

## Sources of Exposure

## Toxicokinetics and Normal Human Levels

## Biomarkers/Environmental Levels

ToxGuide™

for

Tribufos

$C_{12}H_{27}OPS_3$

(CAS# 78-48-8)

March 2020

U.S. Department of Health and  
Human Services  
Public Health Service  
Agency for Toxic Substances  
and Disease Registry  
[www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)

### General Populations

- Tribufos (S,S,S-tributyl phosphorotrithioate) is a defoliant used to remove leaves from cotton plants. The general population is exposed to tribufos through food or water and some cotton products that may contain very small amounts of tribufos.
- The levels of exposure to tribufos in the environment are very low. The general population is not likely to be exposed to tribufos.

### Occupational Populations

- Workers who apply tribufos to cotton fields or maintain and harvest cotton plants may be more highly exposed via inhalation and dermal exposure routes than the general population.

### Toxicokinetics

- Tribufos is readily absorbed following oral or dermal exposure. Inhaled tribufos is absorbed through the lung.
- Absorbed tribufos is widely distributed in the body.
- Tribufos is rapidly metabolized in the body and mostly excreted in the urine.

### Normal Human Levels

- No data available.

### Biomarkers

- There are no known biomarkers of exposure to tribufos.
- Tribufos is an organophosphorus (OP) compound. Effects such as excessive sweating, constricted pupils, unconsciousness, and difficulty breathing could occur following exposure to unusually high levels of tribufos. Decreased activities of the enzyme, acetylcholinesterase, in blood and brain may also occur following exposure to tribufos.

### Environmental Levels

#### *Air*

- Outdoor air (range): 0.0021–0.47 ppb
- Indoor air: No data

#### *Soil*

- No data

#### *Water*

- Surface water: Up to 0.01 ppb
- Ground water: Not detected
- Drinking water: Up to 0.07 ppb

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2020. Toxicological Profile for S,S,S-Tributyl Phosphorotrithioate (Tribufos). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

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## Chemical and Physical Information

## Routes of Exposure

## Relevance to Public Health (Health Effects)

### Tribufos is a Man-Made Herbicide

- Tribufos is an organophosphorus compound that contains carbon, hydrogen, oxygen, phosphorus, and sulfur.
- Tribufos is used to cause the leaves to fall from cotton plants prior to harvesting of cotton.

- Inhalation – Potential exposure route for workers involved in tribufos application or people who live next to cotton fields where tribufos is sprayed.
- Oral – Potential exposure route for the general population through the consumption of food or water sources that may contain small amounts of tribufos.
- Dermal – Potential exposure route for workers involved in tribufos application or harvesting of cotton following its application.

### Tribufos in the Environment

- Tribufos may be measured in the air near areas where it has been sprayed on cotton crops.
- Tribufos is not expected to travel long distances in air.
- Once tribufos reaches the soil, it is not likely to evaporate into the air or travel to the groundwater, although it may reach surface water from runoff or erosion.
- Microbial degradation (biodegradation) is probably the most important way that tribufos is removed from soil, water, and sediment.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

### Minimal Risk Levels (MRLs)

#### Inhalation

- No acute-duration inhalation MRL was derived for tribufos.
- An intermediate-duration (15–364 days) inhalation MRL of 0.04 mg/m<sup>3</sup> based on decreased red blood cell acetylcholinesterase (AChE) activity in rats was derived for tribufos.
- No chronic-duration inhalation MRL were derived for tribufos.

#### Oral

- No acute-duration oral MRL was derived for tribufos.
- An intermediate-duration (15–364 days) oral MRL of 0.003 mg/kg/day based on decreased red blood cell AChE activity in rats was derived for tribufos.
- A chronic-duration ( $\geq 365$  days) oral MRL of 0.0005 mg/kg/day based on vacuolar degeneration in the small intestine in rats was derived for tribufos.

### Health Effects

- In the general population, no health effects have been associated with exposure to tribufos at the low levels found in the environment.
- Clinical signs of neurological effects such as altered gait, decreased movement, constricted pupils, aggressive behavior, convulsions, and salivation have been observed in rats exposed to relatively high airborne concentrations of tribufos.
- Clinical signs of neurological effects such as incoordination, unsteadiness, and tremors, as well as decreased red blood cell and brain AChE activity, have been observed in experimental animals administered tribufos orally at relatively high concentrations.
- Dietary intake of tribufos by experimental animals also resulted in hematological changes (decreases in red blood cell counts, hemoglobin content, and hematocrit), and degenerative effects in the gastrointestinal tract.
- Based on results from chronic-duration oral exposure of experimental animals to tribufos, a committee for EPA's Office of Pesticide Programs concluded that tribufos should be considered unlikely to be carcinogenic at low doses, but likely to be carcinogenic at high doses. Mice were observed to have lung and intestinal cancers when exposed at high doses for up to 2 years.