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PFOS:
AN ACTIVATED SLUDGE, RESPIRATION INHIBITION TEST

ADDENDUM

WILDLIFE INTERNATIONAL, LTD. PROJECT NUMBER: 454E-101
3M LAB REQUEST NO. U2723

U.S. Environmental Protection Agency
Series 850 – Ecological Effects Test Guidelines
OPPTS Number 850.1010
and
OECD Guideline 202

This study was reported using a test substance purity of 90.49%. The test substance characterization was revised on 9/7/00 and the purity was determined to be 86.9%. The Sponsor requested that the results be revised based on the most recent purity analyses. The results previously presented were simply corrected by the ratio of the two purities or a factor of 0.9603. No attempt was made to recalculate analytical standard concentrations or measured concentrations from original raw data. As such, minor errors due to rounding may be present. Attached is the revised summary page from the final report and the most recent certificate of analysis.

REVISED STUDY ABSTRACT BASED ON A PURITY OF 86.9%

The effect of the test substance on activated sludge microorganisms was assessed by the Activated Sludge Respiration Inhibition Test Method (OECD Guideline 209). The test contained a control, reference and treatment groups. The control group was used to determine the background respiration rate of the sludge and was not dosed with the test or reference substance. The reference group was dosed with 3,5-dichlorophenol, a known inhibitor of respiration, at concentrations of 3, 15 and 50 mg/L. The test substance was dosed at 0.87, 2.6, 8.7, 26, 87, 260 and 870 mg a.i./L. After an exposure period of 3 hours, the respiration rates of the test solutions were measured using a dissolved oxygen meter. The respiration rates in the two controls were 39.8 and 41.1 mg O₂/L/hr, or a difference of 3.2%. The difference in control respiration rates was within the 15% difference limit established for the test. The validity of the test was further supported by the results from the 3,5-dichlorophenol reference group, which resulted in an EC50 of 9.0 mg/L. The EC50 was within the 5 to 30 mg/L range considered acceptable for the test.

Differences in O₂ respiration rates between the control group and test substance treatments were observed at all test substance concentrations. Following is a summary of the results.

Treatment	Respiration Rate mg O ₂ /L/hour	Percent Inhibition
Control 1	39.6	NA
Control 2	41.1	NA
3,5-dichlorophenol 3 mg/L	31.3	22.9
3,5-dichlorophenol 15 mg/L	14.6	63.8
3,5-dichlorophenol 50 mg/L	5.1	87.4
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 0.87 mg a.i./L	38.9	3.6
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 2.6 mg a.i./L	35.1	13.0
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 8.7 mg a.i./L	33.5	17.0
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 26 mg a.i./L	37.9	6.1
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 87 mg a.i./L	32.7	19.0
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 260 mg a.i./L	28.1	30.4
Perfluorooctane Sulfonic Acid, Potassium Salt (PFOS) 870 mg a.i./L	24.7	38.8

CERTIFICATE OF ANALYSIS

INTERIM CERTIFICATE OF ANALYSIS

Revision 1(9/7/00)

Centre Analytical Laboratories COA Reference #: 023-018A

3M Product: PFOS, Lot 217

Reference #: SD-018

Purity: 86.9%

Test Name	Specifications	Result
Purity ¹		86.9%
Appearance	White Crystalline Powder	Conforms
Identification NMR		Positive
Metals (ICP/MS)		
1. Calcium		1. 0.005 wt./wt. %
2. Magnesium		2. 0.001 wt./wt. %
3. Sodium		3. 1.439 wt./wt. %
4. Potassium ²		4. 6.849 wt./wt. %
5. Nickel		5. <0.001 wt./wt. %
6. Iron		6. 0.005 wt./wt. %
7. Manganese		7. <0.001 wt./wt. %
Total % Impurity (NMR)		1.93 wt./wt. %
Total % Impurity (LC/MS)		8.41 wt./wt. %
Total % Impurity (GC/MS)		None Detected
Related Compounds - POAA		0.33 wt./wt. %
Residual Solvents (TGA)		None Detected
Purity by DSC		Not Applicable ³
Inorganic Anions (IC)		
1. Chloride		1. <0.015 wt./wt. %
2. Fluoride		2. 0.59 wt./wt. %
3. Bromide		3. <0.040 wt./wt. %
4. Nitrate		4. <0.009 wt./wt. %
5. Nitrite		5. <0.006 wt./wt. %
6. Phosphate		6. <0.007 wt./wt. %
7. Sulfate ⁴		7. 8.76 wt./wt. %
Organic Acids ⁵ (IC)		
1. TFA		1. <0.1 wt./wt. %
2. PFPFA		2. <0.1 wt./wt. %
3. HFBA		3. 0.10 wt./wt. %
4. NFPA		4. 0.28 wt./wt. %
Elemental Analysis ⁶ :		
1. Carbon	1. Theoretical Value = 17.8%	1. 12.48 wt./wt. %
2. Hydrogen	2. Theoretical Value = 0%	2. 0.244 wt./wt. %
3. Nitrogen	3. Theoretical Value = 0%	3. 1.74 wt./wt. %
4. Sulfur	4. Theoretical Value = 5.95%	4. 8.84 wt./wt. %
5. Fluorine	5. Theoretical Value = 60%	5. 54.1 wt./wt. %

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INTERIM CERTIFICATE OF ANALYSIS
Centre Analytical Laboratories COA Reference #: 023-018A

Date of Last Analysis: 08/31/00

Expiration Date: 08/31/01

Storage Conditions: Frozen $\leq -10^{\circ}\text{C}$

Re-assessment Date: 08/31/01

¹Purity = 100% - (sum of metal impurities, 1.45% + LC/MS impurities, 8.41% + Inorganic Fluoride, 0.59% + NMR impurities, 1.93% + organic acid impurities, 0.38% + POAA, 0.33%)

Total impurity from all tests = 13.09%

Purity = 100% - 13.09% = 86.9%

²Potassium is expected in this salt form and is therefore not considered an impurity.

³Purity by DSC is generally not applicable to materials of low purity. No endotherm was observed for this sample.

⁴Sulfur in the sample appears to be converted to SO_4 and hence detected using the inorganic anion method conditions. The anion result agrees well with the sulfur determination in the elemental analysis, lending confidence to this interpretation. Based on the results, the SO_4 is not considered an impurity.

⁵ TFA	Trifluoroacetic acid
HFBA	Heptafluorobutyric acid
NFPA	Nonofluoropentanoic acid
PFPA	Pentafluoropropanoic acid

⁶Theoretical value calculations based on the empirical formula, $\text{C}_2\text{F}_{17}\text{SO}_3\text{K}^+$ (MW=538)

This work was conducted under EPA Good Laboratory Practice Standards (40 CFR 160).

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INTERIM CERTIFICATE OF ANALYSIS
Centre Analytical Laboratories COA Reference #: 023-018A

LC/MS Purity Profile:

Impurity	wt./wt. %
C4	1.22
C5	1.33
C6	4.72
C7	1.14
Total	8.41

Note: The C4 and C6 values were calculated using the C4 and C6 standard calibration curves, respectively. The C5 value was calculated using the average response factors from the C4 and C6 standard curves. Likewise, the C7 value was calculated using the average response factors from the C5 and C8 standard curves.

Prepared By: _____
David S. Bell
Scientist, Centre Analytical Laboratories

Date

Reviewed By: _____
John Flaherty
Laboratory Manager, Centre Analytical Laboratories

Date

December 1, 2000

Ms. Susan A. Beach
3M Corporation
Environmental Laboratory
935 Bush Avenue
St. Paul, Minnesota 55144

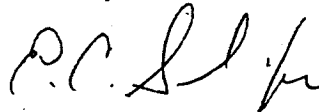
Dear Susan:

Enclosed please find the Addendum for the following study:

1. **PFOS: AN ACTIVATED SLUDGE, RESPIRATION INHIBITION TEST**
WILDLIFE INTERNATIONAL, LTD. PROJECT NO.: 454E-101

If you have any questions, please let me know.

Sincerely,



Edward C. Schaefer
Manager, Biodegradation

KRD/cyw8/beach
Enclosures