



Bioremediation Project Experience Treated Railroad Ties

Project Description

A treatability study was conducted in the summer of 2000 to demonstrate the ability of microbes to remediate treated railroad ties. The railroad ties were processed through a wood chipper and sorted into “large” chips ranging in size from 1 to 2 inches in length, and “small” chips which were approximately ¾-inch in length. Both piles were treated with the following solution:

- Microbe solution with microbial concentration of 4.02E+05
- MicroSurf™ (surfactant to improve wetting and dispersion properties)
- Ammonium sulfate (nutrient source)
- Monopotassium phosphate (nutrient source)
- Tap water

The wood chips were piled on plastic and the above solution was added to both piles using a 50:50 weight ratio. The large wood chip pile was initially treated on April 26, and then retreated on May 12, 2000. The small wood chip pile was initially treated on May 12.

Remedial Time Frame

Final samples were collected on June 14. The large wood chip pile was treated for 49 days and the small wood chip pile was treated for 33 days.

Analytical Results

The treatment of the large wood chips was slightly more successful due to the longer treatment time and second inoculation, but concentration reductions in both piles was significant. A total of 33 analytes were detected in the untreated sample. The concentrations of approximately half of those analytes were reduced to below detection limits in both of the treated piles. A summary of the percent reductions by number of analytes is shown below. In fact, in the large chip pile, 17 of the 33 detected analytes could not be detected following treatment and the concentration of 31 of the detected analytes was reduced by at least 70 percent. A list of the analytes treated by the microbes and the corresponding percent reduction in the large chips pile is shown in the table below.

Analyte	Initial Concentration (mg/kg)	Percent Reduction
2,4-Dimethylphenol	96	< DL
2,4-Dinitrotoluene	4.7	< DL
2-Methylnaphthalene	1,000	92%
2-Methylphenol	38.7	< DL
3,3'-Dichlorobenzidine	2.2	< DL
4,4'-DDD	1.0	< DL
4-Methylphenol	97.3	< DL
Acenaphthene	1,110	88%
Acenaphthylene	47.9	92%
Anthracene	584	92%
Benzoic acid	4.6	< DL
Benzo (A) anthracene	170	73%
Benzo (A) pyrene	34.4	68%
Benzo (B) fluoranthene	41.4	58%
Benzo (G,H,L) perylene	7.6	< DL
Benzo (K) fluoranthene	54.3	70%
bis (2-Ethylhexyl)phthalate	2.4	< DL
Butyl benzyl phthalate	0.04	< DL
Chrysene	237	86%
Dibenzofuran	1,040	94%
Dibenzo (A,H) anthracene	5.8	< DL
Dieldrin	1.1	< DL
Di-n-Octylphthalate	3.4	< DL
Fluoranthene	1,200	81%
Fluorene	1,190	92%
Heptachlor	2.5	< DL
Ieno (1,2,3-CD) Pyrene	1.0	< DL
Carbazole	161	90%
Isophorone	1.2	< DL
Naphthalene	3,070	100%
Phenanthrene	3,020	96%
Phenol	37	< DL
Pyrene	972	84%

