

OPERATION OF THE PRIOR INFORMED  
CONSENT PROCEDURE FOR BANNED  
OR SEVERELY RESTRICTED CHEMICALS  
IN INTERNATIONAL TRADE

# DECISION GUIDANCE DOCUMENTS

**Tris (2,3-Dibromopropyl) Phosphate**

JOINT FAO/UNEP PROGRAMME  
FOR THE OPERATION OF  
PRIOR INFORMED CONSENT

United Nations Environment Programme

Food and Agriculture Organization  
of the United Nations

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Rome – Geneva 1992

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The inclusion of these chemicals in the Prior Informed Consent Procedure is based on reports of control actions submitted to the United Nations Environment Programme (UNEP) by participating countries, and which are presently listed in the UNEP-International Register of Potentially Toxic Chemicals (IRPTC) database on Prior Informed Consent. While recognizing that these reports from countries are subject to confirmation, the FAO/UNEP Joint Working Group of Experts on Prior Informed Consent has recommended that these chemicals be included in the Procedure. The status of these chemicals will be reconsidered on the bases of such new notifications as may be made by participating countries from time to time.

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## ABBREVIATIONS WHICH MAY BE USED IN THIS DOCUMENT

(N.b. chemical elements and pesticides are not included in this list)

ADI	acceptable daily intake
ai	active ingredient
b.p.	boiling point
bw	body weight
°C	degree Celsius (centigrade)
CCPR	Codex Committee on Pesticide Residues
DNA	Designated National Authority
EC	emulsion concentrate
EEC	European Economic Community
EPA	U.S. Environmental Protection Agency
ERL	extraneous residue limit
FAO	Food and Agriculture Organization of the United Nations
g	gram
µg	microgram
GAP	good agricultural practice
GL	guideline level
ha	hectare
IARC	International Agency for Research on Cancer
i.m.	intramuscular
i.p.	intraperitoneal
IPCS	International Programme on Chemical Safety
IRPTC	International Register of Potentially Toxic Chemicals
JMPR	Joint FAO/WHO Meeting on Pesticide Residues (Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and a WHO Expert Group on Pesticide Residues)
k	kilo- (x 10 <sup>3</sup> )
kg	kilogram

l	litre
LC <sub>50</sub>	lethal concentration, 50%
LD <sub>50</sub>	lethal dose, median
m	metre
mg	milligram
ml	millilitre
m.p.	melting point
MRL	Maximum Residue Limit
MTD	maximum tolerated dose
ng	nanogram
NOEL	no-observed-effect level
NOAEL	no-observed-adverse-effect level
NS	Not Stated
OP	organophosphorus pesticide
PHI	pre-harvest interval
ppb	parts per billion
ppm	parts per million (Used only reference to the concentration of a pesticide in an experimental diet. In all other contexts the terms mg/kg or mg/l are used).
ppt	parts per trillion
sp gr	specific gravity
STEL	Short Term Exposure Limit
TADI	Temporary Acceptable Daily Intake
TLV	Threshold Limit Value
TMDI	theoretical maximum daily intake
TMRL	Temporary Maximum Residue Limit
TWA	Time Weighted Average
UNEP	United Nations Environment Programme
WHO	World Health Organization
WP	wettable powder
wt	weight
<	less than
<<	much less than
<=	less than or equal to
>	greater than
>=	greater than or equal to

# **TRIS (2,3-DIBROMOPROPYL) PHOSPHATE**

## **PRIOR INFORMED CONSENT DECISION GUIDANCE DOCUMENT**

### **1. IDENTIFICATION**

- 1.1 **Common Name:** Tris(2,3-dibromopropyl)phosphate
- 1.2 **Chemical Type:** Aliphatic halogenated hydrocarbon
- 1.3 **Use:** Flame-retardant additive for synthetic textiles and plastics. Also used in phenolic resins, paints, paper coatings and rubber
- 1.4 **Chemical Name:** 2,3-Dibromo-1-propanolphosphate (3:1) or 1-propanol, 2,3-dibromo-, phosphate (3:1)
- 1.5 **CAS No:** 126-72-7
- 1.6 **Trade Names/Synonyms:**  
Anfram 3PB, Apex 462-5, Bromkal P 67-6HP, ES 685, Firemaster LV-T 23P, Firemaster T23, Firemaster T23 P, Firemaster T23P-LV, Flacavon R, Flamex T 23P, Flammex AP, Flammex LV-T 23P, Flammex T 23P, Fyrol HB32, phosphoric acid, tris(2,3-dibromopropyl)ester, T 23P, Tris, tris-BP, tris(dibromopropyl)phosphate, USAF DO-41, Zetofex
- 1.7 **Mode of action:** Not relevant
- 1.8 **Formulation types:** The pure substance is a liquid, with a bromine content 68.7% and phosphorus of 4.4%
- 1.9 **Basic Producers:** Michigan Chemistry, USA; Chemische Fabrik Kalk, Germany; Ichill and Seilacher, Germany; Berk, UK; Stauffer, USA.

### **2. SUMMARY OF CONTROL ACTIONS**

#### **2.1 General**

Control actions to ban or severely restrict Tris have been taken in at least 5 countries and in the EEC. The main goal of actions taken is to prevent human (skin) exposure from textiles containing Tris. Furthermore, wastes containing the substance are considered to be hazardous, and therefore waste treatment is regulated.

- 2.2 Reasons for the control action  
Tris(2,3-dibromopropyl)phosphate is considered a possible carcinogen to humans. Absorption via the skin, the main route of entry into the human body, must therefore be prevented.
- 2.3 Uses banned  
All uses banned deal with use of the substance in textile products that may come in contact with the human skin.
- 2.4 Uses reported to be continued in effect  
Other uses than in textile products are allowed. In the USA notification is required regarding any manufacture or import of Tris. In Sweden the substance or its salts may be manufactured, used and handled only after permission has been granted by the Labour Inspectorate.
- 2.5 Alternatives  
No alternatives are presented in government reports.
- 2.6 Contacts for further information  
FAO/UNEP joint Data Base, IRPTC, Geneva and the Designated National Authorities in the countries taking action.

### 3. **SUMMARY OF FURTHER INFORMATION ON TRIS(2,3-DIBROMOPROPYL) PHOSPHATE**

- 3.1 Chemical and Physical Properties  
The pure substance is a viscous, pale-yellow liquid, freezing point 5.5°C, stable to 200-250°C, boiling point 390°C. Insoluble in water, dissolves readily in acetone, chloroform, methylene chloride and benzene.
- 3.2 Toxicological Characteristics
- 3.2.1 *Acute Toxicity:* oral LD<sub>50</sub> rat: 1010 mg/kg b.w., oral LD<sub>50</sub> mouse: 1149 mg/kg, intraperitoneal LD<sub>50</sub> mouse: 300 mg/kg, dermal LD<sub>50</sub> rabbit: 8 g/kg b.w.
- 3.2.2 *Short-term Toxicity:* NOEL rat (IP): < 0.4 mg/kg b.w. (lowest dose tested, 72 days, effects on male reproductive system). Single dose (rat IP) 100 mg/kg kidney damage, above 250 mg/kg liver damage. NOEL rat (oral): 25 mg/kg (15 days). Dermal exposure may produce allergic contact sensitization. Tris induces DNA damage in human cells.
- 3.2.3 *Chronic Toxicity:* IARC classification 2A, sufficient evidence for carcinogenicity to animals, probably carcinogenic to humans. Extra risk for cancer 10<sup>-5</sup> at life time exposure to 10 µg/kg b.w. (skin, 3x/week, linear extrapolation from mouse data)
- 3.2.4 *Epidemiological Studies:* Retrospective mortality study of employees exposed to Tris or DDT. No significant overall or cause-specific mortality excess.

### 3.3 Environmental Characteristics

3.3.1 *Fate:* The limited information available suggests that Tris is relatively persistent in the environment. Hydrolysis, oxidation and photodegradation are not likely to be significant fate processes. Slow biodegradation in raw sewage may occur.

3.3.2 *Effects:* Data are insufficient to characterize environmental effects. No adequate data concerning bioconcentration and biomagnification are available. Using a model a biomagnification potential of 338 has been calculated. LC<sub>50</sub> fish: 1450 µg/l (96h, rainbow trout).

### 3.4 Exposure

3.4.1 *Food:* No data are available.

3.4.2 *Occupational/Use:* According to a 1974 national occupational hazard survey (NIOSH) workers in the telephone communication industry are the category primarily exposed. Tris is widely used in textiles for childrens sleepwear. Estimated intake via skin: 9 µg/kg b.w./day. Over a six year period, 2-77 mg/kg may be absorbed.

3.4.3 *Environment:* No adequate data are available. It has been estimated that as much as 10% of the US production reaches the environment from textile finishing plants and laundries and that most of the remainder will reach the environment as solid waste.

3.4.4 *Accidental Poisoning:* No data available, no antidote is known.

### 3.5 Measures to Reduce Exposures

As skin absorption is main route of intake, workers should wear protective clothing and prevent eye contact. Do not wear textile products containing Tris.

### 3.6 Packaging and Labeling

Suspected carcinogenic substance, hazardous to the environment.

### 3.7 Waste Disposal Methods

Large quantities of cloth containing Tris: extract the Tris by soaking the cloth in ethanol, and incinerate the eluant at high temperature; alternately incinerate the cloth at high temperatures, or land-filling in a lined landfill with an impervious cover with a leachate collection and treatment.



### 3.8 Maximum Residue Limits

*Japan*: maximum concentration in textile products is described.

*Sweden*: no exposure limit established, carcinogenic substance.

*USA*: operator of waste incinerator must achieve 99,99% destruction.

### 4. **MAJOR REFERENCES**

- WHO. IARC monographs on the evaluation of the carcinogenic risk of chemicals to humans, Vol 20 (1979), IARC, Lyon
- Blum, A. and B.N. Ames. Flame-retardant additives as possible cancer hazards. *Science* vol. 195 (1977) p. 17-23
- Sittig, M. Handbook of toxic and hazardous chemicals and carcinogens, Noyes publications, second edition, 1985
- Ulsamer, A.G., R.E. Osterberg and J. McLaughlin. Flame-retardant chemicals in textiles. *Clinical Toxicology* 17, 101-131 (1980)

## ANNEX 1

### SUMMARY OF CONTROL ACTIONS AND REMAINING USES FOR TRIS(2,3 DIBROMOPROPYL)PHOSPHATE, AS REPORTED BY COUNTRIES

#### **BANNED:**

**USA (1978)** A flame-retardant chemical widely used in childrens textile articles until it was banned by the Consumer Product Safety Commission in 1978. Notification to EPA is required regarding any manufacturing or importation of this chemical. The purpose of this requirement is to confirm that there are no significant sources of the substance and to ensure that EPA has the opportunity to investigate the circumstances of any resumption of production.

#### **WITHDRAWN:**

None reported.

#### **SEVERELY RESTRICTED:**

##### **Only remaining uses allowed:**

None reported.

##### **Specific uses reported as not allowed:**

**EEC-countries \*** (1988) The substance may not be used in textile articles, such as garments, undergarments and linen, intended to come into contact with the skin.

##### **Use permitted with special authorization:**

**Sweden** (1988) The substance is severely restricted and may not be used without the permission of the Labour Inspectorate.

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\* **EEC-countries-** Belgium, Denmark, France, Federal Republic of Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and United Kingdom.