



Applied Polymer Systems, Inc.

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Innovations

In Environmental Impact

Living Proof - Frogs

Applied Polymer Systems, Inc. (APS) *Floc Logs*® provide environmentally safe, economical clarification of surface waters contaminated by excess inanimate nutrients or suspended soil particles. All APS products are tested for toxicity and meet the following specifications: ANSI/NSF Standard 60 Drinking Water Treatment Chemical Additives, EPA/600/4-90/027F 48Hr. Acute Static Screen Toxicity Test (*Daphnia Magna*), EPA/600/4-91/002 7 Day Chronic Toxicity Test (*Pimephales promelas*).

To the right is a testing device that places Floc Logs into solution. This device was used to test the longevity of a Floc Log and the efficiency of mixing. In late October of 2003, seven 706b Floc Logs were placed in the grid chamber where they experienced various weather events. The Floc Logs were frequently monitored through the course of the fall, winter, and spring.



Above: The grid chamber in which the tadpoles were hatched. Notice the color of the water.

Below: The concentration levels of 6834 milligrams per liter did not inhibit the tadpoles in any way.



In the spring of 2004, we noticed that eggs had been laid in the water. Two weeks later, tadpoles inhabited all eight sections of the grid chamber. As the weeks progressed, more eggs were laid and more tadpoles hatched. We watched as the tadpoles flourished, despite the extraordinarily high concentration levels of Floc Log materials in the water. The Floc Log concentration in the water was measured at approximately 6,834 mg/L (milligrams/liter), a level far greater than the standard 2.0 – 2.1 mg/L concentrations suggested for applications.

Calculations:

- The grid chamber is 4 feet x 8 feet and holds 12 inches of water or 32 cubic feet. Approximately 240 gallons (930 liters) will fill the grid.
- Seven Floc Logs were used, each weighing approximately 8 lbs for a total of 56 lbs.
- We assume that 1/4 of the initial weight (14 lbs or 6,356,000 mg) remains.
- 6,356,000 mg/930 L, gave us approximately 6,834 mg/L.

Amphibious larval stages have several qualities which make them a useful indicator of harmful levels of pollutants in bioassay tests. Amphibian tadpoles show a variety of sub lethal responses such as changes in growth, development rates, pigmentation, and expression of morphological deformities in a lesser time of exposure to the environmental pollutants. The recent malformations and declinations of amphibian populations unveil some aquatic organisms' sensitivity to toxins. Today, because of these malformations and population declinations, there is a major concern about the effects of aquatic toxins.

Frog eggs generally hatch within 3 to 21 days with the complete life cycle from egg to frog taking roughly 11 to 12 weeks. Some species can take as long as a year.



Above (large pic): One of our tadpoles/frogs before shedding its tail. This frog is about 1 cm in length.

Above (small pic): One of the female frogs responsible for laying the eggs. Full grown frogs can reach 2 1/2 inches.



Below (large pic): One of our tadpoles after complete metamorphosis into a frog. These tree frogs can change color depending on light and mood.

Below (small pic): The fibrous mass is the skeleton from within the Floc Log



We determined that our frogs were Hybrid "Gray" Treefrogs – (*Hyla chrysoscelis X Hyla avivoca*).

The tadpoles/frogs did not exhibit any changes in growth, development rates, pigmentation, and expression of morphological deformities. In due course (11 – 12 weeks), the frogs began leaving the water for limited periods of time, perching themselves on the coconut fiber skeletons of the Floc Logs. By the 13th week, we noticed the frogs were venturing out of the grid. The tadpoles/frogs were thus unhindered by the Floc Log.

For product and distributor information, please contact us at:

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