

Bioremediation with M-1000H*



Bioremediation of Methyl Ethyl Ketone – Paint Factory

In the process of clearing a paint factory site, an underground waste solvent tank was excavated and was found to have been leaking. Groundwater contamination with paint solvents was observed in the excavated pit. The volume of contamination was unknown and leakage had continued for an undetermined period of time.

A groundwater monitoring system was installed, which consisted of several monitoring wells of approximately five meters (5M) depth. Repeated analyses of the wells revealed the presence of xylene, toluene, methyl ethyl ketone, methyl isobutyl ketone, and ethyl benzene. Two years prior, an air-stripping system had been implemented but it had produced no significant changes in groundwater contamination levels.

The diverse nature of the contaminants and the limestone geology of the site limited the remediation options, and so the decision was made to employ microbial remediation technology. Initially, 20 gallons of M-1000H* was added to the pit water and circulated through the plume. The test results at 90 days revealed an increase in xylene levels in the monitoring well water as a result of the solubilization of hydrocarbons that had been previously adsorbed to the clay soils of the aquifer.

At 105 days, an additional 20 gallons of M-1000H*, along with 80 gallons of micronutrients, was added to the pit and applied into the monitoring wells. Again, the treated pit water was circulated through the monitoring wells and throughout the entire plume of contamination. At five months, contaminant values were determined and analyzed. There was a decrease of 46-97% in the methyl ethyl ketone, the methyl isobutyl ketone and the toluene values, while the ethyl benzene and xylene values still measured higher than the pre-treatment values (see chart).

Subsequent to these measurements, increases in contaminant levels were observed during periods of high rainfall. This indicated a significant amount of contaminant still present in the “smear zone” - contaminant that was being released to the groundwater as a result of ongoing microbial solubilization.

A third microbial treatment protocol was completed at 12 months after project start-up and test results from sampling events at 14 months showed further reductions at monitoring well # 1 in the contaminants of concern. The testing at monitoring well # 2 indicated a rebound for MEK and MIK (again due to smear zone desorption).

After two more applications, the testing at 28 months showed the expected levels of contamination. Monitoring well # 1 showed contaminant decreases of 97-100% (ND). Monitoring well # 2 showed reductions of 86-99%.

Analytical Results

During Microbial Treatment Program					
Monitoring Well #1	<i>Mean Values</i>	<i>5 months</i>	<i>14 months</i>	<i>28 months</i>	<i>% decrease</i>
Methyl Ethyl Ketone	15.00	0.5	0.5	ND	100%
Methyl Isobutyl Ketone	15.17	0.5	0.5	ND	100%
Toluene	2.55	1.4	0.1	.018	99%
Ethyl Benzene	1.69	4.7	.958	.049	97%
Xylene	7.52	108.0	1.29	.070	99%
Monitoring Well #2	<i>Mean Values</i>	<i>5 months</i>	<i>14 months</i>	<i>28 months</i>	<i>% decrease</i>
Methyl Ethyl Ketone	5.39	0.5	13.9	.655	88%
Methyl Isobutyl Ketone	13.40	0.5	8.06	1.820	86%
Toluene	8.02	1.6	1.41	.098	99%
Ethyl Benzene	5.36	0.9	1.48	.571	89%
Xylene	19.34	133.0	8.68	2.06	89%