

2,4,5-Trichlorophenoxyacetic acid (2,4,5-T); CASRN 93-76-5

Human health assessment information on a chemical substance is included in the IRIS database only after a comprehensive review of toxicity data, as outlined in the [IRIS assessment development process](#). Sections I (Health Hazard Assessments for Noncarcinogenic Effects) and II (Carcinogenicity Assessment for Lifetime Exposure) present the conclusions that were reached during the assessment development process. Supporting information and explanations of the methods used to derive the values given in IRIS are provided in the [guidance documents located on the IRIS website](#).

STATUS OF DATA FOR 2,4,5-T

File First On-Line 09/07/1988

Category (section)	Assessment Available?	Last Revised
Oral RfD (I.A.)	yes	09/07/1988
Inhalation RfC (I.B.)	not evaluated	
Carcinogenicity Assessment (II.)	not evaluated	

I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

I.A. Reference Dose for Chronic Oral Exposure (RfD)

Substance Name — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)

CASRN — 93-76-5

Last Revised — 09/07/1988

The oral Reference Dose (RfD) is based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis. It is expressed in units of mg/kg-day. In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Please refer to the Background Document for an elaboration of these concepts. RfDs can also be derived for the noncarcinogenic health effects of substances that are also carcinogens. Therefore, it is essential to refer to other sources of

information concerning the carcinogenicity of this substance. If the U.S. EPA has evaluated this substance for potential human carcinogenicity, a summary of that evaluation will be contained in Section II of this file.

I.A.1. Oral RfD Summary

Critical Effect	Experimental Doses*	UF	MF	RfD
Increased urinary coproporphyrins	NOAEL: 3 mg/kg/day LOAEL: 10 mg/kg/day	300	1	1E-2 mg/kg/day
2-Year Rat Feeding Study				
Kociba et al., 1979				
Reduced neonatal survival				
3-Generation Rat Feeding Study				
Smith et al., 1981				

*Conversion Factors -- None

I.A.2. Principal and Supporting Studies (Oral RfD)

Kociba, R.J., D.G. Keyes, R.W. Lisowe, et al. 1979. Results of a two-year chronic toxicity and oncogenic study of rats ingesting diets containing 2,4,5- trichlorophenoxyacetic acid (2,4,5-T). Food Cosmet. Toxicol. 17: 205-221.

Smith, F.A., F.J. Murray, J.A. John, et al. 1981. Three-generation reproduction study of rats ingesting 2,4,5-trichlorophenoxyacetic acid in the diet. Toxicol. Res. Lab., Dow Chemical, Midland, MI.

Groups of Sprague-Dawley rats (50/sex) were maintained on diets supplying 0, 3, 10, or 30 mg 2,4,5-T/kg bw/day for 2 years (Kociba et al., 1979). An additional 10 animals/sex/group were

sacrificed after 4 months. Toxicological endpoints measured were body weight, food consumption, tumorigenicity, hematology, urinalysis, serum chemistry and histopathology. No effects were observed at 3 mg/kg/day. An increase in urinary excretion of coproporphyrins (at 4 months only) was reported for males at 10 and 30 mg/kg/day, and for females only at the high-dose level. A mild dose-related increase in the incidence of mineralized deposits in the renal pelvis was reported for females at 10 and 30 mg/kg/day after 2 years.

In a 3-generation reproduction study (Smith et al.,1981), rats were fed levels of 2,4,5-T corresponding to 0, 3, 10, or 30 mg/kg bw/day. No effects were observed at the low dose. Reduced neonatal survival was observed at both higher doses.

The reproductive endpoint is well documented. Other studies have shown effect on reproduction in mice, rats, hamsters and monkeys. A LOAEL of 15 mg/kg with a NOEL of 8 mg/kg for reduced fetal body weight was reported for mice. Fetal mortality was observed following administration of 2,4,5-T at 40 mg/kg (highest dose) to pregnant hamsters. Cleft palate was induced in A/JAX mice at 15 mg/kg; lower doses were not tested (Cranmer, 1978). Other strains of mice were less sensitive. Higher doses (about 200 mg/kg) induce frank teratogenic effects in rats. A qualitative association between 2,4,5-T exposure and human birth defects has been suggested. Terata and fetotoxic effects have not been observed in monkeys up to a dose of 40 mg/kg.

I.A.3. Uncertainty and Modifying Factors (Oral RfD)

UF — The UF of 300 includes uncertainty in the extrapolation of dose levels from laboratory animals to humans (10A), uncertainty in the threshold for sensitive humans (10H), and uncertainty because of deficiencies in the chronic toxicity database (3D).

MF — None

I.A.4. Additional Studies/Comments (Oral RfD)

None

I.A.5. Confidence in the Oral RfD

Study — High

Database — Medium

RfD — Medium

The Smith et al. (1981) study appears to be adequate for the assessment of long-term reproductive effects; a clear NOEL is established. The database is highly supportive of both the nature and the magnitude of the reproductive effect. The Kociba et al. (1979) study rates a high confidence rating because of its relative completeness. Confidence in the RfD is medium (tending towards high) because of the mutual support of the two studies and strength of the reproductive database. The relative weakness of the chronic toxicity database precludes a higher confidence level.

I.A.6. EPA Documentation and Review of the Oral RfD

Source Document -- U.S. EPA, 1982

Other EPA Documentation — None

Agency Work Group Review — 12/18/1985, 05/15/1986, 08/13/1987, 10/15/1987, 01/20/1988

Verification Date — 01/20/1988

Screening-Level Literature Review Findings — A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the RfD for 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) conducted in August 2003 identified one or more significant new studies. IRIS users may request the references for those studies from the IRIS Hotline at hotline.iris@epa.gov or 202-566-1676.

I.A.7. EPA Contacts (Oral RfD)

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

Substance Name — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)

CASRN — 93-76-5

Not available at this time.

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
CASRN — 93-76-5

This substance/agent has not undergone a complete evaluation and determination under US EPA's IRIS program for evidence of human carcinogenic potential.

III. [reserved]

IV. [reserved]

V. [reserved]

VI. Bibliography

Substance Name — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
CASRN — 93-76-5

VI.A. Oral RfD References

Cranmer, M. 1978. Use of herbicides in forestry. USDA/EPA Symposium, Arlington, VA, February 21-22,.

Kociba, R.J., D.G. Keyes, R.W. Lisowe, et al. 1979. Results of a two-year chronic toxicity and oncogenic study of rats ingesting diets containing 2,4,5- trichlorophenoxyacetic acid (2,4,5-T). Food Cosmet. Toxicol. 17: 205-221.

Smith, F.A., F.J. Murray, J.A. John, K.D. Nitschke, R.J. Kociba and B.A. Schwetz. 1981. Three-generation reproduction study of rats ingesting 2,4,5- trichlorophenoxyacetic acid in the diet. Toxicol. Res. Lab., Dow Chemical, Midland, MI.

U.S. EPA. 1982. Draft Interim Criterion Statement: Chlorophenoxy Herbicides. Ambient Water Quality Criterion for the Protection of Human Health. ECAO-CIN- 82-D005. (Internal Review Draft). This document was developed from a multimedia document on the Chlorophenoxy Herbicides which during 1982 had fairly comprehensive external review with a limited internal review.

VI.B. Inhalation RfD References

None

VI.C. Carcinogenicity Assessment References

None

VII. Revision History

Substance Name — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)

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Date	Section	Description
09/07/1988	I.A.	Oral RfD summary on-line
10/28/2003	I.A.6	Screening-Level Literature Review Findings message has been added.

VIII. Synonyms

Substance Name — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)

CASRN — 93-76-5

Last Revised — 08/01/1989

- 2,4,5-T
- 93-76-5
- ACIDE 2,4,5-TRICHLORO PHENOXYACETIQUE
- ACIDO (2,4,5-TRICLORO-FENOSI)-ACETICO
- BCF-BUSHKILLER
- BRUSH RHAP
- BRUSHTOX

- DACAMINE
- DEBROUSSAILLANT CONCENTRE
- DECAMINE 4T
- DED-WEED BRUSH KILLER
- DINOXOL
- ENVERT-T
- ESTERON 245
- ESTERON 245 BE
- FENCE RIDER
- FORRON
- FORST U 46
- FORTEX
- FRUITONE A
- INVERTON 245
- LINE RIDER
- NA 2765
- PHORTOX
- RCRA WASTE NUMBER U232
- REDDON
- REDDOX
- SPONTOX
- SUPER D WEEDONE
- TIPPON
- TORMONA
- TRANSAMINE
- TRIBUTON
- (2,4,5-TRICHLOR-FENOXY)-AZIJNZUUR
- 2,4,5-Trichlorophenoxyacetic acid
- Trichlorophenoxyacetic acid, 2,4,5-
- (2,4,5-TRICHLOR-PHENOXY)-ESSIGSAEURE
- TRINOXOL
- TRIOXON
- TRIOXONE
- U 46
- VEON
- VEON 245
- VERTON 2T
- VISKO RHAP LOW VOLATILE ESTER
- WEEDAR
- WEEDONE
- WEEDONE 2,4,5-T