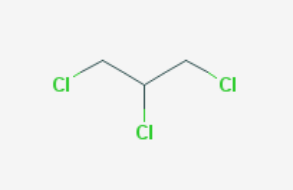
Cal/OSHA Draft Substance Summary for the June 20, 2017 HEAC Meeting

Substance name: 1,2,3-Trichloroproane

CAS: 96-18-4 MW: 147.4

Synonyms: allyl trichloride, glycerol trichlorohydrin, and trichlorohydrin

Molecular formula: $C_3H_5Cl_3$ Structural formula: 

ppm to mg/M^3 conversion factors at 25 °C and 760 mm/Hg: 1 ppm = 6.03 mg/m^3

Physical characteristics at room temp: Colorless to straw-colored liquid w/ Chloroform-like odor.
Special physical characteristics if any: None.
Flammability and other hazards: Flash point 73°C; Auto-Ignition temp. 304°C
Major commercial form(s): Not known.

Uses/applications: Historically, TCP has been used as a paint or varnish remover, a cleaning and degreasing agent, and was an impurity in certain pesticides. It is also used as a chemical intermediate in the process of making chemicals, such as hexafluoropropylene and polysulfides, and as an industrial solvent. No data regarding current use in California has been identified to date.

OELs and Other recommendations:

Source	Findings/Recommendations	Basis/source/ref(s)	Discussion and Assessment
Title 8 PEL	10 ppm; 60 mg/M^3	1989	
OSHA PEL	50 ppm as TWA; 300 mg/M^3	1973	
ACGIH TLV	0.005 ppm as TWA; (skin)	2014	**A2 Cancer**
NIOSH REL	TWA 10 ppm (60 mg/m3) skin	1994	
NIOSH IDLH	100 ppm	1994	
MAK	Carcinogen category 2	2002	
OEHHA REL	Not listed		
Prop 65	Known to cause Cancer	1992	
NTP	Anticipated human carcinogen	NTP Technical Report Series 384, 1993	
EPA	IRIS RfC: 0.3 µg/m^3	peribronchial lymphoid hyperplasia	

IARC	Group 2A		
EU	Not assigned; Cancer Group A	SCOEL/SUM/170 June 2011	

Peer-reviewed journal articles and other studies

National Toxicology Program, 1993
Study Type: chronic oral feeding study
Method: 2-Year Studies: Groups of 60 male and 60 female rats received 0, 3, 10, or 30 mg 1,2,3-trichloropropane/kg body weight in corn oil by gavage 5 days per week for up to 104 weeks. Selection of 30 mg/kg as the high dose in these studies was based on the following chemical-related effects in the 17-week studies: deaths and liver and kidney lesions at 125 and 250 mg/kg and reduced final mean body weights and mean body weight gains at 63 mg/kg or greater. Groups of 60 male and 60 female mice received 0, 6, 20, or 60 mg 1,2,3-trichloropropane/kg body weight in corn oil by gavage 5 days per week for up to 104 weeks. Selection of 60 mg/kg as the high dose was based on chemical-related deaths and lesions of the liver, lung, and forestomach at 125 and 250 mg/kg in the 17-week studies.
Results: Oral exposure to 1,2,3-trichloropropane caused tumors at several different tissue sites in mice and rats. Gavage administration of 1,2,3-trichloropropane increased the combined incidence of benign and malignant tumors of the forestomach (squamous-cell papilloma and carcinoma) in mice and rats of both sexes. In mice of both sexes, it also increased the combined incidence of benign and malignant liver tumors (hepatocellular carcinoma and adenoma) and caused benign Harderian-gland tumors (adenoma). In rats of both sexes and in female mice, it caused benign and/or malignant tumors of the oral mucosa (squamous-cell papilloma and/or carcinoma). In rats, oral exposure to 1,2,3-trichloropropane also caused cancer of the Zymbal gland (carcinoma) in both sexes, cancer of the mammary gland (carcinoma) in females, and benign tumors (adenoma) of the kidney and pancreas in males, and it increased the combined incidence of benign and malignant tumors (adenoma and carcinoma) of the preputial gland in males and the clitoral gland in females. In female mice, it also caused benign and malignant tumors of the uterus (adenoma, stromal polyp, and adenocarcinoma).

Johannsen, 1988.
Study Type: subchronic inhalation study
Method: 15 7-week old CD rats/sex/group were exposed to nominal concentrations of 0, 5, 15, or 50 ppm (0, 30, 90, or 300 mg/m^3) for 6 hours/day, 5 days/week, for up 13 weeks and to 0, 0.5, or 1.5 ppm (0, 3, or 9 mg/m^3) in a follow-up study.
Results: Daily observation of treated animals revealed a general, dose-dependent pattern of respiratory tract and conjunctival irritation, including red nasal discharge and excessive lacrimation. Statistically significant reductions in terminal body weight were observed in females exposed to 15 and 50 ppm. Mean absolute and relative liver weights were statistically significantly elevated in the male rat exposure groups. Mean absolute liver weights were statistically significantly elevated in females exposed to 50 ppm, and relative liver weights were statistically significantly increased in females at 15 and 50 ppm. Relative lung weights were also statistically significantly increased in female rats at doses of 15 and 50 ppm, although no effect was evident in male rats. The mean relative kidney weight of males exposed to 50 ppm was significantly increased. There were no significant dose-related changes in any of the hematological or clinical chemistry parameters evaluated. A number of histopathologic lesions were observed, including an increased incidence of mild to marked peribronchial lymphoid hyperplasia at 5, 15, and 50 ppm. Hepatocellular hypertrophy in males at 5, 15, and 50 ppm was observed in centrilobular to midzonal levels, but was not evident in the highest dose group females. Treated

females showed a dose-dependent increase in extramedullary hematopoiesis of the spleen. The presence of lesions in animals of all exposure groups of the first 13-week study prompted the initiation of a follow-up study with lower exposure concentrations of 0, 0.5, or 1.5 ppm (0, 3, or 9 mg/m^3). Small increases in mean absolute and relative ovarian weights were observed in females in the 1.5 ppm dose group. Treatment-related histopathological findings at 0.5 or 1.5 ppm were not observed in any tissue examined. Sporadic changes were observed in some hematological and clinical chemistry parameters.

USEPA, Integrated Risk Information System, 2009.
Study type: RfC derivation from Johannsen, 1988
Method:
Results: The critical effect selected for the derivation of the chronic RfC was the development of peribronchial lymphoid hyperplasia in the lungs of CD rats, which is supported by the occurrence of this effect in both male and female rats and the possible correlation between the hyperplasia and the observed increased lung weight. Peribronchial lymphoid hyperplasia, also defined as lymphoid hyperplasia of the bronchus-associated lymphoid tissue, is histologically characterized by the presence of hyperplastic lymphoid follicles with reactive germinal centers distributed along the bronchioles and bronchi. Benchmark dose (BMD) modeling of the increased incidence of peribronchial lymphoid hyperplasia in CD rats and an uncertainty factor of 300 resulted in a chronic RfC of 0.0003 mg/m^3.

HEAC Health-based assessment and recommendation

Pending HEAC discussion and consideration of lack of CA usage data.

Usage information: EPA Inventory Update Reporting (IUR), other sources

Three out-of-state IUR reports claim CBI for amount manufactured or used. Adhesives, sealants, paints and coatings are the desiganated product category.

There were no entries for CAS# 96184 in the TRI Database.

The CalEPA CERS database reports only 5 users in California, all at 2 UC campuses. Quantities used are less than 1 pound.

Measurement information

OSHA Method: OSHA 07
NIOSH Method: 1003
Estimated LOD/LOQ: LOD is 1 µg/sample; LOQ is 2.7 µg/sample.
Validated working range in ppm at Max sample volume is 3 to 310.
Theoretical working range in ppm at Max sample volume is .017 to .045
Measurement issues: In discussions with NIOSH regarding ability of the method to be brought down to the needed value.

Recommended Workplace Controls

Providing suitable control measures such as ventilation to control exposure can be accomplished using existing equipment as most systems have the ability to control to the proposed levels.

Economic Impact Analysis/Assessment

The Division has made a determination that this proposal is not anticipated to result in a significant, statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states. This proposal will not have any effect on the creation or elimination of California jobs nor result in the creation or elimination of existing businesses or affect the expansion of existing California businesses. The Division anticipates that any potential costs will be balanced by avoiding or minimizing the costs inherent in workers' compensation claims, lost work time, and productivity losses that would have been caused by exposure related illness of employees.

The PEL proposed is consistent with recent scientific findings, of which professional health and safety staff and consultants of these employers and others with significantly exposed employees should be aware. Many of these entities already seek to control employee exposures to chemicals to levels below existing PELs in the interest of business continuity and minimization of tort and workers compensation liability. At this time, no California employers were identified as having significant quantities.

Setting a Permissible Exposure Limit for TCP that is up-to-date and consistent with current scientific information and state policies on risk assessment will send appropriate market signals to employers with respect to the costs of illness and injury, which chemicals can impose on workers and their families, the government, and society at large. With appropriate market signals, employers may be better able to choose chemicals for use in the workplace that impose less of a burden on workers and society. There are no anticipated benefits to the state's environment.

The economic benefits from the proposed PEL will result primarily from reduced cancer risk among exposed workers.

References cited (author(s), title, journal, volume, page number, year)

NTP. 1993. *Toxicology and Carcinogenesis of 1,2,3-Trichloropropane (CAS No. 96-18-4) in F344/N Rats and B6C3F1 Mice (Gavage Studies).* NTP Technical Report Series no. 384. Research Triangle Park, NC: National Toxicology Program. 348 pp.

F. R. Johannsen , G. J. Levinskas , G. M. Rusch , J. B. Terrill & R. E. Schroeder, 1988. Evaluation of the subchronic and reproductive effects of a series of chlorinated propanes in the rat. I. Toxicity of 1,2,3-trichloropropane. Journal of Toxicology and Environmental Health, 25:3, 299-315

USEPA, Integrated Risk Information System, https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=200