

Merphos oxide; CASRN 78-48-8

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 Merphos oxide

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.)	message	11/01/1992
Carcinogenicity Assessment (II.)	not evaluated	

I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

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

Substance Name — Merphos oxide

CASRN — 78-48-8

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
Ataxia, delayed neurotoxicity and weight loss	NOEL: 0.1 mg/kg/day LOAEL: 0.5 mg/kg/day	3000	1	3E-5 mg/kg/day
90-Day Hen Delayed Neurotoxicity Study				
Abou-Donia et al., 1979				

*Conversion Factors: None

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

Abou-Donia, M.B., D.G. Graham, K.M. Abdo and A.A. Komeil. 1979. Delayed neurotoxic, late acute and cholinergic effects of S,S,S- tributylphosphorotrithioate (DEF): Subchronic (90 days) administration in hens. Toxicology. 14: 229-243.

Groups of mixed breed hens (5/group) were given a daily oral dose of either 0.1, 0.5, 1.0, 2.5, 5.0, 10, 20, 40 or 80 mg/kg of merphos oxide in gelatin capsules for 3 months. Hens at the highest two doses were given 10 to 30 mg/kg/day atropine sulfate (4 to 7 days) as protection against cholinergic effects. Controls consisted of four groups of five hens treated orally with either empty gelatin capsules; 10 mg/kg/day tri-o-cresyl phosphate (positive control); or 1 mg/kg/day parathion (negative control) for 3 months. Another group of three hens was given a daily oral dose of 30 mg/kg of atropine sulfate for 34 to 90 days as an atropine sulfate control. At the end of the treatment period, the birds were observed for 1 month then sacrificed and tissues were taken from the central and peripheral nervous systems for histological examination. Hens receiving 20-80 mg/kg/day lost weight and developed severe ataxia and delayed neurotoxicity that progressed to paralysis. Mortality also occurred at these dose levels. Hens receiving doses of 0.5 to 10 mg/kg/day lost weight, but regained it by the end of the observation period. These hens

also showed mild to gross ataxia, and equivocal or negative histopathological changes in the spinal cord and peripheral nerves.

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

UF — An uncertainty factor of 3000 was used for inter- and intraspecies extrapolation, subchronic to chronic duration and an incomplete database.

MF — None

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

Data Considered for Establishing the RfD

- 1) 90-Day Oral - hen: Principal study, see previous description; no core grade (Abou-Donia et al., 1979)
- 2) 2-Year Feeding - rat: NOEL=0.25 mg/kg/day; LEL=1.25 mg/kg/day (brain ChE inhibition); (Mobay Chemical Corp., 1969)
- 3) 2-Year Feeding - dog: ChE NOEL=0.12 mg/kg/day; Systemic NOEL=1.25 mg/kg/day (Mobay Chemical Corp., 1967a)
- 4) 2-Year Feeding - rat: ChE NOEL=0.25 mg/kg/day; Systemic NOEL=1.25 mg/kg/day; LEL=5 mg/kg/day (fatty change in liver) (Mobay Chemical Corp., 1967b)
- 5) 16-Week Feeding - rat: ChE NOEL=0.5 mg/kg/day; Systemic NOEL=0.5 mg/kg/day; LEL = 2.5 mg/kg/day (liver and kidney changes) (Mobay Chemical Corp., 1965a)
- 6) 12-Week Feeding - dog: ChE NOEL=none; ChE LEL=0.12 mg/kg/day; Systemic NOEL=0.12 mg/kg/day; Systemic LEL=0.62 mg/kg/day (oversensitive to stimuli) (Mobay Chemical Corp., 1965b)
- 7) 3-Generation Reproduction - mouse: Reproductive NOEL=100 ppm (13 mg/kg/day) (Mobay Chemical Corp., 1967c)

Data Gaps: None

I.A.5. Confidence in the Oral RfD

Study — Low
Database — Low
RfD — Low

Low confidence rating to the critical study is due to design deficiencies. Supporting data are too limited to merit a confidence greater than low. Low confidence in the RfD follows.

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

Source Document — This assessment is not presented in any existing U.S. EPA document.

Other EPA Documentation — Pesticide Registration Files.

Agency Work Group Review — 11/21/1985, 08/13/1987

Verification Date — 08/13/1987

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 Merphos oxide conducted in September 2002 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 — Merphos oxide
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The health effects data for Merphos Oxide (orthophosphate defoliant) have been reviewed by the U.S. EPA RfD/RfC Work Group and determined to be inadequate for derivation of an inhalation RfC. Agency Work Group Review — 06/25/1992

Screening-Level Literature Review Findings — A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the RfC for Merphos oxide conducted in September 2002 did not identify any critical new studies. IRIS users who know of important new studies may provide that information to the IRIS Hotline at hotline.iris@epa.gov or (202)566-1676.

EPA Contacts:

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).

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name — Merphos oxide
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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 — Merphos oxide
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VI.A. Oral RfD References

Abou-Donia, M.B., D.G. Graham, K.M. Abdo and A.A. Komeil. 1979. Delayed neurotoxic, late acute and cholinergic effects of S,S,S-tributyl phosphoro- trithioate (DEF): Subchronic (90 days) administration in hens. *Toxicology*. 14: 229-243.

Mobay Chemical Corporation. 1965a. MRID No. 00087423. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Mobay Chemical Corporation. 1965b. MRID No. 00087421. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Mobay Chemical Corporation. 1967a. MRID No. 00087428. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Mobay Chemical Corporation. 1967b. MRID No. 00145268, 00145868. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Mobay Chemical Corporation. 1967c. MRID No. 00087427, 00144939. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Mobay Chemical Corporation. 1969. MRID No. 00087426. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

VI.B. Inhalation RfC References

None available

VI.C. Carcinogenicity Assessment References

None

VII. Revision History

Substance Name — Merphos oxide

CASRN — 78-48-8

Date	Section	Description
09/07/1988	I.A.	Oral RfD summary on-line
11/01/1992	I.B.	Not verified; data inadequate
12/03/2002	I.A.6., I.B.	Screening-Level Literature Review Findings message has been added.

VIII. Synonyms

Substance Name — Merphos oxide

CASRN — 78-48-8

Last Revised — 09/07/1988

- 78-48-8
- B-1,776
- butifos
- butiphos
- butyl phosphorotrithioate
- Chemagro 1,776
- DEF defoliant
- DE-green
- E-Z-Off D
- Fos-Fall
- Merphos Oxide
- Ortho phosphate defoliant
- phosphorotrithioic acid, S,S,S-tributyl ester
- S,S,S-tributyl phosphorotrithioate
- S,S,S-tributyltrithiofosfat
- S,S,S-tributyl trithiophosphate