



Bindex™ BFM Fish Toxicity Report

A liquid sample of the components used for Bindex BFM was tested for fish toxicity and the impact on water quality. The tests were completed by the Environmental Science and Technology Division at the Weyerhaeuser Analytical Laboratory in Federal Way, WA.

In particular, Weyerhaeuser conducted some acute rainbow trout toxicity tests on the liquid portion used in Bindex BFM. It was discussed that expectations of this liquid in its undiluted form would not support fish. This expectation was based on the high viscosity of the liquid and the fact that most chemicals at high enough concentration exert a preservative effect (even naturally occurring chemicals such as alcohol, sugar and salt exert a preservative effect at high concentration). The goal of the testing then was to establish a practical dilution ration at which the liquid portion on Bindex BFM would exert no toxic effect in the acute rainbow trout toxicity test.

Experimental Procedure

The liquid portion of a fresh mix was separated from the fibrous component by filtering through an inert gauze material. This liquid was diluted with varying amounts of fresh water and the resultant solutions were each tested in accordance with WDOE 80-12, rev.9/91 static acute fish toxicity test. In this test the mortality of ten fingerlings of rainbow trout is tracked for a period of four days.

Results

It was observed that when the liquid was diluted by a factor of 2.8 or greater all ten fish survived the four day testing period.

Conclusions

This test indicated that only a modest dilution of the liquid component is necessary to achieve maximum survival rate in this acute fish toxicity test. The nitrogen level is 0.02% of the total by weight. This makes the product of beneficial use for land application. The metals were all at least two orders of magnitude below the existing limits. The volatile organics were well below the guidelines. Attached are the results of the analysis.



Results of Chemical Analysis of Bindex BFM Liquid Components

Federal Leachate Limits For Reference Only:

1. Toxicity Characteristic Leaching Procedure (TCLP)
2. Land Application Criteria (LAC)

| Constituent | Analytical Results - ppm | TCLP - ppm | LAC - ppm |
|-----------------------|--------------------------|----------------|----------------|
| Silver | <0.001 | 5 | N/A |
| Arsenic | <0.1 | 5 | 41 |
| Barium | 0.2 | 100 | N/A |
| Cadmium | <0.01 | 1 | 39 |
| Chromium | <0.01 | 5 | 1,200 |
| Copper | 0.05 | N/A | 1,500 |
| Mercury | <0.001 | 0.2 | 17 |
| Molybdenum | <0.01 | N/A | 18 |
| Nickel | <0.03 | N/A | 210 |
| Lead | <0.05 | 5 | 300 |
| Selenium | <0.2 | 1 | 36 |
| Zinc | 0.11 | N/A | 2,800 |
| Vinyl Chloride | <0.10 | 0.2 | 0.525 |
| 1, 1-Dichloroethylene | <0.10 | 0.7 | 11.6 |
| Chloroform | <0.10 | 6 | 1.24 |
| Carbon Tetrachloride | <0.10 | 0.5 | 35.2 |
| 1,2-Dichloroethane | <0.10 | 0.5 | 20 |
| Methyl Ethyl Ketone | 0.4 | 200 | N/A |
| Trichloroethylene | <0.10 | 0.7 | 0.84 |
| Benzene | <0.10 | 0.5 | 5.3 |
| Tetrachloroethylene | <0.10 | 0.7 | 0.84 |
| Chlorobenzene | <0.10 | 100 | 0.15 |
| Nitrogen | 0.02% | Beneficial Use | Beneficial Use |

Bindex BFM Liquid Components “Land Application Criteria”

TCLP Report SR# 13085 ND = Not Detected above the Quantification Limit Listed

| E.P.A. | Constituent | Component Water (mg/L) | Quantity Limit (mg/L) | (TCLP) Maximum (mg/L) |
|--------|-----------------------------------|------------------------|-----------------------|-----------------------|
| 012 | Insecticides/Herbicides Endrin | ND | 0.0001 | 0.02 |
| 013 | Lindane | ND | 0.00005 | 0.4 |
| 014 | Methoxychlor | ND | 0.0005 | 10.00 |
| 015 | Tozaphene | ND | 0.005 | 0.5 |
| 016 | 2,4-D | ND | 0.04 | 10.00 |
| 017 | 2,4,5-TP Silvex | ND | 0.001 | 1.00 |
| | Semivolatiles | | | |
| 023 | o-Cresol | ND | 0.05 | 200.00 |
| 024 | m-Cresol | ND | 0.05 | 200.00 |
| 025 | p-Cresol | ND | 0.05 | 200.00 |
| 026 | Cresols | ND | 0.15 | 200.00 |
| 027 | 1,4-Dichlorobenzene | ND | 0.05 | 7.50 |
| 031 | 2,4-Dinitrotoluene | ND | 0.05 | 0.13 |
| 032 | Hezachlorobenzene | ND | 0.05 | 0.13 |
| 033 | Hexachlorobutadiene | ND | 0.05 | 0.5 |
| 034 | Hezachloroethane | ND | 0.05 | 3.00 |
| 036 | Nitrobenzene | ND | 0.05 | 2.00 |
| 037 | Pentachlorophenol | ND | 0.12 | 100.00 |
| 038 | Pyridine | ND | 0.05 | 5.00 |
| 041 | 2,4,5-Trichlorophenol | ND | 0.12 | 400.00 |
| 042 | 2,4,6-Trichlorophenol | ND | 0.05 | 2.00 |



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