

7. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding chlorophenols in air, water, and other media are summarized in Table 7-1. Occupational standards (OSHA) or guidelines (ACGIH) have not been set for any of the eight chlorophenols discussed in this profile.

The chlorophenols as a group have been classified as an IARC group 2B carcinogen (IARC 1987). This classification is based on limited evidence of carcinogenicity in humans exposed during the production of chlorophenoxy herbicides and sufficient animal evidence of carcinogenicity for 2,4,6-TCP. The evidence of carcinogenicity in animals for 2,4,5-TCP was considered inadequate.

At relatively low concentrations, chlorophenols give water an unpleasant medicinal taste (EPA 1980a). Based on taste thresholds, the EPA has developed ambient water quality criteria. A comparison of the ambient water quality criteria with the health based RfD indicates that a water concentration resulting in the RfD would be well above the taste threshold. For example, drinking two liters of water in a day containing the ambient water quality criteria concentration of 2,4-DCP would result in a dose of 0.009 $\mu\text{g}/\text{kg}/\text{day}$ relative to the RfD of 3 $\mu\text{g}/\text{kg}/\text{day}$.

An acute-duration oral MRL of 0.01 $\text{mg}/\text{kg}/\text{day}$ has been derived for the chlorophenols based on a NOAEL for liver effects in rats identified in the study of 4-CP by Phornchirasilp et al. (1989b). An intermediateduration oral MRL of 0.003 $\text{mg}/\text{kg}/\text{day}$ has been derived for the chlorophenols based on a NOAEL for immunological effects observed in rats following treatment with 2,4-DCP (Exon and Koller 1985; Exon et al. 1984). These MRLs are derived from the chlorophenol with the lowest duration-specific LOAEL and, therefore, should protect against effects following exposure to all chlorophenols as well as exposure to mixtures of chlorophenols, if effects of multiple chlorophenols are additive.

Rather than derive a single RfD for all the chlorophenols, the EPA has derived RfDs for individual compounds for which data were available. The oral RfD for 2-CP is 0.005 $\text{mg}/\text{kg}/\text{day}$ based on a decrease ($p < 0.1$) in litter size observed at 50 but not 5 $\text{mg}/\text{kg}/\text{day}$ (Exon and Koller 1982, 1985). The oral RfDs for 2,4-DCP and 2,4,5-TCP are 0.003 $\text{mg}/\text{kg}/\text{day}$ and 0.1 $\text{mg}/\text{kg}/\text{day}$, respectively (IRIS 1998). These values are based on the same studies and NOAELs as described for the MRLs.

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TABLE 7-1. Regulations and Guidelines Applicable to Chlorophenols

Agency	Description	Information	References
<u>INTERNATIONAL</u>			
IARC	Carcinogenic classification chlorophenols	Group 2B ^a	IARC 1987
<u>NATIONAL</u>			
Regulations:			
a. Water:			
EPA OWRS	2,4-DCP General permits under the NPDES Priority pollutant effluent limitations for BAT and NSPS Maximum for 1 day Monthly average shall not exceed	Yes 112 mg/L 39 mg/L	EPA 1998a (40 CFR 122 Appendix D)
EPA	2-CP Toxic Pollutant	Yes	EPA 1998b (40 CFR 401.15)
b. Other			
EPA OERR	Reportable Quantity 2,4,5-TCP, 2,4,6-TCP, 2,3,4,6-TeCP 2-CP, 2,4-DCP	10 lbs 100 lbs	EPA 1989a (54FR33418)
EPA OSW	Listing as a hazardous waste (2-CP, 2,4-DCP, 2,4,5-TCP, 2,4,6-TCP, 2,3,4,5-TeCP, 2,3,4,6-TeCP, 2,3,5,6-TeCP)	Yes	EPA 1988d (53FR13382)
	Listing as a toxic pollutant (2-CP, 2,4-DCP)	Yes	EPA 1998c (40 CFR 401.15)
Guidelines:			
a. Air			
EPA	Cancer Potency Factor 2,4,6-TCP Unit Risk	3.1x10 ⁻⁶ per µg/m ³	IRIS 1998

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TABLE 7-1. Regulations and Guidelines Applicable to Chlorophenols (continued)

Agency	Description	Information	References
b. Water			
EPA OWRS	Human Water Quality Criteria monochlorophenols	0.1 µg/L (organoleptic)	EPA 1980a
	2,4-DCP	0.3 µg/L (organoleptic)	
	2,4,5-TCP	1 µg/L (organoleptic)	
	2,3,4,6-TeCP	1 µg/L (organoleptic)	
EPA	Ambient Water Quality Criteria		
	2,4-DCP		EPA 1980b (45FR79318)
	Water and fish	3.09 mg/L	(11/28/80)
	Fish only	3.09 mg/L	
	2,4,5-TCP		EPA 1990c (55FR19986)
	Fresh water		(5/14/89)
	Acute:	100 µg/L	
	Chronic:	63 µg/L	
	Marine		
	Acute:	240 µg/L	
	Chronic:	11 µg/L	
	2,4,6-TCP		EPA 1980b (45FR79318)
	Water and Fish	1.2 µg/L	
	Fish only	3.6 µg/L	
	2,3,4,6-TeCP		EPA 1980b (45FR79318)
	Water and Fish	1 µg/L	(11/28/80)
EPA ODW	Health Advisories ^b		EPA 1996
	2-CP		
	10-kg child		
	1-day	0.5 mg/L	
	10-day	0.5 mg/L	
	Longer term	0.5 mg/L	
	70-kg adult		
	Longer term	2.0 mg/L	
	DWEL	0.2 mg/L	
	Lifetime	0.04 mg/L	
	2,4-DCP		
	10-kg child		
	1-day	0.03 mg/L	
	10-day	0.03 mg/L	
	Longer term	0.03 mg/L	
	70-kg adult		
	Longer term	0.1 mg/L	
	DWEL	0.1 mg/L	
	Lifetime	0.02 mg/L	

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TABLE 7-1. Regulations and Guidelines Applicable to Chlorophenols (continued)

Agency	Description	Information	References
NAS	SNARL 2,4-DCP 24-hour 7-day 2,4,6-TCP 24-hour 7-day	7 mg/L 2 mg/L 17.5 mg/L 2.5 mg/L	NAS 1987 NAS 1982
c. Nonspecific Media			
EPA	Chronic RfD (oral) 2-CP 2,4-DCP 2,4,5-TCP 2,3,4,6-TeCP	0.005 mg/kg/day 0.003 mg/kg/day 0.1 mg/kg/day 0.03 mg/kg/day	IRIS 1998
EPA	Carcinogenic classification 2,4,6-TCP	Group B2 ^c	
DHHS	Carcinogenic classification 2,4,6-TCP	Reasonably anticipated to be a carcinogen	NTP 1994
STATE			
Regulations and Guidelines:			
a. Air	Acceptable ambient air concentration		NATICH 1992
Texas	2-CP (30 minutes)	19.0 µg/m ³	
Arizona	2,4-DCP (24 hours)	1.6 µg/m ³	
Florida (Pinella)	(Annual)	3 µg/m ³	
Michigan	(Annual)	77.0 µg/m ³	
Texas	(Annual)	53.0 µg/m ³	
Washington (southwest)	Trichlorophenols (Annual)	0.180 µg/m ³	
Arizona	2,4,5-TCP (24 hours)	3500 µg/m ³	
Florida	(Annual)	100 µg/m ³	
Massachusetts	(Annual)	0.16 µg/m ³	
Pennsylvania	(1 year)	350 µg/m ³	
Texas	(Annual)	44 µg/m ³	

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TABLE 7-1. Regulations and Guidelines Applicable to Chlorophenols (continued)

Agency	Description	Information	References
	2,4,6-TCP		
Arizona	(Annual)	0.43 $\mu\text{g}/\text{m}^3$	
Florida	(Annual)	0.180 $\mu\text{g}/\text{m}^3$	
Pennsylvania (Philadelphia)	(Annual)	3,500 $\mu\text{g}/\text{m}^3$	
Texas	(30 minutes)	21.0 $\mu\text{g}/\text{m}^3$	
Vermont	(Annual)	0.180 $\mu\text{g}/\text{m}^3$	
	2,3,4,6-TeCP		
Florida	(Annual)	30.0 $\mu\text{g}/\text{m}^3$	
Texas	(Annual)	7.0 $\mu\text{g}/\text{m}^3$	
b. Water	Drinking water quality standards		
Kansas	2-CP	0.1 $\mu\text{g}/\text{L}$	FSTRAC 1990
Kansas	4-CP	0.3 $\mu\text{g}/\text{L}$	
	2,4-DCP		
Arizona		21 $\mu\text{g}/\text{L}$	
Kansas		700 $\mu\text{g}/\text{L}$	
Maine		200 $\mu\text{g}/\text{L}$	
	2,4,5-TCP		
Arizona		700 $\mu\text{g}/\text{L}$	
Kansas		1 $\mu\text{g}/\text{L}$	
	2,4,6-TCP		
Arizona		1.8 $\mu\text{g}/\text{L}$	
Kansas		17 $\mu\text{g}/\text{L}$	
Maine		700 $\mu\text{g}/\text{L}$	
Minnesota		18 $\mu\text{g}/\text{L}$	
New Hampshire		1.87 $\mu\text{g}/\text{L}$	
	2,3,4,6-TeCP		
Kansas		263 $\mu\text{g}/\text{L}$	

^aGroup 2B: Limited evidence for human carcinogenicity.

^bAll health advisories for the chlorophenols listed are in draft status.

^cGroup B2: Probable human carcinogen; sufficient evidence from animal studies

BAT = Best Available Technology; DHHS = Department of Health and Human Services; DWEL = Drinking Water Exposure Level; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; NAS = National Academy of Science; NPDES = National Pollutant Discharge Elimination System; NSPS = New Source Performance Standards; ODW = Office of Drinking Water; OERR = Office of Emergency and Remedial Response; OSW = Office of Solid Wastes; OWRS = Office of Water Regulations and Standards; RfD = reference dose; SNARL = Suggested No Adverse Response Level

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2,4,6-TCP has been categorized as a group B2 carcinogen (probably human carcinogen) based on leukemias in male rats and hepatocellular adenomas or carcinomas in male mice (NCI 1979), and no RfD has been derived (IRIS 1998). An RfD of 0.03 mg/kg/day has been derived for 2,3,4,6-TeCP based on increased liver weights and hypertrophy observed in rats treated by gavage at 100 but not 25 mg/kg/day (American Biogenics 1988).