1,1,1-Trichloroethane (CASRN 71-55-6)

Health assessment information on a chemical substance is included in IRIS only after a comprehensive review of chronic toxicity data by U.S. EPA health scientists from several Program Offices and the Office of Research and Development. The summaries presented in Sections I and II represent a consensus reached in the review process. Background information and explanations of the methods used to derive the values given in IRIS are provided in the Background Documents.

STATUS OF DATA FOR 1,1,1-Trichloroethane

File First On-Line 03/31/1987

Category (section) Status Last Revised
Oral RfD Assessment (I.A.) withdrawn 02/01/1996
Inhalation RfC Assessment (I.B.) no data
Carcinogenicity Assessment (II.) on-line 09/01/1990

_I. Chronic Health Hazard Assessments for Noncancerogenic Effects

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

Substance Name -- 1,1,1-Trichloroethane CASRN -- 71-55-6

The oral RfD for 1,1,1-trichloroethane has been withdrawn on 08/01/1991 pending further review by the RfD/RfC Work Group.

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 1,1,1-Trichloroethane conducted in November 2001 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.
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).

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

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6

Not available at this time.

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6
Last Revised -- 09/01/1990

Section II provides information on three aspects of the carcinogenic assessment for the substance in question; the weight-of-evidence judgment of the likelihood that the substance is a human carcinogen, and quantitative estimates of risk from oral exposure and from inhalation exposure. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. The rationale and methods used to develop the carcinogenicity information in IRIS are described in The Risk Assessment Guidelines of 1986 (EPA/600/8-87/045) and in the IRIS Background Document. IRIS summaries developed since the publication of EPA's more recent Proposed Guidelines for Carcinogen Risk Assessment also utilize those Guidelines where indicated (Federal Register 61(79):17960-18011, April 23, 1996). Users are referred to Section I of this IRIS file for information on long-term toxic effects other than carcinogenicity.

II.A. Evidence for Human Carcinogenicity

II.A.1. Weight-of-Evidence Characterization

Classification -- D; not classifiable as to human carcinogenicity.

Basis -- There are no reported human data and animal studies (one lifetime gavage, one intermediate-term inhalation) have not demonstrated carcinogenicity. Technical grade 1,1,1-trichloroethane has been shown to be weakly mutagenic, although the contaminant, 1,4-dioxane, a known animal carcinogen, may be responsible for this response.
II.A.2. Human Carcinogenicity Data

None.

II.A.3. Animal Carcinogenicity Data

Inadequate. The NCI (1977) treated Osborne-Mendel rats (50/sex/dose) with 750 or 1500 mg/kg technical-grade 1,1,1-trichloroethane 5 times/week for 78 weeks by gavage. The rats were observed for an additional 32 weeks. Twenty rats of each sex served as untreated controls. Low survival of both male and female treated rats (3%) may have precluded detection of a significant number of tumors late in life. Although a variety of neoplasms was observed in both treated and matched control rats, they were common to aged rats and were not dose-related. Similar results were obtained when the NCI (1977) treated B6C3F1 hybrid mice with the time-weighted average doses of 2807 or 5615 mg/kg 1,1,1-trichloroethane by gavage 5 days/week for 78 weeks. The mice were observed for an additional 12 weeks. The control and treated groups had 20 and 50 animals of each sex, respectively. Only 25 to 45% of those treated survived until the time of terminal sacrifice. A variety of neoplasms were observed in treated groups, but the incidence not statistically different from matched controls.

Quast et al. (1978) exposed 96 Sprague-Dawley rats of both sexes to 875 or 1750 ppm 1,1,1-trichloroethane vapor for 6 hours/day, 5 days/week for 12 months, followed by an additional 19-month observation period. The only significant sign of toxicity was an increased incidence of focal hepatocellular alterations in female rats at the highest dosage. It was not evident that a maximum tolerated dose (MTD) was used nor was a range-finding study conducted. No significant dose-related neoplasms were reported, but these dose levels were below those used in the NCI study.

II.A.4. Supporting Data for Carcinogenicity

Mutagenicity testing of 1,1,1-trichloroethane has produced positive results in S. typhimurium strain TA100 (Simmon et al., 1977; Fishbein, 1979; Snow et al., 1979) as well as some negative results (Henschler et al., 1977; Taylor, 1978).

It was mutagenic for S. typhimurium strain TA1535 both with exogenous metabolic activation (Farber, 1977) and without activation (Nestmann et al., 1980). 1,1,1-Trichloroethane did not result in gene conversion or mitotic recombination in Saccharomyces cerevisiae (Farber, 1977; Simmon et al., 1977) nor was it positive in a host-mediated forward mutation assay using Schizosaccharomyces pombe in mice. The chemical also failed to produce chromosomal aberrations in the bone marrow of cats (Rampy et al., 1977), but responded positively in a cell transformation test with rat embryo cells (Price et al., 1978).

An isomer, 1,1,2-trichloroethane, is carcinogenic in mice, inducing liver cancer and pheochromocytomas in both sexes. Dichloroethanes, tetrachloroethanes and hexachloroethanes also produced liver cancer in mice and other types of neoplasms in rats.

It should be noted that 1,4-dioxane, a known animal carcinogen that causes liver and nasal tumors in more than one strain of rats and hepatocellular carcinomas in mice, is a contaminant of technical-grade 1,1,1-trichloroethane.
II.B. Quantitative Estimate of Carcinogenic Risk from Oral Exposure

Not available.

II.C. Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure

Not available.

II.D. EPA Documentation, Review, and Contacts (Carcinogenicity Assessment)

II.D.1. EPA Documentation

Source Document -- U.S. EPA, 1984a,b

The 1984 Health Effects Assessment for 1,1,1-Trichloroethane has received limited Agency review. The values in the 1984 Health Assessment Document for 1,1,1-Trichloroethane have received both Agency and public review.

II.D.2. EPA Review (Carcinogenicity Assessment)

Agency Work Group Review -- 08/05/1987

Verification Date -- 08/05/1987

Screening-Level Literature Review Findings -- A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the cancer assessment for 1,1,1-Trichloroethane conducted in November 2001 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.

II.D.3. EPA Contacts (Carcinogenicity Assessment)

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).
_VI. Bibliography

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6
Last Revised -- 08/01/1991

VI.A. Oral RfD References

Not available at this time.

VI.B. Inhalation RfD References

None

VI.C. Carcinogenicity Assessment References

Farber, H. 1977. Manager of Environmental Affairs, Dow Chemical letter to James Price, Chief of Air Quality Data Analysis, Texas Air Control Board, Austin, TX. (Cited in: NCI, 1977)


_VII. Revision History

Substance Name — 1,1,1-Trichloroethane
CASRN — 71-55-6

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08/01/1995  I.A., I.B., VI.A.  EPA's RfD/RfC and CRAVE workgroups were discontinued in May, 1995. Chemical substance reviews that were not completed by September 1995 were taken out of IRIS review. The IRIS Pilot Program replaced the workgroup functions beginning in September, 1995.

02/01/1996  I.A.  Contact changed

09/01/1996  III.A.5.  DWEL withdrawn

04/01/1997  III., IV., V.  Drinking Water Health Advisories, EPA Regulatory Actions, and Supplementary Data were removed from IRIS on or before April 1997. IRIS users were directed to the appropriate EPA Program Offices for this information.

01/09/2002  I., II.  This chemical is being reassessed under the IRIS Program.

12/03/2002  I.A., II.D.2.  Screening-Level Literature Review Findings message has been added.

_VIII. Synonyms_

Substance Name — 1,1,1-Trichloroethane
CASRN — 71-55-6
Last Revised — 03/31/1987

71-55-6
AEROTHENE TT
CHLOROETENE
CHLOROETHENE
CHLOROETHENE NU
CHLOROFORM, METHYL-
CHLOROTHANE NU
CHLOROTHENE
CHLOROTHENE NU
CHLOROTHENE VG
CHLORTEN
ETHANE, 1,1,1-TRICHLORO-
INHIBISOL
METHYLCHLOROFORM
METHYLTRICHLOROMETHANE
NCI-C04626
RCRA WASTE NUMBER U226
STROBANE
alpha-T
1,1,1-TCE
1,1,1-TRICHLOROETHAAN
1,1,1-TRICHLORAETHAN
Trichloroethane, 1,1,1-
alpha-TRICHLOROETHANE
1,1,1-TRICLOROETANO
TRI-ETHANE
UN 2831

http://www.epa.gov/iris/subst/0197.htm 2/14/2005