



Updated

WALTHAM / MASSACHUSETTS / PAUL'S AUTO SERVICE

On July 7, 2004, GBI began installation of a *Butane Biostimulation Technologies*[™] treatment system to remediate petroleum contamination resulting from historic releases at a former gasoline dispensing facility located in Waltham, Massachusetts. The *Butane Biosparging*[™] system startup occurred on September 3, 2004. In order to treat vadose zone soils, a *Butane Bioventing*[™] system was installed at the Site and is operated concurrently with the *Butane Biosparging*[™] treatment system. The bioventing system controls potential migration of VOCs from the treatment area into adjacent buildings. In addition, the *Butane Bioventing*[™] system further oxygenates the soil resulting in enhanced microbial degradation of petroleum compounds in the capillary fringe and in the unsaturated zone. The extracted soil gas is combined with fresh air introduced through a dilution valve for additional oxygen enrichment prior to reinjection into the butane biotreatment zone. This process provides vapor control while reducing the overall O&M costs by eliminating the need for carbon replacement or regeneration. The recycling of butane gas further facilitates soil treatment.

The last groundwater sampling event was conducted on September 29, 2005. The groundwater samples were submitted for laboratory analysis for VPH with target analytes. The groundwater samples were transferred directly to laboratory-prepared bottles and stored on ice in a cooler. The September 2005 analytical results are summarized in Table 1.

There were no VPH contaminants observed in the groundwater samples collected from monitoring wells GBI-1, GBI-3, and GBI-4. VPH exceedances were observed in the groundwater samples collected from monitoring wells GBI-2, GBI-5, PA-1, PA-2, and PA-3.

Overall, the September 2005 sampling event demonstrated that VPH contaminant concentrations continue to decrease in the Site monitoring wells. Significant contaminant reductions have already been noted in monitoring wells GBI-2, GBI-4, GBI-5, PA-1, and PA-2.

BUTANE BIOSTIMULATION TECHNOLOGIES[™]

Site Photos



TABLE 1

**SUMMARY OF GROUNDWATER DATA: VPH
PAUL'S AUTO SERVICE
152 HIGH STREET, WALTHAM, MASSACHUSETTS**

System Startup 9/3/2004

System Flow Rate = 1 cfm

SAMPLE LOCATION	SAMPLE DATE	BENZENE	ETHYL-BENZENE	TOLUENE	XYLENES	MTBE	NAPHTH-ALENE	C5 - C8 ALIPHATICS	C9 - C12 ALIPHATICS	C9 - C10 AROMATICS
GBI-1	6/1/2004	<5	<5	<5	<5	<5	< 20	<40	<15	<55
	10/27/2004	<5	<5	<5	<5	<5	< 20	<40	<15	<55
	3/2/2005	<5	<5	<5	<5	<5	< 20	<40	<15	<55
	7/7/2005	<2	<2	<2	<2	<3	<10	<50	<50	<50
	9/29/2005*	<2	<2	<2	<2	<3	<10	<50	<50	<50
	9/29/2005**	<5	<5	<5	<5	<5	<10	<50	52	<50
GBI-2	6/1/2004	<5	2,300	1,690	16,490	<5	236	<40	<15	8,140
	10/27/2004	<5	118	290	4,180	<5	33.2	955	<15	2,390
	3/2/2005	<5	427	180	15,000	<5	195	1,660	9,240	9,430
	3/14/2005*	<40	540	187	12,630	<60	<200	1,900	4,520	6,880
	7/7/2005	<100	1,500	527	10,360	<150	<500	<2,500	6,850	7,710
	9/29/2005*	<20	404	67.9	2,200	<30	143	514	2,610	4,720
9/29/2005**	<5	390	72	2,200	<5	130	700	<50	8,500	
GBI-3	6/1/2004	<5	<5	<5	<5	<5	<20	<40	<15	<55
	10/27/2004	<5	<5	<5	<5	<5	<20	<40	<15	<55
	3/2/2005	<5	<5	<5	<5	<5	< 20	<40	<15	<55
	7/7/2005	<2	<2	<2	<2	<3	<10	<50	<50	<50
	9/29/2005*	<2	<2	<2	<2	<3	<10	<50	<50	<50
	9/29/2005**	<5	<5	<5	<5	<5	<10	<50	51	<50
GBI-4	6/1/2004	300	2,500	3,460	12,100	<5	457	<40	<15	7,630
	10/27/2004	<5	<5	<5	<5	<5	< 20	<40	<15	<55
	3/2/2005	<5	<5	<5	<5	<5	< 20	<40	<15	<55
	7/7/2005	<2	<2	<2	<2	<3	<10	<50	<50	<50
	9/29/2005*	<2	<2	<2	<2	<3	<10	<50	<50	<50
	9/29/2005**	<5	<5	<5	<5	<5	<10	<50	64	<50
GBI-5	6/1/2004	<5	22.3	6.3	79.3	<5	<20	49.3	<15	232
	10/27/2004	272	1,790	3,340	10,780	9.80	335	5,570	<300	4,710
	3/2/2005	60.2	1,220	78	2,191	<5	184	2,850	<15	4,200
	3/14/2005*	18.4	262	33	493	<15	<50	1,640	892	1,090
	7/7/2005	75.7	267	803	2,532	<15	<50	2,870	1,220	2,160
	9/29/2005*	197	568	978	1,547	<15	98.4	4,010	1,780	2,350
9/29/2005**	310	630	1,100	1,770	<5	110	2,600	<50	4,800	
PA-1	3/2/2005	131	1,440	26.5	2,494	<5	552	3,760	426	4,730
	3/14/2005*	56.6	529	<20	671	<30	255	2,180	1,860	2,290
	7/7/2005	99.7	895	<20	1,100	<30	348	2,460	1,310	3,010
	9/29/2005*	105	1,120	26	1,480	<30	584	2,570	3,140	3,870
	9/29/2005**	150	1,000	<50	1,300	<50	520	1,400	<500	6,700
PA-2	3/2/2005	<5	91	23	601	<5	121	1,520	638	2,000
	7/7/2005	<2	4.14	<2	14.9	<3	12.8	228	145	313
	9/29/2005*	219	388	34	280	<15	64.1	1,020	758	1,360
	9/29/2005**	210	330	43	271	<5	46	850	<50	2,800
PA-3	3/2/2005	28.1	169	10.2	561	<5	112	1,130	570	1,960
	7/7/2005	26	56.8	<10	239	<15	131	1,620	525	1,840
	9/29/2005*	111	392	17.9	499	<15	276	1,640	1,270	3,150
	9/29/2005**	130	400	14	421	<5	230	650	<50	5,400

GW-2	2,000	30,000	6,000	6,000	50,000	6,000	1,000	1,000	5,000
GW-3	7,000	4,000	50,000	50,000	50,000	6,000	4,000	20,000	4,000

NOTES: All concentrations expressed in µg/L (ppb).
 Bold values exceed GW-2 and/or GW-3 Standards.
 * = Samples analyzed at Alpha Analytical Labs.
 ** = Data analyzed at Alpha Analytical Labs for quality assurance check. All other data analyzed at GeoLabs, Inc.
 Wells GBI-3 and GBI-4 are classified as GW-3. All other wells are classified as GW-2.

REFERENCES

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