



U. S. A. REPORT #55-01

- Definitive Toxicity LC 50
- Static Sheen

SUMMARY:

It is important to evaluate drilling products and materials that are used in environmentally sensitive areas, such as offshore drilling sites. FORTA SUPER-SWEEP[®] fiber was tested by a leading environmental research and consulting agency to determine the effects regarding static sheen and definitive toxicity, using Mysid shrimp (*Mysidopsis bahia*) as test organisms. FORTA SUPER-SWEEP[®] fiber was shown to pass both static sheen and LC 50) toxicity testing to satisfy U. S. Environmental Protection Agency requirements for offshore drilling applications.

TEST METHOD:

For the static sheen portion of the research, FORTA SUPER-SWEEP[®] was tested at a dosage rate of 1.0 lb. per barrel, as per Part I, Section D.6 of the U. S. EPA reference "The Final NPDES Permit For New and Existing Sources in the Offshore Subcategory of the Oil and Gas Extraction Category for the Western Portion of the Outer Continental Shelf of the Gulf of Mexico" of the Federal Register (Vol. 61, no. 155, 8-9-96). For definitive toxicity, FORTA SUPER-SWEEP[®] was also tested at 1.0 lb. per barrel, using the analytical method referenced by the U.S.-EPA in appendix 2 to subpart A of part 435 of "Drilling Fluids Toxicity Test, Final Rule for Offshore Subcategory of the Oil and Gas Extraction Point Source Category" of the Federal Register (Vol. 58, no. 41, 3-4-93).

Testing was conducted using the Suspended Particulate Phase (SPP) of the representative samples. Dilution water was prepared with hw-MARINEMIX + Bio-Elements and deionized water, and adjusted to 20 parts per thousand (ppt) salinity. Mysid shrimp, 3 to 6 days of age, were cultured and maintained at a salinity of 23 ± 2 ppt and a temperature of $23 \pm 2^{\circ}\text{C}$. Mysids were acclimated to a salinity of 20 ± 1 ppt and a temperature of $20 \pm 2^{\circ}\text{C}$ prior to test initiation. Test organisms were fed daily *Artemia nauplii*, less than 24-hours old. Standard reference toxicant (Sodium dodecyl sulfate, Sigma Chemical. Lot #106H0112, 95% purity) testing yielded a 96-hour LC 50 of 8.2 ppm, with a 95% confidence interval of 7.6 to 8.8 ppm. The FORTA SUPER-SWEEP[®] fiber was tested at 1 lb. per barrel: 1.54 gm of sample and 539 ml dilution water. The SPP was prepared as described by EPA (1993). The "whole mud" solution was mixed for 15 minutes on a shaker table and then added to 4851 ml dilution water to prepare a 1 part "mud" to 9 parts seawater (1:9 mud/seawater) slurry. The mud/seawater slurry was mixed for 5 minutes, its pH measured, and then allowed to settle. After one hour, the SPP was carefully poured off. The temperature, dissolved oxygen, salinity, and pH of the SPP were measured and recorded. If necessary, the pH and dissolved oxygen were adjusted. A 96-hour range-finding test indicated that the LC 50 should exceed 1,000,000 ppm. Therefore, 60 mysids (3 replicates of 20) were each exposed to 100% SPP and negative controls. Surviving mysids were counted and recorded daily. At 24-hour intervals, temperature, DO, pH, and salinity were measured in each treatment.

TEST RESULTS:

Testing showed that the FORTA SUPER-SWEEP[®] sample passed the static sheen requirement at 1 lb. per barrel mixed with artificial seawater. The 96-hour exposure to the 100% FORTA SUPER-SWEEP[®] SSP resulted in 100% survival, while the control survival was also 100%. These tests confirm the LC 50 for the FORTA SUPER-SWEEP[®] mud sample was in excess of 1,000,000 parts per million.

Drilling Fluid Toxicity Test:

Definitive 96-hour Static LC 50 Test with Mysidopsis Bahia

LC 50 results exceeded 1,000,000 ppm, test passed.

[From "96-Hour Static Definitive Toxicity Test: FORTA SUPER-SWEEP® Fiber", Environmental Enterprises USA, Inc. Slidell, LA; EE#M-247-98; March 1998.]

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