

**REPORT FOR ACUTE TOXICITY TESTING OF
APPLIED POLYMER SYSTEMS, INC.
SILT STOP 704B and 706B PRODUCT**

WOODSTOCK, GEORGIA

TEST PERIOD: APRIL 16-18, 2002

Prepared for:

APPLIED POLYMER SYSTEMS, INC.
Woodstock, Georgia

April 2002

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Prepared for:

**Applied Polymer Systems, Inc.
Woodstock, Georgia**

Prepared by:

**BioTox Laboratory
Law Engineering and Environmental Services, Inc.
Kennesaw, Georgia**

April 2002

April 29, 2002

Mr. Steven R. Iwinski
Applied Polymer Systems, Inc.
519 Industrial Way
Woodstock, GA 30189

Subject: **Applied Polymer Systems, Inc. Acute Toxicity Testing on 704B and 706B Product,**
April 16-18, 2002
Law Project No. 12000-0-2046.01

Dear Mr. Iwinski:

Law Engineering and Environmental Services, Inc. (LAW), BioTox Laboratory has completed 48-hour acute toxicity testing on samples of Silt Stop 704B and 706B submitted by you on April 11, 2002. Toxicity testing was initiated by LAW on April 16, 2002 to determine the LC₅₀ (the concentration of the sample at which 50% of the test organism, *Daphnia magna*, die). Test samples were prepared by adding 420 milligrams (mg) of polymer to 1.0 liter (L) of laboratory formulated water and allowed to mix on a stir plate until fully dissolved (approximately 3 hours). This stock test sample was then diluted with laboratory formulated water to the following test concentrations: 26.25 parts per million (ppm), 52.5 ppm, 105 ppm, 210 ppm, and 420 ppm. Test results indicated no acute mortality to *Daphnia magna* in the 704B and 706B polymer samples. Since neither sample exhibited 50% or greater mortality, an LC₅₀ was not calculable and is reported as greater than 420 ppm.

Results are summarized in the accompanying report. Detailed testing documentation, including chemical and physical measurements (Appendix A), test organism documentation (Appendix B), and polymer sample test data/reference toxicant data (Appendix C).

LAW appreciates the opportunity to provide these testing services to you and Applied Polymer Systems, and we look forward to serving your future needs. If there are any questions, please do not hesitate to contact Mr. Andrew S. Peiken at (770) 421-7027.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Andrew S. Peiken, C.E.
BioTox Laboratory Manager

Margaret E. Tanner
Environmental Engineer

Attachment: Data Report

TEST SUMMARY

I. Client

Client: Applied Polymer Systems, Inc.
Norcross, GA 30092519 Industrial Way
Woodstock, GA 30189

Product Tested: Silt Stop 704B and 706B

II. Laboratory Accreditation

Laboratory: BioTox Laboratory
Law Engineering and Environmental Services, Inc.
3200 Town Point Drive N.W., Suite 100
Kennesaw, Georgia 30144

Accreditor: State of Florida, Dept. of Health and Rehabilitative Services
Office of Laboratory Services, Environmental Water

Accreditation ID: Lab ID. E87477, Certificate No. 477-128

Category: Bioassay

Effective: July 1, 2001 through June 30, 2002

III. Tests Conducted

Test: Water Flea, *Daphnia magna*
48-hr. Acute Static Toxicity Test
EPA/600/4-90/027F, Fourth Edition, Sept. 1991

Test Dates: April 16-18, 2002

Source, Age of Organisms: In-house cultures, ID No. MAGM120040502 / <24-hr

Test Concentrations: Control, 26.25, 52.5, 105, 210, and 420 ppm

Dilution/Control Water: Blend of Diluted Mineral Water (20% Perrier/80% Milli-Q) and
Moderately hard synthetic freshwater (reagent grade chemicals
and Milli-Q)

Deviation From Test Protocol: None

IV. Results

Survival Data for *Daphnia magna* Exposed for 48-hr to Applied Polymer Systems, Inc. Silt Stop 704B and 706B Product, April 16-18, 2002.

Sample (ppm)	Survival at 48-hours (%)	LC ₅₀ (ppm)
704B		
Laboratory Control ^a	100	>420
26.25	100	
52.5	100	
105	100	
210	90	
420	100	
706B		
Laboratory Control ^a	100	>420
26.25	65	
52.5	80	
105	93.3	
210	60	
420	55	

Calculated by: ASP 4/18/02

Checked by: RFP 4/18/02

^a Laboratory Control – Moderately hard synthetic freshwater.

V. Summary

48-hour acute toxicity testing was conducted on samples of Silt Stop 704B and 706B submitted by you on April 11, 2002. Toxicity testing was initiated by LAW on April 16, 2002 to determine the LC₅₀ (the concentration of the sample at which 50% of the test organism, *Daphnia magna*, die). Test samples were prepared by adding 420 mg of polymer to 1.0 L of laboratory formulated water and allowed to mix on a stir plate until fully dissolved (approximately 3 hours). This stock test sample was then diluted with laboratory formulated water to the following test concentrations: 26.25 ppm, 52.5 ppm, 105 ppm, 210 ppm, and 420 ppm. Test results indicated no acute mortality to *Daphnia magna* in the 704B and 706B polymer samples. Since neither sample exhibited 50% or greater mortality, an LC₅₀ was not calculable and is reported as greater than 420 ppm (>420 ppm).

VI. Quality Assurance

Daphnia magna, NaCl Reference Toxicant, 009, 3/27/02

Survival: 48-hr LC₅₀ = 5,464 mg/L NaCl (PASS)

48-hr LC₅₀ Range of Acceptability = 3,010 to 7,250 mg/L NaCl

GLOSSARY AND ABBREVIATIONS

Acute	Involving a stimulus severe enough to rapidly induce a response; in toxicity tests, a response observed in 96 hours or less typically is considered acute.
Chronic	Involving a stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. A chronic effect can be lethality, growth, reduced reproduction, etc.
Chronic Value	A numeric value representing the geometric mean of the numeric values of concentrations analyzed as the NOEC (No Observed Effect Concentration) and the LOEC (Lowest Observed Effect Concentration) by chronic toxicity testing. The chronic value is an estimate of the toxicant concentration that will be the actual no effect concentration based on the chronic effect tested.
Critical Value	Minimum numeric value for a toxicity test endpoint (i.e., survival, growth, or reproduction) below which a given test result will be statistically significantly different from the control value.
DMW	Diluted Mineral Water
EC	Effective concentration, a point estimate of the toxicant concentration that would cause an adverse response such as death, immobilization, or serious incapacitation.
Ft-c	Foot candles - a measure of <u>light</u> intensity
Graphical Method	Log concentration versus percent mortality method. Toxicity test data are plotted on 2-cycle semi-log graph paper. The logarithmic axis (y axis) is used for percent effluent concentration, and the linear axis (x axis) is used for percent mortality. The graph provides a reasonably accurate estimate of the LC ₅₀ , but does not provide a confidence interval.
IC	Inhibition Concentration, a point estimate of the toxicant concentration that would cause a given percent reduction in a biological measurement such as fecundity or growth.
LC	Lethal Concentration, identical to EC when the observed response is death.
LC ₅₀	The toxicant concentration that is lethal to 50 percent of exposed organisms at a specific time of observation.
LCL	Lower 95% Confidence Limit
LOEC	Lowest-Observed-Effect-Concentration, the lowest concentration of toxicant to which organisms are exposed that causes adverse effects.
LWC	Lab Water Control, moderately hard synthetic freshwater prepared from MILLIPORE MILLI-Q ^R water and reagent grade chemicals.

NOEC	No-Observed-Effect-Concentration, the highest concentration of toxicant to which organisms are exposed that causes no observable adverse effects.
Probit Analysis	Probit Analysis consists of a group of statistical methods used to analyze data from concentration-response experiments, and provides an estimate of the LC ₅₀ and the precision of this estimate. In Probit Analysis, the percentages of affected organisms are converted to Probits (probability units), and the effluent concentrations are converted to logarithms. The relationship between the Probits and the logarithmic values of the concentrations is approximately linear. A Probit regression line drawn through the data points is used to estimate the LC ₅₀ and its precision estimate. To use Probit Analysis, at least two partial mortalities must be obtained in the toxicity test.
RWC	Receiving Water Control
UCL	Upper 95% Confidence Limit
μE/m ² /s	Micro-ergs per square meter per second - a measure of <u>light</u> intensity

REFERENCES

- Gulley, D.D., and WEST, Inc. 1996. TOXSTAT version 3.5. Fish Physiology and Toxicology Laboratory. Department of Zoology and Physiology. University of Wyoming. Laramie, Wyoming.
- Peltier, W., and C.I. Weber. eds. 1991. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH. EPA 600/4-90/027F.
- U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water And Wastes. Environmental Monitoring Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH. EPA 600/4-79-020.
- U.S. Environmental Protection Agency. 1999. Errata for Effluent and Receiving Water Toxicity Testing Manuals: Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms; Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms; and Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. U.S. Environmental Protection Agency, Office of Research and Development, Duluth, MN. EPA/600/R-98/182.

Summary of Effluent Toxicity Test Conditions for the Water Flea (*Daphnia magna*) Acute Survival Test (EPA 600/4-90/027F)

1. Test type:	48-hr Static Acute
2. Temperature (°C):	18.5-20.5°C
3. Light quality:	Cool White Fluorescent
4. Light intensity:	10-20 uE/m ² /s (50-100 ft-c)
5. Photoperiod:	16-hr light, 8-hr dark
6. Test chamber size:	30 mL
7. Test solution volume:	25 mL/replicate
8. Age of test organisms:	<24-hr
9. No. neonates per test chamber:	5
10. No. replicate chambers per concentration:	4
11. No. neonates per concentration:	20
12. Feeding regime:	Fed 0.1 each of <i>Selenastrum</i> /YCT prior to test start
13. Aeration:	None
14. Dilution water:	Blend of Diluted Mineral Water (20% Perrier/80% Milli-Q) and Moderately hard synthetic freshwater (reagent grade chemicals and Milli-Q)
15. Effluent concentrations (ppm):	Control, 26.25, 52.5, 105, 210, and 420
16. Dilution factor:	0.5
17. Test duration	48-hr
18. Effect measured:	Mortality - no movement on gentle prodding
19. Test acceptability:	90% or greater survival in controls
20. Sample handling:	Whole polymer samples held at room temperature.
21. Sample volume required:	1 L
22. Chemical parameters:	pH, DO, total residual chlorine, total alkalinity, total hardness, conductivity, temperature

Initial Chemical Characterization of Applied Polymer Systems, Inc. Silt Stop 704B and 706B Product and Control Water Used in Acute Toxicity Tests, April 16-18, 2002.

Parameter	Sample		
	704B (420 ppm)	706B (420 ppm)	Control ^a
Dissolved Oxygen (mg/L)	8.26	7.49	7.60
pH	7.70	7.92	7.35
Total Alkalinity as CaCO ₃ (mg/L)	125.0	115.0	72.5
Total Hardness as CaCO ₃ (mg/L)	174.0	126.0	92.0
Conductivity @ 25°C (µmhos/cm)	412	455	271
Total Residual Chlorine ^b (mg/L)	0.05	<0.01	<0.01
Total Ammonia-nitrogen ^b (mg/L)	0.82 ^c	0.58 ^c	<0.01

Determined according to EPA 600/4-79-020, 1979.

Entered by: ASP 4/19/02
Checked by: RFP 4/19/02

^a Control = Moderately hard synthetic freshwater (reagent grade chemicals and Milli-Q)

^b Determined by Hach Colorimetric Test Kit in conjunction with spectrophotometer

^c A flocculant (interference) was noted upon addition of Nessler Reagent to the sample. Results should be interpreted with caution.

APPENDICES

APPENDIX A

Chemical and Physical Data

APPENDIX B

Test Organism Documents

LAW Engineering and Environmental Services, Inc.
BioTox Laboratory

Daphnia magna In-house Culture Source Document

Brood Board ID No.	Brood Board Date	Date/Time Cups Marked	Age of Neonates at Test Start	Water Type/Temp. (°C)	Food Type
MAGM120040502	4/5/02	4/16/02 (0900)	<24 hrs.	LWC (20.0)	YCT & <i>Selenastrum</i>

APPENDIX C

Test Data Sheets

**Water Flea
Polymer Test**

**Water Flea
Reference Toxicant Data Sheets**