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TERRESTRIAL TOXICITY AND AESTHETICS VALUES

Chemical Name: 1,1,2-trichloroethane CAS No. 79-00-5
Literature Review Date: 8/3/2007
Derived By: S. Briggs
Reviewed By: D. Bush DB Verification Date: 9/30/2007

HNV Tier Status: 1 **WV Tier Status:**
HCV Tier Status: 1

		Drinking Water		Non-Drinking Water
HUMAN HEALTH	HNV	110 ug/L		3,000 ug/L
	SCREENING LEVEL			
	HCV	12 ug/L		330 ug/L
	POTENCY		0.0292061074 $(mg/kg/d)^{-1}$	
	HH-BAF-TL.3		3.1 L/kg	
	HH-BAF-TL.4		4.5 L/kg	
	RfD (ADE)		0.0039 mg/kg/d	
WILDLIFE HEALTH	WV			
	WV-BAF-TL.3			
	WV-BAF-TL.4			
	RfD			
AESTHETICS	TASTE THRESHOLD			
	ODOR THRESHOLD			

Comments:

HH BAF_{TL3} and BAF_{TL4} based on log Kow values.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER BUREAU

TOXICOLOGICAL ASSESSMENT FOR 1, 1, 2-TRICHLOROETHANE (CASRN: 79-00-5) HUMAN NONCANCER VALUE

Literature Review Date: August 3, 2007
Shannon Briggs

White *et al.* (1985) conducted a 90-day study in which 32 male and 32 female CD-1 mice/dose group were exposed to 0, 0.02, 0.2, and 2.0 mg/ml 1,1,2-trichloroethane (TCE) in drinking water. When corrected for differential rates of fluid consumption and body weights, males were exposed to 0, 4.4, 46, and 305 mg TCE/kg/day and females were exposed to 0, 3.9, 44, and 384 mg TCE/kg/day. The authors recorded organ and body weights, hematology, differential cell counts, serum chemistry, liver glutathione levels, and hepatic microsomal activities. No histopathology was performed. The target organs of TCE were the liver of both sexes and the erythrocytes of the females. The toxic endpoints for determination of the LOAEL and NOAEL were significant ($p < 0.05$), dose-dependent reductions in cytochrome P-450 levels (10 and 26% in the mid- and high-dose groups, respectively) and aniline hydroxylase activity (14 and 47% in the mid- and high-dose groups, respectively) in females and reductions in male liver glutathione concentrations (11 and 28% in the mid- and high-dose groups, respectively). High-dose group female liver, kidney, and spleen weights were increased ($p < 0.05$) by 32, 18, and 10%, respectively. Females in the high-dose group also had a 5-6% decrease in hemoglobin and hematocrits.

Sanders *et al.* (1985), a companion paper to the study described above, reported supporting evidence of the toxicity of TCE and showed effects of TCE on the immune system. Data from their paper reiterate and support the LOAEL and NOAEL from White *et al.* (1985). Significant reductions in hemagglutination titers were observed in the mid- and high-dose groups of both sexes. Females had a reduced spleen lymphocyte response to B cell mitogens in the high-dose group, and vascular clearance was increased in the mid- and high-dose females. Phagocytic ability was reduced in males of the high-dose group.

The HNV was based on effects observed in female mice because the observed decreases in hemoglobin and hematocrit concentrations, the reduction in spleen lymphocyte response, and the greater effect on the female humoral immune response system (as indicated by the hemagglutination assay: 13% depression in females and 9% depression in males) indicated a greater sensivity of females to TCE. Thus, the HNV was calculated from the female CD-1 mice NOAEL of 0.02 mg/ml (3.9 mg/kg/d) as determined by White *et. al.* (1985) and supported by Sanders *et al.* (1985). Uncertainty factors of 10x each were applied for interspecies, intraspecies, and subchronic-chronic extrapolation. This approach is consistent with that used by EPA (2002) in IRIS.

References:

Sanders, V.M., K.L. White, Jr., G.M.Shopp, Jr., and A.E. Munson. 1985. Humoral and cell-mediated immune status of mice exposed to 1,1,2-trichloroethane. Drug Chem. Toxicol. 8(5):357-372.

White, K.L. Jr., V.M. Sanders, D.W. Barnes, G.M. Shopp, Jr., and A.E. Munson. 1985. Toxicology of 1,1,2-trichloroethane in the mouse. Drug Chem. Toxicol. 8(5):333-355.

HUMAN NONCANCER VALUE WORKSHEET

Chemical Name: 1,1,2-trichloroethane CAS No. 79-00-5
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Key Study:

A NOAEL of 0.02 mg/ml (20 mg/L) was reported for female CD-1 mice that were exposed to 1,1,2-trichloroethane in drinking water for 90 days (White et al., 1985).
20 mg/L x 0.195 L/kg/d = 3.9 mg/kg/d

$$ADE = \frac{3.9\ mg/kg/d}{1000} = 0.0039\ mg/kg/d$$

Where UF = 10x each for interspecies, intraspecies, and subchronic to chronic extrapolation.

$$HNV_{dw} = \frac{(0.0039\ mg/kg/d)\ (70\ kg)\ (0.8)}{2.0\ l/d + [(.0036\ kg/d \times 3.1\ l/kg) + (.0114\ kg/d \times 4.5\ l/kg)]} = \mathbf{0.105892962\ mg/L}$$

110 ug/L

$$HNV_{non\text{-}dw} = \frac{(0.0039\ mg/kg/d)\ (70\ kg)\ (0.8)}{0.01\ l/d + [(.0036\ kg/d \times 3.1\ l/kg) + (.0114\ kg/d \times 4.5\ l/kg)]} = \mathbf{3.014076732\ mg/L}$$

3,000 ug/L

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER BUREAU

TOXICOLOGICAL ASSESSMENT FOR 1, 1, 2-TRICHLOROETHANE (CASRN: 79-00-5) HUMAN CANCER VALUE

Literature Review Date: August 3, 2007
Shannon Briggs

The Human Cancer Value (HCV) was calculated from data presented in the sole cancer bioassay for 1,1,2-trichloroethane (TCE) (NCI 1978). B6C3F1 mice (50/sex/dose group and 20/sex/control group) and Osborne-Mendel rats (50/sex/dose group and 20/sex/control group) were exposed 5 days/wk to TCE by gavage (using corn oil as the vehicle) over the 78 week dosing period. Rats were then observed for an additional 35 weeks and mice for an additional 12-13 weeks prior to necropsy. Low-dose and high-dose group rats received time weighted average doses of 46 and 92 mg/kgBW/d, respectively. There were no statistically significant incidences of neoplasms in either male or female rats. Low-dose and high-dose group mice received time weighted average doses of 195 and 390 mg/kgBW/d, respectively. There was a statistically significant increase in hepatocellular carcinomas in mice of both sexes.

Hepatocellular carcinomas occurred in 2/17, 2/20, 18/49 and 37/49 for males in the untreated control, vehicle control, low-dose, and high-dose group mice, respectively, and in 2/20, 0/20, 16/48, and 40/45 for females in the untreated control, vehicle control, low-dose, and high-dose group mice, respectively. The occurrence of hepatocellular carcinomas was statistically significant for male and female mice in the low- and high-dose groups. There was also a positive dose-related association between TCE and adrenal pheochromocytomas in both male and female high-dose group mice, but the increased incidence was significant only for female mice in the high-dose group. Adrenal pheochromocytomas were observed in 8/48 high-dose group males (not-significant) and in 12/43 high-dose group females ($p < 0.006$).

On the basis of statistically significant, positive dose-related incidences of hepatocellular carcinomas in male and female mice and adrenal gland pheochromocytomas in female mice (with suggestive evidence of such in males), TCE was determined to be carcinogenic to mice and is listed as a possible human carcinogen (class C carcinogen) by EPA (2002). The incidence of hepatocellular carcinomas in male mice generated the highest potency value ($q^*_1 = 5.72 \times 10^{-2}$ $(mg/kg/d)^{-1}$) (Global 82), and this potency value was used to calculate a HCV. This approach is similar to the approach used by EPA (1996) to derive a slope factor in IRIS.

References:

NCI. 1978. Bioassay of 1,1,2-Trichloroethane for possible carcinogenicity. No. 74. DHEW Publication No. (NIH) 78-1324. 48 pp.

U.S. EPA. 2002. Integrated Risk Information System. IRIS. Chemical file for 1,1,2-trichloroethane (79-00-5). Verification date 2/01/94.

HUMAN CANCER VALUE WORKSHEET

Chemical Name: 1,1,2-trichloroethane CAS No. 79-00-5
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Key Study: NTP (1978) 50 male/female mice and rats were gavaged with 1,1,2-trichloroethane (in corn oil) 5 days per week for 78 weeks. The highest potency was generated by hepatocellular carcinomas in male mice.

Adjusted Ave Dose mg/kg/d	Tumors/animal at risk	Animal Weight
0	2 / 20	0.033 kg
121	18 / 49	
239	37 / 49	

Global 82 $q = \frac{0.0001359963}{0.031600899177} = 0.004303557$

$q^* = (q)$ (species scaling factor)

$q^* = (0.004303557)\ (70\ kg/0.033\ kg)^{1/4}$

$q^* = 0.0292061074\ (mg/kg/d)^{-1}$

$RAD = \frac{0.00001}{q^*} = 0.00034239414\ mg/kg/d$

$HCV_{dw} = \frac{(0.00034239414\ mg/kg/d)\ (70\ kg)}{2.0\ l/d + [(.0036\ kg/d \times 3.1\ l/kg) + (.0114\ kg/d \times 4.5\ l/kg)]} = \mathbf{0.011620875\ mg/L}$ **12 ug/L**

$HCV_{non\text{-}dw} = \frac{(0.00034239414\ mg/kg/d)\ (70\ kg)}{0.01\ l/d + [(.0036\ kg/d \times 3.1\ l/kg) + (.0114\ kg/d \times 4.5\ l/kg)]} = \mathbf{0.330769939\ mg/L}$ **330 ug/L**

BIOACCUMULATION FACTOR WORKSHEET

Chemical Name: 1,1,2-trichloroethane CAS No. 79-00-5
BAF Derived By: S. Briggs Literature Review Date: 8/3/2007
BAF Reviewed By: D. Bush DB Verification Date: 9/30/2007

HH-BAF-TL.3: 3.1 L/kg **WL-BAF-TL.3:**
HH-BAF-TL.4: 4.5 L/kg **WL-BAF-TL.4:**

I. FIELD BAFs, BSAFs, or LABORATORY BCFs

Ref #	BAF, BSAF, or BCF	Value	Species	Exposure Duration (Days)	Tissue Type	Tissue Lipid (%)	Steady State Tissue Conc.

Final BAF, BSAF, or BCF: N/A
Justification: No measured BCF or BAF available.

II. LOG Kow VALUES

Ref #	Meas./Calc. Log Kow	Method	Value	Ref #	Meas./Calc. Log Kow	Method
1.)	calculated	C log P	2.05			

Final Log Kow: 2.05
Justification: The only log Kow value available is a calculated value.

Food Chain Multipliers
FCM-TL.3: 1.0055
FCM-TL.4: 1.0002