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Publication Brief

Effects of a Fire-Retardant Chemical to Fathead Minnows in Experimental Streams

Each year millions of liters of fire-retardant chemicals are applied to wildfires across the nation. These chemicals are sometimes applied in relatively pristine and environmentally sensitive areas that are potentially inhabited by endangered, threatened, or sensitive aquatic species.

Fire-retardant chemicals are generally of low toxicity to aquatic organisms, however, recent laboratory studies indicate a significant photoenhanced toxicity of products containing sodium ferrocyanide, a corrosion inhibitor.

This publication presents results of a study that determined lethal concentrations of a fire-retardant chemical. Juvenile fathead minnows (*Pimephales promeleas*) were exposed in experimental, outdoor streams. Stream tests determined the potential toxicity of a fire-chemical pulse, as might occur when fire retardants rinse from the watershed by rainfall.

View of experimental streams during the fire-retardant chemical study at the USGS Columbia Environmental Research Center, Columbia, Missouri, USA.

Under these outdoor conditions, toxicity of the fire-retardant only occurred in the presence of sunlight. When the chemical was tested on sunny days 100 percent mortality resulted, during overcast conditions, no mortality occurred. The fathead minnow mortality is attributed to lethal concentrations of cyanide, indicating that a minimum ultraviolet irradiance is necessary to induce toxicity, as well as the release of cyanide from the retardant.

Under sunny conditions, rainwater runoff from areas treated with this fire-retardant at the recommended rate, could result in lethal concentrations occurring in small ponds and streams receiving limited water flow. Larger aquatic systems would likely dilute the formulation to sublethal levels, but could have lethal effects at source points.

Keywords: experimental streams; fathead minnows; fire-retardant chemicals; sodium ferrocyanide; unionized ammonia; UV radiation; weak-acid-dissociable cyanide.

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