

**REPORT FOR ACUTE TOXICITY TESTING OF  
APPLIED POLYMER SYSTEMS, INC.  
SILT STOP PRODUCTS**

**NORCROSS, GEORGIA**

**TEST PERIOD: NOVEMBER 28-30, 2000**

**Prepared for:**

**APPLIED POLYMER SYSTEMS, INC.**

**Norcross, Georgia**

**December 2000**

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**Prepared for:**

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

**Prepared by:**

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

**December 2000**

December 20, 2000

Mr. Steven R. Iwinski  
Applied Polymer Systems, Inc.  
4015 Holcomb Bridge Rd.  
Suite 350-931  
Norcross, GA 30092

Subject: **Applied Polymer Systems, Inc. Acute Toxicity Testing, November 28-30, 2000**

Dear Mr. Iwinski:

Law Engineering and Environmental Services, Inc. (LAW), BioTox Laboratory has completed 48-hr. acute toxicity testing on samples of Silt Stop 770 submitted by you on October 12, 2000. Toxicity testing was initiated by LAW on November 28, 2000 to determine the LC<sub>50</sub> (the concentration of the sample at which 50% of the fathead minnows, *Pimephales promelas*, die). Samples were prepared according to your instruction and 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 the fathead minnow at any of the dilutions of the Silt Stop 770 sample. The LC<sub>50</sub> was not calculable and is reported as >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  
BioTox Laboratory Manager

Margaret E. Tanner  
Environmental Engineer

Attachment: Data Report

## TEST SUMMARY

### **I. Client**

Client: Applied Polymer Systems, Inc.  
4015 Holcomb Bridge Rd.  
Suite 350-931  
Norcross, GA 30092

Product Tested: Silt Stop Product 770

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

### **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, 2000 through June 30, 2001

### **III. Tests Conducted**

Test: Fathead Minnow, *Pimephales promelas*  
48-hr. Acute Static Toxicity Test  
EPA/600/4-90/027F, Fourth Edition, Sept. 1991

Test Dates: November 28-30, 2000

Source, Age of Organisms: In-house cultures, ID No.FHM111600 / 12-days old

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

Dilution/Control Water: Moderately hard synthetic freshwater (reagent grade chemicals and Milli-Q)

Deviation From Test Protocol: None

**IV. Results**

**Survival Data for Fathead Minnows Exposed for 48-hr to Applied Polymer Systems, Inc. Silt Stop 770 Product, November 28-30, 2000.**

Sample (ppm)	Survival at 48-hours (%)	LC <sub>50</sub> (ppm)
---		>420
Laboratory Control <sup>a</sup>	100	
26.25	100	
52.5	100	
105	100	
210	100	
420	95	

Calculated by: ASP 12/4/00

Checked by: RFP 12/5/00

<sup>a</sup> Laboratory Control – Moderately hard synthetic freshwater.

There were no test concentrations that had survival rates significantly different from the laboratory control using statistical comparisons.

**V. Summary**

48-hr. acute toxicity testing was conducted on samples of Silt Stop 770 submitted by you on October 12, 2000. Toxicity testing was initiated by LAW on November 28, 2000 to determine the LC<sub>50</sub> (the concentration of the sample at which 50% of the fathead minnows, *Pimephales promelas*, die). Samples were prepared according to your instruction and 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 the fathead minnow at any of the dilutions of the Silt Stop 770 sample. The LC<sub>50</sub> was not calculable and is reported as >420 ppm.

**VI. Quality Assurance**

*Pimephales promelas*, NaCl Reference Toxicant No. 92, 11/27/00

Survival: 48-hr LC<sub>50</sub> = 6498 mg/L NaCl (**PASS**)  
 48-hr LC<sub>50</sub> Range of Acceptability = 4290 to 11770 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 <sub>50</sub> , 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 <sub>50</sub>	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 <sup>R</sup> 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 <sub>50</sub> 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 <sub>50</sub> 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 <sup>2</sup> /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 Fathead Minnow (*Pimephales promelas*) Acute Survival Test (EPA 600/4-90/027F)**

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1. Test type:	48-hr Static Acute
2. Temperature (°C):	20.0-21.0°C
3. Light quality:	Ambient laboratory illumination
4. Light intensity:	10-20 uE/m <sup>2</sup> /s (50-100 ft-c) (ambient laboratory levels)
5. Photoperiod:	16-hr light, 8-hr dark
6. Test chamber size:	250 mL
7. Test solution volume:	200 mL/replicate
8. Age of test organisms:	12-days
9. No. fish per test chamber:	10
10. No. replicate chambers per concentration:	2
11. No. fish per concentration:	20
12. Feeding regime:	Fed <i>Artemia salina</i> prior to test start
13. Aeration:	None
14. Dilution water:	Moderately hard synthetic freshwater (reagent grade chemicals and Milli-Q)
15. Effluent concentrations (ppm):	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 gram
22. Chemical parameters:	pH, DO, total residual chlorine, total alkalinity, total hardness, conductivity, temperature

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**Initial Chemical Characterization of Applied Polymer Systems, Inc. Silt Stop 770 Product and Control Water Used in Acute Toxicity Tests, November 28-30, 2000.**

Parameter	420 ppm Polymer Sample	
	Silt Stop 770	Control <sup>a</sup>
Dissolved Oxygen (mg/L)	7.65	7.60
pH	10.48	7.64
Total Alkalinity as CaCO <sub>3</sub> (mg/L)	235.0	58.0
Total Hardness as CaCO <sub>3</sub> (mg/L)	116	82.0
Conductivity @ 25°C (μmhos/cm)	344	300
Total Ammonia <sup>b</sup> (mg/L)	1.06 <sup>c</sup>	<0.01

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

<sup>a</sup> Control used in the water fathead minnow test was Moderately hard synthetic freshwater (reagent grade chemicals and Milli-Q).

<sup>b</sup> Determined by Hach Colorimetric Test Kit (DPD Method in conjunction with spectrophotometer)

<sup>c</sup> Caution should be used when interpreting ammonia data as there was interference noted (formation of a white flocculant) in the samples upon addition of the Nessler reagent. When ammonia is present, a sample will exhibit an orange color change upon addition of test reagents. In the Silt Stop polymer samples, there was no orange coloration, indicating that ammonia is not present and the observed measurement of ammonia by the spectrophotometer is artifactual and caused by the interference of the flocculant.

## **APPENDICES**

## **APPENDIX A**

### **Chemical and Physical Data**

## **APPENDIX B**

### **Test Organism Documents**

LAW Engineering and Environmental Services, Inc.  
BioTox Laboratory

*Pimephales promelas* In-house Culture Source Document

<b>Egg ID No.</b>	<b>Egg Hatch Date</b>	<b>Date Larvae Used</b>	<b>Age of Larvae at Test Start</b>	<b>Water Type/Temp. (°C)</b>	<b>Food Type</b>
EGG111000	11/16/00	11/28	12 days	MH RECON (20.0)	<i>Artemia salina</i>

**APPENDIX C**

**Test Data Sheets**

**Fathead Minnow  
Polymer Test Data Sheets**

**Fathead Minnow  
Reference Toxicant Data Sheets**