72	0.76	4.63	20.0	21.0	38.8	27.2	37.0	38.2	35.2	60.0	24.0	32.1
7/29/04	d	On	On	844.62	0.99	0.77	7.60	22	15	--	26	35	34	35	--	25	33
8/12/04	e	On	On	1075.97	0.98	0.78	2.08	--	--	--	--	--	--	--	--	--	--
9/10/04		On	On	1490.23	0.85	0.78	3.73	32	32	33	33	21	24	30	20	26	30
10/5/04		On	On	1868.83	0.90	0.78	3.41	31	32	33	31	22	23	31	21	26	28
11/5/04		On	On	2360.90	0.93	0.79	4.43	22	26	12	18	12	22	30	32	26	22
12/2/04	f	Off	Off	2802.02	0.97	0.79	3.97	--	--	--	--	--	--	--	--	--	--
1/13/05		Off	On	2802.07	0.00	0.76	0.00	23	27	15	20	15	23	31	34	28	25
2/25/05	g	Off	Off	2802.42	0.00	0.73	0.00	--	--	--	--	--	--	--	--	--	--
3/8/05	h,i	Off	Off	2802.42	0.00	0.72	0.00	--	--	--	--	--	--	--	--	--	--
4/5/05	i	Off	Off	2802.42	0.00	0.70	0.00	--	--	--	--	--	--	--	--	--	--
5/4/05	j	Off	On	2802.49	0.00	0.69	0.00	14	11	16	12	20	27	25	29	25	31
6/2/05	k	On	On	3407.97	1.00	0.69	5.45	35	25	Off	40	41	36	35	34	27	25
7/7/05	k,l,m	On	On	4067.42	1.29	0.71	5.94	31	23	Off	30	Off	26	32	28	25	Off
8/26/05	n	On	On	4665.98	0.81	0.72	5.39	13	13	Off	14	Off	13	12	12	13	Off
9/23/05	o	On	On	4947.97	0.69	0.71	2.54	16	15	Off	Off	Off	16	16	16	16	Off
10/23/05	p	On	On	5264.28	0.72	0.71	2.85	16	16	Off	Off	Off	16	16	16	16	Off
11/11/05	q,r	On	Off	0.90	--	0.71	--	--	--	--	--	--	--	--	--	--	--
11/15/05	s	Off	On	0.90	0.00	0.71	0.00	35	16	16	22	23	18	23	23	23	24
12/6/05	t	Off	On	2.49	0.00	0.70	0.01	22	20	19	24	24	22	26	23	24	25
1/4/06	u	Off	On	6	0.01	0.69	0.03	20	20	18	17	23	20	25	19	22	20
1/18/06	u	Off	On	203	0.67	0.69	1.77	22	19	19	20	19	18	21	22	22	23
2/1/06	v	Off	On	316	0.38	0.68	1.02	20	20	18	22	22	18	23	23	22	25
2/15/06	v	Off	On	344	0.10	0.68	0.25	20	19	18	17	19	20	23	19	22	20
3/1/06	v	Off	On	417	0.25	0.67	0.66	21	20	19	19	21	17	24	23	21	21
3/16/06	u	Off	On	501	0.27	0.67	0.76	20	19	18	17	19	20	23	20	22	20
3/29/06	u	Off	On	560	0.22	0.67	0.53	20	20	19	19	20	21	25	21	22	21
4/16/06	u	Off	On	624	0.17	0.66	0.58	20	19	18	17	19	20	23	20	23	21

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76 Service Station No. 1871  
96 MacArthur Blvd., Oakland, California  
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		System Status (On/Off)		Hourmeter Reading	Period Online Factor	Cumulative Online Factor	Ozone Injected (lbs)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)	Pressure (psi)
		Arrival	Departure															
4/25/06	u	Off	On	718	0.50	0.66	0.85	20	20	19	18	20	22	24	21	22	20	
5/9/06	u	Off	On	776	0.20	0.65	0.52	20	19	19	17	19	21	22	20	22	20	
5/23/06	u	Off	On	834	0.20	0.65	0.52	19	20	18	18	20	20	23	20	23	21	
6/6/06	u	Off	On	1042	0.71	0.65	1.87	20	19	18	17	19	20	23	20	22	20	
6/20/06	w	Off	On	1206	0.56	0.65	1.48	19	20	18	18	19	20	25	21	23	21	
7/7/06	x	Off	Off	1313	0.30	0.65	0.96	--	--	--	--	--	--	--	--	--	--	
7/28/06	y	Off	On	1313	0.00	0.64	0.00	19	17	16	19	24	17	22	19	21	23	
8/15/06	u	Off	On	1616	0.80	0.64	2.73	19	17	17	16	19	19	23	19	21	21	
8/29/06	u	Off	On	1801	0.63	0.64	1.67	19	19	17	17	21	18	21	19	22	23	
9/12/06	u	Off	On	2022	0.75	0.64	1.99	23	19	17	16	19	19	25	19	22	21	
9/22/06	u	Off	On	2204	0.87	0.64	1.64	21	21	19	20	23	21	26	23	25	27	
10/4/06	u	Off	On	2313	0.43	0.64	0.98	18	18	17	18	18	18	25	23	22	21	
10/18/06	u	Off	On	2401	0.30	0.64	0.79	20	19	17	16	18	19	20	20	21	27	
10/31/06	w	Off	On	2516	0.42	0.63	1.04	22	20	19	20	19	19	23	21	25	23	
11/14/06	u	Off	On	2636	0.41	0.63	1.08	18	18	17	17	18	18	22	24	22	24	
11/28/06	u	Off	On	2744	0.37	0.63	0.97	20	20	19	20	22	21	25	25	22	23	
12/14/06	u	Off	On	2801	0.17	0.63	0.51	19	19	18	18	19	19	22	22	23	22	
12/26/06	u	Off	On	2906	0.42	0.62	0.95	20	20	19	20	21	20	25	25	20	24	
1/15/07	u	Off	On	2983	0.18	0.62	0.69	19	20	18	18	19	19	22	23	22	22	
1/29/07	v	Off	On	3076	0.32	0.62	0.84	20	20	19	20	20	20	24	21	23	24	
2/6/07	u	Off	On	3156	0.48	0.62	0.72	19	20	18	17	19	19	21	24	21	23	
2/21/07	u	Off	On	3303	0.47	0.62	1.32	20	21	20	20	18	21	23	21	25	23	
3/5/07	u	Off	On	3378	0.30	0.61	0.68	19	20	18	18	18	20	21	23	22	22	
3/19/07	u	Off	On	3476	0.33	0.61	0.88	20	21	20	19	18	21	23	24	23	24	
Sparge time per cycle (min)								7	7	7	7	7	7	7	7	7	7	
<b>Reporting Period: First Quarter 2007 (1/01/07 to 3/31/07)</b>																		
Total Hours Operational: 12,398																		
Total Pounds Ozone Injected: 112																		
Period Hours Operational: 570																		
Period Percent Operational: 33%																		
Period Pounds Ozone Injected: 3.57																		

**Table 1**  
**Ozone Injection - System Operation Data**  
76 Service Station No. 1871  
96 MacArthur Blvd., Oakland, California  
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**Definitions:**

psi	Pounds per square inch
--	Data not available
NA	Not applicable
lbs	Pounds

**Notes:**

- System cycles through program 18 times per day, for 53% utilization
- a Troubleshooting time counter
  - b Hourmeter replaced
  - c Solenoid 8 has high pressure, taken offline
  - d Solenoid 3 leaking, taken off line
  - e Pressures not properly recorded
  - f Ozone generator hose ruptured on effluent side to solenoid manifold. No Readings.
  - g System down due to bad GFI
  - h New GFI was installed.
  - i Fan in compressor broken and tubing from compressor to manifold needs to be replaced. System left off until repairs made.
  - j Installed new motor fan and manifold fittings, restarted system.
  - k OZ-3 turned off due to high pressure of over 60 psi.
  - l OZ-5 too brittle. Left off until lines are replaced.
  - m OZ-10 turned off due to leak in secondary containment
  - n Hourmeter reading not correct, will check next visit
  - o Hourmeter not working properly.
  - p Pressure gauge stuck at 16 psi.
  - q New hourmeter, panel fan, and GFCI installed
  - r Fuse blown in ozone generator, system left off
  - s Replaced tubing to all wells and replaced ozone generator circuit board and pressure gauge
  - t System down due to tripped GFI; foam on door may have been pressing reset button. Foam removed.
  - u Ozone sensor tripped; system restarted.
  - v Rainbird meter malfunction.
  - w System down time due to tripped GFI; system restarted.
  - x System off due to bad compressor.
  - y Compressor repaired; system restarted.



**Table 2**  
**Ozone Injection - Groundwater Monitoring Data**  
76 Service Station No. 1871  
96 MacArthur Blvd., Oakland, California  
Page 1 of 1

Date	Notes	Monitoring Well: MW-1								Monitoring Well: MW-7							
		ORP (mV)	DO (mg/l)	TPHg (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (total) (µg/L)	MtBE (µg/L)	ORP (mV)	DO (mg/l)	TPHg (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (total) (µg/L)	MtBE (µg/L)
4/16/2003	a	NM	NM	510	57	0.62	29	61	160	NM	NM	<25,000	<250	<250	<250	<500	37,000
6/23/2003	a	NM	NM	75	<0.50	<0.50	<0.50	5.3	12	NM	NM	20,000	260	<0.50	<0.50	<1.0	20,000
8/29/2003	a	NM	NM	11,000	64	<10	330	1,400	440	NM	NM	<10,000	<100	<100	<100	<200	24,000
9/18/2003		NM	NM	390	2.3	<0.50	3.6	31	30	NM	NM	--	--	--	--	--	--
10/16/2003		NM	NM	2,100	6.0	<0.50	24.0	120	110	NM	NM	--	--	--	--	--	--
11/17/2003		NM	NM	130	0.51	<0.50	2.1	7.9	43	NM	NM	16,000	<130	<130	<130	<250	17,000
12/5/2003		NM	NM	<50	<0.50	<0.50	<0.50	<1.0	36	NM	NM	12,000	<100	<100	<100	<200	19,000
1/16/2004	b	NM	NM	<50	<0.50	<0.50	<0.50	<1.0	<2.0	NM	NM	17,000	160	270	<130	<250	19,000
2/3/2004		238	NM	<50	<0.50	<0.50	<0.50	<1.0	<2.0	72	NM	10,000	<25	<25	<25	<50	15,000
3/24/2004	b	169	NM	55	<0.50	<0.50	0.80	2.9	7.8	56	NM	13,000	<100	<100	<100	<200	15,000
4/14/2004	b	0.4	NM	23,000	310	10	590	2400	1700	42	NM	9,000	<50	<50	<50	<100	11,000
5/11/2004		c	NM	7,800	160	<10	170	700	720	-3	NM	8,300	<50	<50	<50	<100	11,000
6/14/2004		20	5.25	110	<0.50	<0.50	1.0	6.4	3.4	35	1.45	<5,000	<50	<50	<50	<100	6,500
7/26/2004		NM	NM	<50	<0.50	<0.50	<0.50	<1.0	3.2	NM	NM	<5,000	<50	<50	<50	<100	3,100
8/12/2004		171	0.07	<50	<0.50	<0.50	<0.50	<1.0	0.80	117	0.06	2,100	<10	<10	<10	<20	2,700
9/10/2004		180	0.08	<50	<0.50	<0.50	<0.50	<1.0	5.7	122	0.07	3,100	<13	<13	<13	<25	4,400
10/5/2004		175	0.09	<50	<0.50	<0.50	<0.50	<1.0	<0.50	117	0.08	<50	<0.50	<0.50	<0.50	<1.0	7.1
11/5/2004	d	117	0.05	<50	<0.50	<0.50	<0.50	<1.0	0.89	210	0.06	50	<0.50	<0.50	<0.50	<1.0	1.1
12/2/2004		109	0.03	83	0.83	<0.50	<0.50	1.2	44	214	0.03	180	1.6	<0.50	66	4.5	51
1/13/2005		105	0.04	1,100	26	1.2	2.10	70	630	201	0.05	1,000	25	1	1.9	68	460
2/25/2005	c,f	--	2.67	24,000	350	10	820	2,200	1,300	21	2.05	680	<2.0	<2.0	2.3	58	2,500
3/8/2005	g	-35	4.43	23,000	410	<10	1,100	2,300	1,300	NR	NR	--	--	--	--	--	--
4/5/2005		-30	4.56	34,000	300	<10	910	2,000	1,100	135	6.53	<5,000	<.50	<.50	<.50	<1.00	19,000
5/4/2005		-59	2.40	26,000	220	7.4	790	2,100	860	-24	1.13	<2,000	<0.50	<0.50	<0.50	<1.0	7,100
6/2/2005		-20	7.34	<50	<0.50	<0.50	<0.50	<1.0	3.5	-12	1.01	3500	<0.50	<0.50	<0.50	<1.0	4,000
7/7/2005	i,j	142	7.42	<50	<0.50	<0.50	<0.50	<1.0	0.61	154	1.40	5000	<0.50	<0.50	<0.50	<1.0	8,900
9/23/2005		16	7.77	<50	<0.50	<0.50	<0.50	<1.0	<0.50	56	1.39	<500	<5.0	<5.0	<5.0	<10	1,900
10/23/2005		154	7.13	<50	<0.50	<0.50	<0.50	<1.0	0.56	191	1.59	<250	<2.5	<2.5	<2.5	<5	680
11/1/2005	k	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Definitions:**

TPHg = Total petroleum hydrocarbons as gasoline  
MtBE = Methyl tert-butyl ether  
µg/L = Micrograms per liter

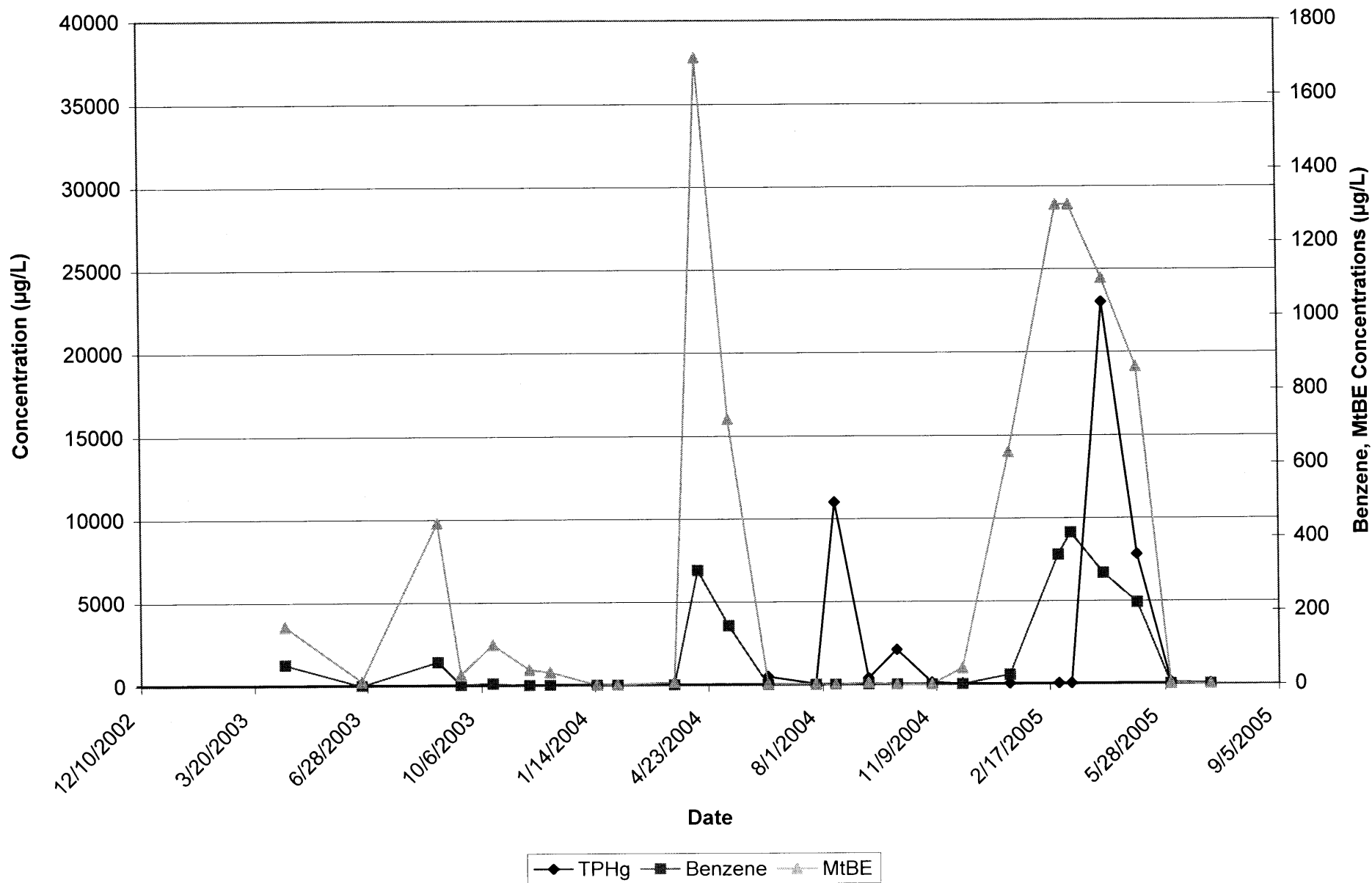
ORP = Oxidation Reduction Potential  
DO = Dissolved Oxygen  
mV = Millivolts  
mg/l = Milligrams per liter

**Notes:**

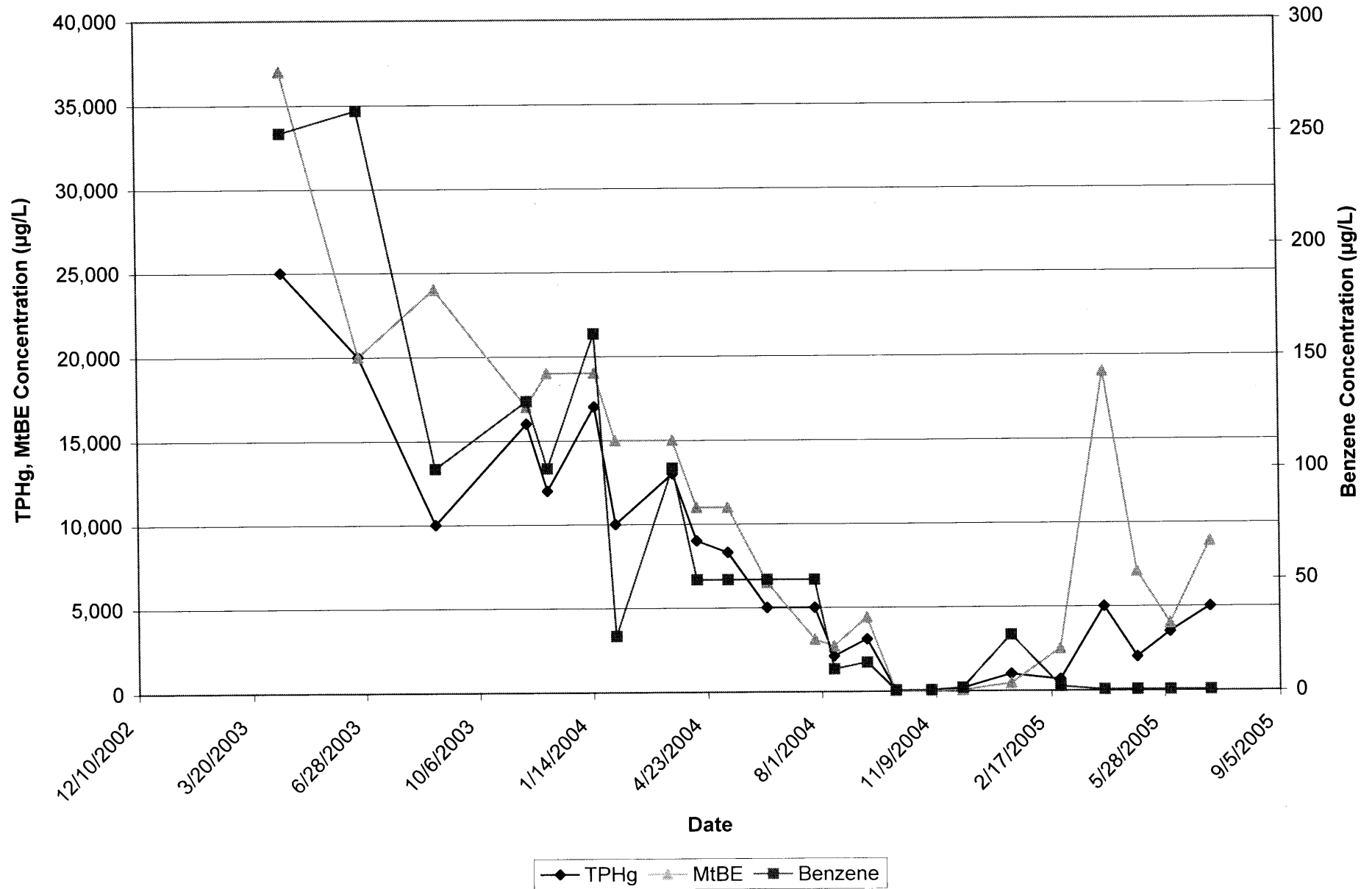
- Data not available
- NM Not Measured
- a Sampled by Gettler-Ryan, Inc.
- b Hydrocarbon in gasoline range does not match laboratory gasoline standard.
- c ORP reading under the range
- d Quantity of unknown hydrocarbon(s) in sample based on gasoline.
- e Data not available at time of reporting
- f MW-7 Estimated value of MtBE; concentration exceeded the calibration of analysis
- g Car parked on MW-7.
- h Data not available at time of reporting
- i Siloxane peaks were found in the sample which are not believed to be gasoline related. If they were to be quantified as gasoline, the concentration would be 58 ug/L. (MW-1).
- j The concentration reported reflect(s) individual or discrete unidentified peaks not matching a typical fuel pattern. (MW-1)
- k Sampling discontinued at the request of ConocoPhillips

## **Graphs**

**Graph 1**  
**MW-1 TPHg, Benzene, and MtBE Groundwater Concentrations**  
 76 Service Station No. 1871  
 96 MacArthur Blvd., Oakland, California



**Graph 2**  
**MW-7 TPHg, Benzene, and MtBE Groundwater Concentrations**  
 76 Service Station No. 1871  
 96 MacArthur Blvd., Oakland, California



**Appendix A**  
**Field Notes**

**ConocoPhillips Ozone Injection System Data**

Station No. T1871

City: OAKLAND

Date	Notes/ Date Sampled	Status ON/OFF	Cycles/ Day	Hour Meter	Well ID: <u>O2-1</u>				Well ID: <u>O2-2</u>				Well ID: <u>O2-3</u>			
					Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)
15 Jan 07	O <sub>3</sub> Sensor	off/on	18	2983	19		7		20		7		18		7	
29 Jan 07	D	off/on	18	3076	20		7		20		7		19		7	
6 Feb 07	O <sub>3</sub> Sensor	off/on	18	3156	19		7		20		7		18		7	
21 Feb 07	O <sub>3</sub> Sensor	off/on	18	3303	20		7		21		7		20		7	
5 Mar 07	O <sub>3</sub> Sensor	off/on	18	3378	19		7		20		7		18		7	
19 Mar 07	O <sub>3</sub> Sensor	off/on	18	3476	20		7		21		7		20		7	

Date	Well ID: <u>O2-4</u>				Well ID: <u>O2-5</u>				Well ID: <u>O2-6</u>				Well ID: <u>O2-7</u>			
	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)
15 Jan 07	18		7		19		7		19		7		22		7	
29 Jan 07	20		7		20		7		20		7		24		7	
6 Feb 07	17		7		19		7		19		7		21		7	
21 Feb 07	20		7		18		7		21		7		23		7	
5 Mar 07	18		7		18		7		20		7		21		7	
19 Mar 07	19		7		18		7		21		7		23		7	

Date	Well ID: <u>O2-8</u>				Well ID: <u>O2-9</u>				Well ID: <u>O2-10</u>				Well ID:			
	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)	Pressure (psi)	Temp. (°F)	Run Time (min)	Flowrate (acfm)
15 Jan 07	23		7		22		7		22		7					
29 Jan 07	21		7		23		7		24		7					
6 Feb 07	24		7		21		7		23		7					
21 Feb 07	21		7		25		7		23		7					
5 Mar 07	23		7		22		7		22		7					
19 Mar 07	24		7		23		7		24		7					

**Ozone Injection System Maintenance and Inspection Log**

Date	Check Hose Fittings Valves	Measure Blower Running Amperage	Check Electrical Fittings and Controller Operation	Adjust Controller Program	Particle Filter Inspect/ Replace	Check Flow Pressure Assembly	Check Well Head Connect	Test all Safety Override Systems
29 Jan 07	OK	—	OK	—	OK	OK	OK	OK
21 Feb 07	OK	—	OK	—	OK	OK	OK	OK
19 Mar 07	OK	—	OK	—	OK	OK	OK	OK

Comments: \_\_\_\_\_