Global BioSciences, Inc.

PETROLEUM POLLUTANTS CASE STUDY

FAIRHAVEN / MASSACHUSETTS

In December 2001, GBI installed the Butane Injector 2000™ to remediate petroleum contamination resulting from leaking No. 2 fuel oil underground storage tanks (USTs) at a former heating oil distribution facility in Fairhaven, Massachusetts. The primary environmental contractor for the Site is Horsley & Witten (H&W) located in Sandwich, Massachusetts. Before introducing Butane Biostimulation Technologies™, approximately 20 gallons of non-aqueous phase liquid (NAPL) oil were initially recovered through bailing. Several remediation technologies, including chemical oxidation, were considered for the Site. It was determined that Butane Biostimulation Technologies™ would be the most appropriate and economical option for obtaining a permanent solution in a timely manner. Butane Biosparging™ was implemented with a Butane Bioventing™ System (BBS) – a type of soil vapor extraction/vapor reinjection system. The BBS controls potential migration of VOCs from the treatment area into adjacent buildings and further oxygenates soils resulting in enhanced microbial degradation of petroleum compounds in the capillary fringe and vadose zone. The BBS system recirculates extracted soil gas back into the butane biotreatment zone, thus allowing for vapor control while reducing the overall O&M costs by eliminating the need for carbon treatment of off-gas and by recycling the butane gas. The Butane Injector 2000™ system was shut down in June 2002.

The remedial objectives for the site included reducing groundwater and soil concentrations of the contaminants of concern to below Massachusetts Contingency Plan (MCP) GW-2, GW-3, S-2/GW-2 and S-2/GW-3 standards for volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) and eliminating the potential for migration of contaminants from the soil in the source area to the groundwater. Groundwater sampling data collected after six months of system operation are presented here for the two source area monitoring wells, HW-3 and HW-4, with initial concentrations exceeding the MCP limits. Documents for Site closure were prepared by H&W.

BUTANE BIOSTIMULATION TECHNOLOGIES™
Site Photos

Summary of Groundwater Quality Data
Fairhaven, Massachusetts
System Startup – December 2001
System Shut Down – June 2002

Sample Location	Sample Date	Analytical Method	C_5-C_8 Aliphatic	C_9-C_{12} Aliphatic	C_9-C_{10} Aromatic	C_9-C_{18} Aliphatic	C_{19}-C_{36} Aliphatic	C_{11}-C_{22} Aromatic
HW-3	12/13/2000	VPH & EPH	<40	370	**680**	**9,000**	1,500	15,000
	6/25/2002	VPH & EPH	<40	<15	<100	<100	<100	<100
MW-4	12/13/2000	VPH & EPH	54	830	**1,200**	**19,000**	2,400	**30,000**
	6/25/2002	VPH & EPH	<40	<15	**583**	<100	<100	<100
MCP GW-2 Standards			**1,000**	**1,000**	**500**	**1,000**	**NA**	**50,000**
MCP GW-3 Standards			**4,000**	**20,000**	**4,000**	**20,000**	**20,000**	**30,000**

NOTES: All concentrations expressed in µg/l (ppb)
Bold concentration exceeds MCP GW-2 and/or GW-3 Standard
NA = Not Available

REFERENCES

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