



R.E.D. FACTS

Silver

Pesticide Reregistration

All pesticides sold or used in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing undue hazards to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Document, or RED. This fact sheet summarizes the information in the RED for silver.

Use Profile

Silver, a naturally-occurring element, is registered for use in water filters to inhibit the growth of bacteria within the filter unit of water filter systems designed to remove objectionable taste, odors, and color from municipally treated tap water; these bacteriostatic water filters account for over 90% of its pesticidal use. Silver also is used to control several types of algae in swimming pool water systems; this algicide use accounts for only about 3% of silver's use as a pesticide.

Silver manufacturing use products are granular formulations, the bacteriostatic water filters are impregnated with silver, and the swimming pool algcides are formulated as soluble liquid concentrates.

Silver also has many other non-pesticidal, industrial uses including use in photo processing, mirror production, dental alloys, coinage, tableware and jewelry production, solder, electroplating, the manufacture of inks and dyes, the processing of food and beverages, and the etching of ivory. Silver salts and nitrate also are used as therapeutic agents in treating warts, burns, and eye infections.

Regulatory History

Silver was first registered as a pesticide in the United States in 1954, for use in disinfectants, sanitizers and fungicides. Currently, about 80 pesticide products are registered which contain silver as an active ingredient.

Many regulations pertaining to silver have been promulgated through the years, particularly by EPA's Office of Water (OW). The most recent of these was a secondary maximum contaminant level (SMCL) issued in 1991, based on silver's ability to cause argyria, an undesirable cosmetic condition.

OW classified silver as a Group D carcinogen (one that is not classifiable as to carcinogenicity in humans) in 1988. EPA established an oral Reference Dose (RfD), or daily intake limit, of 0.005 mg/kg/day for silver in 1991.

The Office of Pesticide Programs (OPP) issued a Data Call-In (DCI) for silver in 1992, requiring additional product chemistry and toxicity data. The silver RED reflects EPA's reassessment of all data submitted in response to the DCI.

Human Health Assessment

Toxicity

Most usually-required toxicity and exposure studies have been waived for silver since adequate published information is available.

Human Toxicology

Silver can be absorbed from the lungs and the gastrointestinal tract. When an excessive amount of silver is absorbed, tissues become impregnated with silver sulfite, which forms a complex in elastic fibers. Large amounts of this complex under the skin will give it bluish, grey-blue, or in extreme cases a black color. This condition is called argyria. Although it is not a toxic effect, argyria is undesirable and usually permanent.

Excessive exposure to silver also can cause lung and kidney lesions; exposure to dusts can cause breathing problems, lung and throat infections and abdominal pain; and skin contact can cause mild allergic reactions such as rashes, swelling, and inflammation.

Animal Toxicology

The acute toxicity of silver is relatively low by the oral route (it has been placed in Toxicity Category III for this effect). Silver also is of low acute dermal toxicity (Toxicity Category III), is not an eye or skin irritant (Toxicity Category IV), and is not a skin sensitizer.

Silver is not known to have human carcinogenic potential, and does not appear to be a mutagen. Although long term ingestion of silver may cause argyria in humans and animals, this effect is cosmetic only and is not harmful to health.

Dietary Exposure

Silver is not registered for application to food or feed crops nor for use on processed commodities. Silver is a natural element and trace amounts are normally present in the human diet. Minimal dietary exposure may result from the use of silver in human drinking water systems. EPA does not anticipate that dietary exposure to these low levels of silver will be associated with any significant degree of risk.

Occupational and Residential Exposure

Occupational exposure can be expected for individuals handling silver algacide solutions or silver-impregnated filter materials. When the soluble liquid concentrates used for water treatment in swimming pools are applied through a pool skimmer basket, splashes to the eye or on the skin may occur. People handling silver-impregnated filters may be exposed to minute quantities of silver-containing charcoal. Thus, the potential exists among mixers, loaders and applicators for eye, inhalation and dermal exposure to concentrated solutions or dusts.

Residential exposure to very low levels of silver may be expected through consumption of drinking water filtered through bacteriostatic filters, and by swimming in treated pools.

Human Risk Assessment

Applicator Exposure

Residential consumption of water filtered through filtering systems containing silver is not expected to result in build-up of silver in the body to an argyria-comparable level. The use of silver as a water treatment for pools is minor, and of little concern from a toxicity perspective. Thus, the residential uses of silver are not expected to constitute an unreasonable risk or hazard.

Occupational exposure to silver may occur; however, this exposure generally would be of such a low level, and silver is of sufficiently low toxicity, that it is not expected to present unreasonable risks or hazards.

Environmental Assessment

Environmental Fate

Because a large data base is available for silver, most environmental fate testing was waived. However, registrants must clarify the nature of the concentrate used in swimming pools, due to concern about the potential formation of water soluble or colloidal species that swimmers may ingest.

Products containing silver are not to be applied in marine/estuarine environments or oil fields. Discharge of effluent into lakes, streams and ponds or public water is subject to NPDES license restrictions. Water treated with silver as a pesticide cannot be discharged into sewage systems without notifying the sewage plant authority.

Ecological Effects

The available acute toxicity data indicate that silver is highly toxic to fish, aquatic invertebrates and estuarine organisms. Avian toxicity data were required in the 1992 Data Call-In and these studies are underway. The risk to birds will be assessed after the data are submitted and reviewed. However, exposure to birds should be low from the pesticidal uses of silver.

Ecological Effects Risk Assessment

Silver exposure from products used for swimming pool and human drinking water systems will be discharged to municipal water systems, and treated in municipal water treatment plants and is regulated under NPDES permits. The Agency does not expect unreasonable adverse effects to the environment from these uses.

**Additional Data
Required**

EPA is requiring a new confidential statement of formula (CSF) detailing the nature of the soluble liquid concentrate. EPA also is requiring product-specific data and revised labeling for reregistration of pesticide products containing silver.

**Product Labeling
Changes Required**

The labels of all registered pesticide products containing silver must comply with EPA's current pesticide labeling requirements. EPA has determined that the current end-use label precautions are still appropriate and are required for product reregistration. It is the Agency's position that these precautions must continue to include a statement indicating that:

- a. This pesticide [silver] is toxic to fish and aquatic invertebrates.
- b. "Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of E.P.A."
- c. That the drinking water filters are for use on cold water only.

**Regulatory
Conclusion**

The use of currently registered pesticide products containing silver in accordance with approved labeling will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, all uses of products containing silver registered as of June 23, 1993 are eligible for reregistration.

These silver products will be reregistered once the required confirmatory, product-specific data and revised labeling are received and accepted by EPA.

For More

EPA is requesting public comments on the Reregistration Eligibility

Information Document (RED) for silver during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED or to submit written comments, please contact the Pesticide Docket, Public Response and Program Resources Branch, Field Operations Division (7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Following the comment period, the silver RED will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about silver or about EPA's pesticide reregistration program, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000. For information about reregistration of individual products containing silver, please contact Joanne I. Miller, Product Manager, Registration Division (7505C), OPP, US EPA, Washington, DC 20460, telephone 703-305-7830.