

## ACUTE TOXICITY TO THE SALTWATER MYSID

TEST SUBSTANCE

**Identity:** Perfluorooctanesulfonate; may also be referred to as PFOS or FC-95. (1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt, CAS # 2795-39-3)

**Remarks:** The test substance is a white powder. Sample was taken from 3M lot number 217. Sample was stored under ambient conditions prior to testing. Purity determined to be 90.49% by LC/MS, <sup>1</sup>H-HMR, <sup>19</sup>F-NMR and elemental analyses techniques.

METHOD

**Method:** OPPTS 850.1035

**Type:** Static acute

**GLP:** Yes

**Year completed:** Study completed 1999. Report completed 2000

**Species:** *Mysidopsis bahia*

**Supplier:** In-house cultures, Wildlife International, Ltd., Easton, MD

**Analytical monitoring:** PFOS measured at 0, 48, 96-hours

**Exposure period:** 96-hours

**Statistical methods:** LC<sub>50</sub> values calculated, when possible, by probit analysis, moving average method or binomial probability with non-linear interpolation using the computer software of C.E. Stephan.

**Test fish age:** < 24-hours old

**Pretreatment:** None

**Test conditions:**

**Dilution water:** Natural seawater diluted to 20‰ with well water, 0.45µm filtered.

**Dilution water chemistry (during the 4-week period immediately preceding the test):**

**Salinity:** 20 (20-20) ‰

**pH:** 8.2 (8.1-8.2)

**TOC:** < 1.0 mg/L

**Stock and test solution preparation:** Primary stock prepared at 8.2 mg/L and mixed for ~22 hours prior to use. After mixing, primary stock solution was proportionally diluted with dilution water to prepare the four additional test concentrations. All test solutions appeared clear and colorless.

**Concentrations dosing rate:** Once

**Stability of the test chemical solutions:** Extremely stable

**Exposure vessels:** 2L polyethylene aquaria containing approximately 1000mL of test solution; water depth approximately 6.6 cm.

**Number of replicates:** two

**Number of mysids per replicate:** ten

**Number of concentrations:** five plus a negative control

**Feeding:** Live brine shrimp nauplii daily

**Water chemistry during the study:**

**Dissolved oxygen range** (0 – 96 hours):

6.8 – 7.4 mg/L (control exposure)

6.8 – 7.3 mg/L (5.4 mg/L exposure)

**pH range** (0 – 96 hours)

8.1 – 8.2 (control exposure)

8.1 – 8.2 (5.4 mg/L exposure)

**Test temperature range** (0 – 96 hours)

24.2 – 25.4°C (control exposure)

23.8 – 24.5°C (5.4 mg/L exposure)

**Method of calculating mean measured concentrations:**  
arithmetic mean

## RESULTS

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**Nominal concentrations:** Bk control, 1.1, 1.8, 3.0, 4.9, 8.2 mg/L

**Measured concentrations:** <LOQ, 0.57, 1.1, 1.9, 3.0, 5.4 mg/L

**Element value:** 24-hour  $LC_{50}$  = > 5.4 mg/L (CI not calculable)

48-hour  $LC_{50}$  = > 5.4 mg/L C.I. not calculable)

72-hour  $LC_{50}$  = 4.4 (3.6-6.2) mg/L

96-hour  $LC_{50}$  = 3.6 (3.0-4.6) mg/L

All element values based on mean measured concentrations

**Statistical Evaluation of Mortality:**  $LC_{50}$  values could not be calculated for 24 and 48-hours of exposure due to the lack on an adequate concentration-response pattern. The probit method was used to evaluate mortality at 72 and 96 hours.

**Analytical Methodology:** Analyses of test solutions were performed at Wildlife International Ltd. using high performance liquid chromatography with mass spectrometric detection (HPLC/MS). When determining the concentration of the test substance in the test solutions, the same and most prominent peak response for perfluorooctane sulfonate was used. No attempt was made to quantify on the basis of individual isomeric components. The LOQ (limit of quantitation) was 0.115 mg/L in this study. The mean percent recovery of matrix fortifications analyzed concurrently during sample analysis was 97.4. Samples collected at test initiation had

measured values from 52.4 to 70.7% of nominal. Measured values for samples taken at 48-hours ranged from 43.5 to 71.0% of nominal. Measured values for samples taken at 96-hours ranged from 35.5 to 71.1% of nominal.

#### Summary of analytical chemistry data:

| Nominal Test Concentration, mg/L | Measured Duplicate Values at 0, 48, and 96-hours, Respectively, mg/L | Mean Measured Concentration, mg/L | Percent of Nominal |
|----------------------------------|----------------------------------------------------------------------|-----------------------------------|--------------------|
| Negative Control                 | All < LOQ                                                            | <LOQ                              | -                  |
| 1.1                              | 0.575, 0.622, 0.605, 0.640, 0.391, 0.580                             | 0.57                              | 52                 |
| 1.8                              | 1.12, 1.19, 1.10, 1.09, 1.04, 1.13                                   | 1.1                               | 61                 |
| 3.0                              | 1.92, 1.99, 1.92, 1.91, 1.79, 1.91                                   | 1.9                               | 63                 |
| 4.9                              | 3.05, 2.66, 2.96, 3.35, 3.11, 3.11                                   | 3.0                               | 61                 |
| 8.2                              | 5.82, 5.78, 3.58, 5.85, 5.22, 5.86                                   | 5.4                               | 66                 |

**Biological observations after 96-hours:** Mysids in the negative control, and the 0.57 and 1.1 mg/L (mean measured concentrations) treatment groups appeared normal and healthy during the test.

#### Cumulative percent mortality:

| Mean Measured Test Conc., mg/L | 24-hours | 48-hours | 72-hours | 96-hours |
|--------------------------------|----------|----------|----------|----------|
| Neg. Control                   | 0        | 0        | 0        | 0        |
| 0.57                           | 0        | 0        | 0        | 0        |
| 1.1                            | 0        | 0        | 0        | 0        |
| 1.9                            | 0        | 0        | 5        | 10       |
| 3.0                            | 5        | 15       | 30       | 40       |
| 5.4                            | 15       | 45       | 60       | 75       |

**Mortality of controls:** None

000932

## CONCLUSIONS

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The potassium perfluorooctanesulfonate 96-hour LC<sub>50</sub> for saltwater mysids was determined to be 3.6 mg/L with a 95% confidence interval of 3.0 – 4.6 mg/L. The 96-hour no mortality and NOEC concentration was 1.1 mg/L.

**Submitter:** 3M Company, Environmental Laboratory, P.O. Box 33331, St. Paul, Minnesota, 55133

## DATA QUALITY

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**Reliability:** Klimisch ranking = 1

## REFERENCES

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This study was conducted at Wildlife International Ltd., Easton, MD at the request of the 3M Company.

## OTHER

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**Last changed:** 5/3/00

000933