

**SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS**

Guidesheet Number → #10			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	#21	#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30	
			Residential Drinking Water Protection Criteria	Industrial And Commercial Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Groundwater Contact Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Piperidine	110894	NA	64	180	NA	6.8E+5	NLV	NLV	NLV	NLV	4.1E+9	4.9E+5	8.8E+5	6.4E+5	1.2E+8
Propionic acid	79094	NA	2.4E+5	7.0E+5	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	8.8E+9	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Pyridine (I)	110861	NA	330 (M)	420	NA	37,000 (C)	2,000	9,800	40,000	97,000	1.0E+8	37,000 (C)	37,000 (C)	37,000 (C)	37,000
1,2,4,5-Tetrachlorobenzene	95943	NA	1.5E+6	1.5E+6	3,400 (X)	1.5E+6	ID	ID	ID	ID	ID	3.8E+8 (D)	6.8E+8	5.0E+8	NA
p-Toluidine	106490	NA	660 (M)	1,200	NA	4.8E+5	NLV	NLV	NLV	NLV	1.9E+8	6.7E+5	1.2E+6 (C)	8.7E+5	1.2E+6
Tributylamine	102829	NA	7,800	23,000	ID	1.8E+6	1.1E+6	7.2E+5	ID	ID	2.1E+8	3.7E+6 (C)	3.7E+6 (C)	3.7E+6 (C)	3.7E+6
1,2,4-Trichlorobenzene	120821	NA	4,200	4,200	1,800	1.1E+6	1.1E+6 (C)	3.4E+7	3.4E+7	3.4E+7	1.1E+10	1.1E+6 (C,AD)	1.1E+6 (C,AD)	1.1E+6 (C,AD)	1.1E+6
Triphenyl phosphate	115866	NA	1.1E+5 (C)	1.1E+5 (C)	NA	1.1E+5 (C)	NLV	ID	ID	ID	ID	1.1E+5 (C)	1.1E+5 (C)	1.1E+5 (C)	1.1E+5
tris(2,3-Dibromopropyl)phosphate	126727	NA	66	270	NA	27,000 (C)	27,000 (C)	60,000	60,000	60,000	7.4E+6	27,000 (C)	27,000 (C)	27,000 (C)	27,000
<b>PCBs</b>															
Polychlorinated biphenyls (PCBs) (J,T)	1336363	NA	NLL	NLL	NLL	NLL	1.6E+7	8.1E+5	2.8E+7	2.8E+7	6.5E+6	{T}	{T}	{T}	NA
<b>PHTHALATES</b>															
bis(2-Ethylhexyl)phthalate	117817	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	8.9E+8	1.0E+7 (C)	1.0E+7 (C)	1.0E+7 (C)	1.0E+7
Butyl benzyl phthalate	85687	NA	3.1E+5 (C)	3.1E+5 (C)	26,000 (X)	3.1E+5 (C)	NLV	NLV	NLV	NLV	2.1E+10	3.1E+5 (C)	3.1E+5 (C)	3.1E+5 (C)	3.1E+5
Di-n-butyl phthalate	84742	NA	7.6E+5 (C)	7.6E+5 (C)	11,000	7.6E+5 (C)	NLV	NLV	NLV	NLV	1.5E+9	7.6E+5 (C)	7.6E+5 (C)	7.6E+5 (C)	7.6E+5
Di-n-octyl phthalate	117840	NA	1.0E+8	1.4E+8 (C)	ID	1.4E+8 (C)	NLV	NLV	NLV	NLV	ID	2.8E+7	6.9E+7	4.0E+7	1.4E+8
Dicyclohexyl phthalate	84617	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	NA
Diethyl phthalate	84662	NA	1.1E+5	3.2E+5	NA	7.4E+5 (C)	NLV	NLV	NLV	NLV	1.5E+9	7.4E+5 (C)	7.4E+5 (C)	7.4E+5 (C)	7.4E+5
Phthalic acid	88993	NA	2.8E+5	8.0E+5	NA	1.7E+6 (C)	NLV	NLV	NLV	NLV	ID	1.7E+6 (C)	1.7E+6 (C)	1.7E+6 (C)	1.7E+6
Phthalic anhydride	85449	NA	3.0E+5	8.8E+5	NA	1.1E+6 (C)	NLV	NLV	NLV	NLV	ID	1.1E+6 (C)	1.1E+6 (C)	1.7E+6 (C)	1.1E+6
<b>PESTICIDES</b>															
Alachlor	15972608	NA	52	52	290 (X)	44,000	NLV	NLV	NLV	NLV	ID	5.3E+5	1.3E+6	7.8E+5	NA
Aldrin	309002	NA	NLL	NLL	NLL	NLL	7.1E+6	2.0E+5	2.0E+5	2.0E+5	8.0E+5	5,900	15,000	8,600	NA
Atrazine	1912249	NA	60	60	150 (X)	1.1E+5	NLV	NLV	NLV	NLV	ID	5.0E+5 (AD)	9.0E+5 (AD)	6.6E+5 (AD)	NA
Chlordane (J)	57749	NA	NLL	NLL	NLL	NLL	5.9E+7	4.2E+6	4.2E+6	4.2E+6	2.1E+7	2.4E+5	3.8E+5	3.0E+5	NA
Chlorpyrifos	2921882	NA	17,000	48,000	NA	8.4E+5	240	5,500	ID	ID	5.9E+7	4.6E+7	1.2E+8	6.7E+7	NA
Cyanazine	21725462	NA	500 (M)	500 (M)	1,100 (X)	56,000	NLV	NLV	NLV	NLV	ID	1.0E+5	1.8E+5	1.3E+5	NA
Dacthal	1861321	NA	50,000	1.4E+5	NA	3.4E+5	NLV	NLV	NLV	NLV	ID	1.1E+7	2.0E+7	1.5E+7	NA
4,4'-DDD	72548	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	5.6E+7	5.4E+5	1.4E+6	7.9E+5	NA
4,4'-DDE	72559	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	4.0E+7	2.6E+5	6.4E+5	3.7E+5	NA
4,4'-DDT	50293	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	4.0E+7	4.6E+5	6.8E+5	5.5E+5	NA
Diazinon	333415	NA	95	280	NA	95,000	NLV	NLV	NLV	NLV	ID	1.0E+5 (AD)	2.1E+5 (AD)	1.4E+5 (AD)	3.1E+5

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Dichlorovos	62737	NA	50 {M}	130	NA	1.2E+5	NLV	NLV	NLV	NLV	1.5E+7	72,000	1.3E+5	93,000	2.2E+6
Dieldrin	60571	NA	NLL	NLL	NLL	NLL	7.2E+5	64,000	64,000	64,000	8.5E+5	6,400	16,000	9,300	NA
Dinoseb	88857	NA	300	300	NA	1.4E+5 {C}	ID	ID	ID	ID	ID	1.4E+5 {C,AD}	1.4E+5 {C,AD}	1.4E+5 {C,AD}	1.4E+5
Diuron	330541	NA	620	1,800	NA	7.4E+5	NLV	NLV	NLV	NLV	2.1E+8	4.8E+6	8.6E+6	6.3E+6	NA
Endosulfan {J}	115297	NA	NLL	NLL	NLL	NLL	ID	ID	ID	ID	ID	6.7E+6	1.2E+7	8.7E+6	NA
Endothal	145733	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.0E+9	1.9E+7	3.4E+7	2.5E+7	NA
Endrin	72208	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	2.6E+5	6.5E+5	3.8E+5	NA
Heptachlor	76448	NA	NLL	NLL	NLL	NLL	1.9E+6	2.1E+5	2.1E+5	2.1E+5	3.0E+6	32,000	80,000	47,000	NA
Heptachlor epoxide	1024573	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.5E+6	13,000	39,000	19,000	NA
Lindane	58899	NA	20 {M}	20 {M}	20 {M}	7,100	ID	ID	ID	ID	ID	73,000	96,000	84,000	NA
Methoxychlor	72435	NA	16,000	16,000	NA	18,000	ID	ID	ID	ID	ID	7.7E+6	1.9E+7	1.1E+7	NA
Methyl parathion	298000	NA	46	130	NA	76,000	NLV	NLV	NLV	NLV	ID	2.8E+5	5.0E+5	3.6E+5	NA
Metolachlor	51218452	NA	4,800	20,000	NA	4.4E+5 {C}	NLV	NLV	NLV	NLV	ID	4.4E+5 {C,AD}	4.4E+5 {C,AD}	4.4E+5 {C,AD}	4.4E+5
Mirex	2385855	NA	NLL	NLL	NLL	NLL	ID	ID	ID	ID	ID	5.5E+4	1.4E+5	80,000	NA
Pendimethalin	40487421	NA	1.1E+6	1.1E+6	NA	1.1E+6	NLV	NLV	NLV	NLV	ID	1.8E+8	4.6E+8	2.7E+8	NA
Prometon	1610180	NA	4,900	14,000	NA	5.5E+6	NLV	NLV	NLV	NLV	ID	2.5E+7	4.4E+7	3.2E+7	NA
Propachlor	1918167	NA	1,900	5,400	NA	8.8E+6	NLV	NLV	NLV	NLV	ID	1.5E+7	2.6E+7	1.9E+7	NA
Propazine	139402	NA	4,000	11,000	NA	1.7E+5	NLV	NLV	NLV	NLV	ID	3.0E+7	5.4E+7	3.9E+7	NA
Simazine	122349	NA	80	80	NA	90,000	NLV	NLV	NLV	NLV	ID	5.8E+6	1.0E+7	7.6E+6	NA
Tebuthiuron	34014181	NA	10,000	30,000	NA	5.0E+7	NLV	NLV	NLV	NLV	ID	4.0E+7 {AD}	8.2E+7 {AD}	5.5E+7 {AD}	NA
Toxaphene	8001352	NA	24,000	24,000	860	3.6E+5	NLV	NLV	NLV	NLV	1.2E+7	1.2E+5	2.9E+5	1.7E+5	NA
Triallate	2303175	NA	95,000	2.5E+5 {C}	NA	2.5E+5 {C}	ID	ID	ID	ID	ID	2.5E+5 {C}	2.5E+5 {C}	2.5E+5 {C}	2.5E+5
<b>PESTICIDES-HERBICIDES</b>															
Aldicarb	116063	NA	60	60	NA	2.4E+6	NLV	NLV	NLV	NLV	ID	1.1E+6	2.0E+6	1.5E+6	NA
Aldicarb sulfide	1646873	NA	80	80	NA	5.4E+7	NLV	NLV	NLV	NLV	ID	1.5E+6	2.6E+6	1.9E+6	NA
Aldicarb sulfone	1646884	NA	50 {M}	50 {M}	NA	4.2E+7	NLV	NLV	NLV	NLV	ID	1.2E+6	2.2E+6	1.6E+6	NA
Carbaryl	63252	NA	14,000	40,000	NA	2.6E+6	ID	ID	ID	ID	ID	1.1E+8	1.9E+8	1.4E+8	NA
Carbofuran	1563662	NA	800	800	NA	6.8E+6	NLV	NLV	NLV	NLV	ID	5.6E+6	1.0E+7	7.3E+6	NA
Dalapon	75990	NA	4,000	4,000	NA	5.9E+7 {C}	NLV	NLV	NLV	NLV	ID	5.9E+7 {C}	5.9E+7 {C}	5.9E+7 {C}	5.9E+7
2,4-Dichlorophenoxyacetic acid	94757	NA	1,400	1,400	4,400	2.4E+6	NLV	NLV	NLV	NLV	2.9E+9	1.5E+7	2.0E+7	1.7E+7	NA
Diquat	85007	NA	400	400	NA	1.4E+7	NLV	NLV	NLV	NLV	ID	2.5E+6	4.4E+6	3.2E+6	NA
Glyphosate	1071836	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	7.4E+7 {AD}	2.2E+8 {AD}	1.1E+8 {AD}	NA

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2-Methyl-4-chlorophenoxyacetic acid	94746	NA	390	1,100	NA	4.9E+5	NLV	NLV	NLV	NLV	ID	1.1E+6	2.0E+6	1.5E+6	NA
Oxamyl	23135220	NA	4,000	4,000	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	4.3E+7	7.6E+7	5.5E+7	NA
Picloram	1918021	NA	10,000	10,000	NA	8.6E+6	NLV	NLV	NLV	NLV	ID	7.8E+7	1.4E+8	1.0E+8	NA
Silvex (2,4,5-TP)	93721	NA	3,600	3,600	NA	3.1E+6	NLV	NLV	NLV	NLV	ID	8.4E+6	1.5E+7	1.1E+7	NA
Trifluralin	1582098	NA	1.9E+5	5.7E+5	NA	1.2E+7	ID	ID	ID	ID	ID	7.8E+6	2.0E+7	1.1E+7	NA
<b>DIOXINS</b>															
2,3,7,8-Tetrabromodibenzo-p-dioxin (O)	50585416	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	{O}	{O}	{O}	{O}	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin (O)	1746016	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	89 {O}	0.99 {O}	1.4 {O}	2.9 {O}	NA
<b>PHENOLS</b>															
4-Chloro-3-methylphenol	59507	NA	5,800	16,000	NA	3.0E+6	NLV	NLV	NLV	NLV	ID	2.2E+7	4.0E+7	2.9E+7	NA
2-Chlorophenol	95578	NA	900	2,600	440	1.9E+6	ID	ID	ID	ID	ID	6.9E+6	1.2E+7	9.0E+6	1.9E+7
2,4-Dichlorophenol	120832	NA	1,500	4,200	380	9.6E+5	NLV	NLV	NLV	NLV	2.3E+9	1.8E+6 {C,AD}	1.8E+6 {C,AD}	1.8E+6 {C,AD}	1.8E+6
2,4-Dimethylphenol	105679	NA	7,400	20,000	7,600	1.0E+7	NLV	NLV	NLV	NLV	2.1E+9	5.6E+7	1.0E+8	7.3E+7	NA
2,6-Dimethylphenol	576261	NA	330 {M}	330 {M}	NA	1.3E+5	NLV	NLV	NLV	NLV	ID	6.7E+5	1.2E+6	8.7E+5	NA
3,4-Dimethylphenol	95658	NA	330 {M}	580	NA	3.6E+5	NLV	NLV	NLV	NLV	ID	1.6E+6	2.8E+6	2.0E+6	NA
2-Methyl-4,6-dinitrophenol	534521	NA	1,700 {M}	1,700 {M}	NA	1.9E+5	NLV	NLV	NLV	NLV	ID	3.9E+5	7.0E+5	5.1E+5	NA
Methylphenols (J)	1319773	NA	7,400	20,000	1,400	1.6E+7	NLV	NLV	NLV	NLV	2.9E+9	5.6E+7	1.0E+8	7.3E+7	NA
2-Nitrophenol	88755	NA	400	1,200	ID	1.6E+6	NLV	NLV	NLV	NLV	ID	3.1E+6	5.6E+6	4.1E+6	NA
Pentachlorophenol	87865	NA	22	22	{G,X}	4,300	NLV	NLV	NLV	NLV	1.3E+8	3.9E+5	1.7E+6	6.5E+5	NA
Phenol	108952	NA	88,000	2.6E+5	4,200	1.2E+7 {C}	NLV	NLV	NLV	NLV	1.8E+10	1.2E+7 {C,AD}	1.2E+7 {C,AD}	1.2E+7 {C,AD}	1.2E+7
2,4,5-Trichlorophenol	95954	NA	39,000	1.1E+5	NA	9.1E+6	NLV	NLV	NLV	NLV	1.0E+10	1.1E+8	2.0E+8	1.5E+8	NA
2,4,6-Trichlorophenol	88062	NA	2,400	9,400	330 {M}	2.0E+5	NLV	NLV	NLV	NLV	1.3E+9	5.0E+6	9.0E+6	6.6E+6	NA
3-Trifluoromethyl-4-nitrophenol	88302	NA	1.1E+5	3.1E+5	NA	1.2E+8	NLV	NLV	NLV	NLV	ID	3.5E+8 {AD}	7.3E+8 {AD}	4.8E+8 {AD}	NA
<b>MISCELLANEOUS</b>															
Ammonia	7664417	NA	ID {N}	ID {N}	{AC}	ID	ID	ID	ID	ID	2.9E+9	ID	ID	ID	1.0E+7
Asbestos {AB}	1332214	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.0E+7 {M}	ID	ID	ID	NA
Chloride	16887006	NA	5.0E+6	5.0E+6	2.5E+6 {X}	ID	NLV	NLV	NLV	NLV	ID	5.0E+5 {F}	5.0E+5 {F}	5.0E+5 {F}	NA
Cyanide {R}	57125	390 {Total}	4,000 {P}	4,000 {P}	400 {P}	2.5E+5 {P}	NLV	NLV	NLV	NLV	2.5E+5 {P}	2.5E+5 {P}	2.5E+5 {P}	2.5E+5 {P}	NA
Fluorine (soluble fluoride) {B}	7782414	NA	40,000	40,000	NA	2.4E+8	NLV	NLV	NLV	NLV	ID	1.2E+8 {AD}	1.5E+8 {AD}	1.3E+8 {AD}	NA
Nitrate {B,N}	14797558	NA	2.0E+5 {N}	2.0E+5 {N}	NA	1.0E+9 {D}	NLV	NLV	NLV	NLV	ID	ID	ID	ID	NA
Nitrite {B,N}	14797650	NA	20,000 {N}	20,000 {N}	NA	3.8E+8	NLV	NLV	NLV	NLV	ID	ID	ID	ID	NA
Phosphorus (total)	7723140	NA	1.3E+6	4.8E+6	NA	ID	NLV	NLV	NLV	NLV	ID	1.0E+9 {D}	1.0E+9 {D}	1.0E+9 {D}	NA

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Sulfate	14808798	NA	5.0E+6	5.0E+6	NA	ID	NLV	NLV	NLV	NLV	ID	ID	ID	NA	
Urea	57136	NA	ID (N)	ID (N)	NA	ID	NLV	NLV	NLV	NLV	ID	ID	ID	NA	
<b>PBBs</b>															
Polybrominated biphenyls (J)	67774327	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	6,600	17,000	9,600	NA
<b>GLYCOLS</b>															
Diethylene glycol monobutyl ether	112345	NA	1,800	5,000	NA	8.0E+7	NLV	NLV	NLV	NLV	5.9E+8	1.3E+7	2.4E+7	1.7E+7	1.1E+8
Ethylene glycol	107211	NA	3.0E+5	8.4E+5	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	2.9E+10	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Ethylene glycol monobutyl ether	111762	NA	74,000	2.0E+5	NA	4.1E+7 (C)	1.4E+6	2.1E+7	1.5E+8	3.6E+8	3.8E+11	4.1E+7 (C)	4.1E+7 (C)	4.1E+7 (C)	4.1E+7
Propylene glycol	57556	NA	3.0E+6	8.4E+6	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	1.8E+11	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Triethylene glycol	112276	NA	2.0E+5	1.1E+5 (C)	NA	1.1E+5 (C)	NLV	NLV	NLV	NLV	ID	1.1E+5 (C,AD)	1.1E+5 (C,AD)	1.1E+5 (C,AD)	1.1E+5
<b>CARBONYLS</b>															
Acetaldehyde (I)	75070	NA	19,000	54,000	NA	1.1E+8 (C)	4.0E+5	2.1E+5	2.1E+5	2.9E+5	2.6E+8	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Cyclohexanone	108941	NA	5.2E+6	1.5E+7	NA	2.2E+8 (C)	32,000	1.3E+6	ID	ID	2.9E+10	2.2E+8 (C)	2.2E+8 (C)	2.2E+8 (C)	2.2E+8
Formaldehyde	50000	NA	26,000	76,000	2,400	6.0E+7 (C)	65,000	43,000	69,000	1.5E+5	3.0E+8	6.0E+7 (C)	6.0E+7 (C)	6.0E+7 (C)	6.0E+7
<b>LOW MOLECULAR WEIGHT ACIDS</b>															
Acetic acid	64197	NA	9.0E+5 (M)	9.0E+5 (M)	9.0E+5 (M)	6.5E+8 (C)	NLV	NLV	NLV	NLV	7.4E+9	6.4E+8	6.5E+8 (C)	6.5E+8 (C)	6.5E+8
Formic acid (I,U)	64186	NA	9.0E+5 (M)	9.0E+5 (M)	ID	1.1E+8 (C)	2.8E+6	9.0E+5 (M)	9.0E+5 (M)	9.0E+5 (M)	5.9E+7	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8

## Tamarack City Stamp Mill

### GSI and GSIPC Criteria Calculated in Accordance with Footnote {G}

Calculate GSI in ug/L (ppb)									
Hazardous Substance	* ENTER Hardness in mg CaCO3/L	* ENTER pH	FCV Conversion Factor	Final Chronic Value (FCV)	Wildlife Value (WV)	Surface Water Human Non-Drinking Water Value (HNDV)	Surface Water Human Drinking Water Value (HDV)	GSI Criteria for Surface Water Not Protected for Drinking Water Use	GSI Criteria for Surface Water Protected for Drinking Water Use
Barium	50	NA	NA	2.1E+2	NA	1.6E+5	1,900	2.1E+2	2.1E+2
Beryllium	50	NA	NA	4.1E-1	NA	1,200	160	4.1E-1	4.1E-1
Cadmium	50	NA	0.937992957	1.3E+0	NA	130	3	1.3E+0	1.3E+0
Chromium (III)	50	NA	0.86	4.2E+1	NA	9,400	120	4.2E+1	4.2E+1
Copper	50	NA	0.96	5.0E+0	NA	64,000	790	5.0E+0	5.0E+0
Lead	50	NA	0.892009128	4.8E+0	NA	190	14	4.8E+0	4.8E+0
Manganese	50	NA	NA	2.9E+2	NA	59,000	3,600	2.9E+2	2.9E+2
Nickel	50	NA	0.997	2.9E+1	NA	2.1E+5	2,600	2.9E+1	2.9E+1
Zinc	50	NA	0.986	6.6E+1	NA	22,000	4,500	6.6E+1	6.6E+1
Pentachlorophenol	NA	7	NA	6.7E+0	NA	2.8	1.8	2.8E+0	1.8E+0



Applicable criteria

## Tamarack City Stamp Mill

### GSI and GSIPC Criteria Calculated in Accordance with Footnote {G}

Calculate Soil GSI PC in ug/Kg (ppb)								
Hazardous Substance	* ENTER GSI	Soil-Water Distribution Coefficients (Kd) L/Kg	Henry's Law Constant (HLC) atm-m <sup>3</sup> /mol	Soil Organic Carbon-Water Partition Coefficient (Koc) L/Kg	Soil-Water Partition Value for GSI ug/Kg	20 X GSI ug/Kg	Soil GSI PC ug/Kg	Soil GSI PC mg/Kg
Barium	210	41	NA	NA	1.4E+5	4.2E+3	1.4E+5	140
Beryllium	0.41	790	NA	NA	5.2E+3	8.2E+0	5.2E+3	5.2
Cadmium	1.3	75	NA	NA	1.6E+3	2.6E+1	1.6E+3	1.6
Chromium (III)	42	1.8E+6	NA	NA	1.2E+9	8.4E+2	1.2E+9	1,200,000
Copper	5	360	NA	NA	2.9E+4	1.0E+2	2.9E+4	29
Lead	4.8	11,000	NA	NA	8.4E+5	9.6E+1	8.4E+5	840
Manganese	290	NA	NA	NA	NA	5.8E+3	5.8E+3	5.8
Nickel	29	65	NA	NA	3.0E+4	5.8E+2	3.0E+4	30
Zinc	66	62	NA	NA	6.5E+4	1.3E+3	6.5E+4	65
Pentachlorophenol	2.8	NA	2.44E-8	592	2.7E+4	5.6E+1	27,000	



Applicable criteria

## FOOTNOTES

- {A} Criterion is the State of Michigan Drinking Water Standard established pursuant to Section 5 of the Safe Drinking Water Act, Act No. 399 of the Public Acts of 1976.
- {B} Background, as defined in Rule 299.5701(c), may be substituted if higher than the calculated cleanup criteria. Background levels may not exceed criteria for all inorganic compounds.
- {C} Value presented is a screening level based on the chemical-specific generic soil saturation concentration (C<sub>sat</sub>) since the calculated risk-based criterion is greater than C<sub>sat</sub>. Concentrations greater than C<sub>sat</sub> are acceptable cleanup criteria for this pathway where a site-specific demonstration indicates that free-phase contaminant is not present. Consult the Generic Soil Saturation Concentrations: Technical Support Document (August 31, 1998) for further guidance on development of site-specific C<sub>sat</sub> values. Risk-based criteria are available by contacting an ERD toxicologist.
- {D} Calculated criterion exceeds 100%, hence it is reduced to 100% (i.e., 1.0E+9 ppb). Evaluation of free phase contaminant, environmental impacts, adverse aesthetics and acute or local toxicity is required.
- {E} Criterion is the aesthetic drinking water value, as required by Sec. 20120(1)(5). A Notice of Aesthetic Impact may be employed as an institutional control mechanism where groundwater concentrations exceed the aesthetic DWC, but do not exceed the applicable health-based DWC. Health-based DWC are provided in the table below.

Hazardous Substance	CAS #	Residential Health-Based DWC	Industrial-Commercial Health-Based DWC
Aluminum	7429905	300	4,100
Chloride	16887006	ID	ID
Copper	7440508	1,400	4,000
Diethyl ether	60297	3,700	10,000
Ethylbenzene	100414	700	700
Iron	7439896	2,000	5,600
Manganese	7439965	860	2,500
Methyl-tert-butyl ether (MTBE)	1634044	240	690
Sulfate	14808798	ID	ID
Toluene	108883	1,000	1,000
1,2,4-Trimethylbenzene	95636	1,000	2,900
1,3,5-Trimethylbenzene	108678	1,000	2,900
Xylenes	1330207	10,000	10,000

- {F} Criterion is based on adverse impacts to plant life (i.e., phytotoxicity).
- {G} GSI criterion is pH or water hardness dependent. The Final Chronic Value (FCV) for the protection of aquatic life must be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg CaCO<sub>3</sub>/L, use 400 mg CaCO<sub>3</sub>/L for the FCV calculation. The FCV formula provides values in units of ug/L (ppb). The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV) and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 X GSI and the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote.

Hazardous Substance	FCV Formula ug/L	FCV Conversion Factor (CF)	WV ug/L	HNDV ug/L
Barium <sup>o</sup>	EXP(1.0629*(LnH)+1.1869)	NA	NA	1.6E+5
Beryllium	EXP(2.5279*(LnH)-10.7689)	NA	NA	1,200
Cadmium <sup>o</sup>	(EXP(0.7852*(LnH)-2.715))*CF	1.101672-((LnH)*0.04184)	NA	130
Chromium (III) <sup>o</sup>	(EXP(0.819*(LnH)+0.6848))*CF	0.86	NA	9,400
Copper	(EXP(0.8545*(LnH)-1.702)) *CF	0.96	NA	64,000

Hazardous Substance	FCV Formula ug/L	FCV Conversion Factor (CF)	WV ug/L	HNDV ug/L
Lead <sup>⊗</sup>	$(EXP(1.273*(LnH)-3.296))*CF$	$1.46203-((LnH)*0.14571)$	NA	190
Manganese	$EXP(0.8784*(LnH)+2.226)$	NA	NA	59,000
Nickel	$(EXP(0.846*(LnH)+0.0584))*CF$	0.997	NA	2.1E+5
Pentachlorophenol <sup>⊗</sup>	$EXP(1.005*(pH)-5.134)$	NA	NA	2.8
Zinc	$(EXP(0.8473*(LnH)+0.884))*CF$	0.986	NA	22,000

Where,

- EXP(x) = The base of the natural logarithm raised to power x ( $e^x$ ).
- LnH = The natural logarithm of water hardness in mg  $CaCO_3/L$ .
- SS = Total suspended solids in mg/L
- \* = The multiplication symbol.
- ⊗ = The GSI criterion developed here may not be protective for surface water that is used as a drinking water source. Refer to footnote {X} for further guidance.

A spreadsheet that may be used to calculate GSI and GSI PC for {G} footnoted hazardous substances is available at <http://www.deq.state.mi.us/erd>.

- {H} Valence-specific chromium data (Cr III and Cr VI) must be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the DWC of 100 ug/l. If analytical data are provided for "total" chromium only, then values for Cr VI must be applied as the cleanup criteria. Cr III cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future.
- {I} Hazardous substance may exhibit the characteristic of ignitability as defined in 40 CFR 261.21.
- {J} Hazardous substance may be present in several isomer forms. Isomer-specific concentrations must be added together for comparison to criteria.
- {K} Hazardous substance may be flammable and/or explosive.
- {L} Reserved
- {M} Calculated criterion is below the analytical Target Detection Limit (TDL), therefore, the criterion defaults to the TDL.
- {N} The concentrations of all potential sources of nitrate-nitrogen (e.g., ammonia-N, nitrite-N, nitrate-N) in groundwater used as a source of drinking water must not, when added together, exceed the nitrate DWC of 10,000 ug/L. Where leaching to groundwater is a relevant pathway, soil concentrations of all potential sources of nitrate-nitrogen must not, when added together, exceed the nitrate DWPC of 2.0E+5 ug/Kg.
- {O} All polychlorinated and polybrominated dibenzodioxins and dibenzofurans are considered as one hazardous substance. The concentration of all isomers present at a facility, expressed as an equivalent concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin based upon their relative potency, must be added together and compared to the criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin. The generic criteria revisions have not been incorporated into the criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin, therefore the criteria listed is the same as shown in the May 28, 1999 criteria tables.
- {P} Amenable or Method OIA-1677 analysis are used to quantify cyanide concentrations for compliance with all groundwater criteria. Total, amenable, or Method OIA-1677 analysis may be used to quantify cyanide concentrations for compliance with soil criteria. Industrial/commercial DCC may not be protective of the potential for release of hydrogen cyanide (HCN) gas. Additional land use restrictions may be necessary to protect for the acute inhalation concerns associated with HCN.



- {Q} Criteria for carcinogenic polycyclic aromatic hydrocarbons (PAHs) were developed using "relative potential potencies" (RPPs) to benzo(a)pyrene.
- {R} Hazardous substance may exhibit the characteristic of reactivity as defined in 40 CFR 261.23.
- {S} Criterion defaults to the chemical-specific water solubility limit.
- {T} Refer to the Toxic Substances Control Act (TSCA), 40 CFR 761, Subparts D and G, as amended, to determine the applicability of TSCA cleanup standards. Alternatives to compliance with the standards listed below are possible under Subpart D. New releases may be subject to the standards identified in Subpart G. Use Part 201 soil direct contact criteria in the table below where TSCA standards are not applicable.

LAND USE CATEGORY	TSCA, Subpart D	PART 201
Residential & Commercial I	1,000 ppb, or 10,000 ppb if capped	4,000 ppb
Industrial & Commercial II	1,000 ppb, or 10,000 ppb if capped	20,000 ppb
Commercial III	1,000 ppb, or 10,000 ppb if capped	62,000 ppb
Commercial IV	1,000 ppb, or 10,000 ppb if capped	32,000 ppb

- {U} Hazardous substance may exhibit the characteristic of corrosivity as defined in 40 CFR 261.22.
- {V} Criterion is the aesthetic drinking water value (secondary maximum contaminant level), as required by Sec. 20120(a)(5). Higher concentrations (up to 200 ug/L) may be acceptable on a case-by-case basis.
- {W} Concentrations of trihalomethanes in groundwater must be added together to determine compliance with the State of Michigan Drinking Water Standard of 100 ug/L. Concentrations of trihalomethanes in soil must be added together to determine compliance with the DWPC of 2,000 ug/kg.
- {X} The GSI criterion shown is not protective for surface water that is used as a drinking water source. For groundwater discharges to the Great Lakes and their connecting waters or discharges in close proximity to water supply intake(s) in inland surface waters, the generic GSI criterion is the Surface Water Human Drinking Water Value (HDV) listed in the table below except for those HDV indicted with an asterisk. For HDV with an asterisk, the generic GSI criterion is the lesser of the HDV, the WV and the calculated FCV (see formulas in footnote (G)). Soil GSI protection criteria based on the HDV are listed below except for those values with an asterisk. Soil GSI protection criteria for compounds with an asterisk are the greater of the 20 X GSI and the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote.

Hazardous Substance	Chemical Abstract Service Number	Surface Water Human Drinking Water Values (HDV) (ug/L)	Soil GSI Protection Criteria for HDV (ug/Kg)
Acrylonitrile	107131	0.87	17
Alachlor	15972608	3.5	70
Arsenic	7440382	50	16,000
Atrazine	1912249	4.3	86
Barium	7440393	1,900*	*
Benzene	71432	12	240
Butyl benzyl phthalate	85687	6.9	1,300
Cadmium	7440439	2.5*	*
Carbon tetrachloride	56235	5.6	110
Chloride	16887006	50,000	1.0E+6
Chloroform	67663	77	1,500
Chromium (III)	16065831	120*	*
Cyanazine	21725462	10 {M}	200
3,3'-Dichlorobenzidine	91941	0.3 {M}	500
1,2-Dichloroethane	107062	6	120
1,1-Dichloroethylene	75354	24	480
1,2-Dichloropropane	78875	9.1	180
N,N-Dimethylacetamide	127195	700	14,000
1,4-Dioxane	123911	34	680
Ethylene glycol	107211	56,000	1.1E+6
Hexachloroethane	67721	5.3	1,500
Isophorone	78591	310	6,200
Lead	7439921	14*	*
Methyl-tert-butyl ether (MTBE)	1634044	120	2,400
Methylene chloride	75092	47	940
Molybdenum	7439987	120	2,400
Nitrobenzene	98953	4.7	94
Pentachlorophenol	87865	1.8*	*
1,2,4,5-Tetrachlorobenzene	95943	2.8	3,300
1,1,2,2-Tetrachloroethane	79345	3.2	64
Tetrachloroethylene	127184	11	220
Tetrahydrofuran	109999	350	7,000
Thallium	7440280	1.2	910
1,1,2-Trichloroethane	79005	12	240
Trichloroethylene	79016	29	580

{Y} Source size modifiers for Soil Inhalation Criteria (SIC) for Ambient Air. Consult the Technical Support Document (TSD) for the SIC if further guidance is needed.

Source Size sq. feet or acres	Modifier
400 sq feet	3.17
1000 sq feet	2.2
2000 sq feet	1.76
1/2 acre	1
1 acre	0.87
5 acre	0.66
10 acre	0.6
32 acre	0.5
100 acre	0.43

{Z} The current TDL for mercury is 0.2 ppb, however, a TDL of 5.0E-4 using U.S. EPA Method 1631, will be required after September 30, 2000.

{AA} Filtered groundwater samples must be collected for appropriate comparison to the GCC, since these hazardous substances are likely to be adsorbed to particulates rather than dissolved in water.

- {AB} The state drinking water standard for asbestos is in units of fibers per milliliter of water (f/mL) longer than 10 millimicrons. Soil concentrations of asbestos are determined by polarized light microscopy (PLM).
- {AC} The GSI criteria for unionized ammonia are 29 ug/L and 53 ug/L for coldwater and warmwater streams, respectively. The unionized ammonia concentration for comparison to the GSI is calculated from the measured total ammonia concentration based on pH and temperature for the receiving surface water and the discharge plume. The soil GSI PC are 580 ug/Kg and 1,100 ug/Kg for coldwater and warmwater streams, respectively.
- {AD} Hazardous substance causes developmental effects. Residential and Commercial I DCC are protective of both prenatal and postnatal exposure. Industrial and Commercial II, III and IV DCC are protective for an adult pregnant receptor.
- {AE} The following are applicable generic GSI criteria as allowed for under Sec. 20120a(15).

Hazardous Substance	GSI (ug/L)	Notes
Phosphorus	1,000	If the discharge is to an inland lake or a surface water with a designated phosphorus waste load allocation, consult the ERD Field Operation Section for further guidance.
Total dissolved solids (TDS)	5.0E+5	If TDS data are not available, the TDS criterion may be used a screening level for the sum of the concentrations of the following substances: Calcium, Chlorides, Iron, Magnesium, Potassium, Sodium, Sulfate.
Dissolved Oxygen (DO): Cold receiving waters Warm receiving waters	≥ 7,000 ≥ 5,000	DO criteria are not applicable if groundwater Carbonaceous Biochemical Oxygen Demand (CBOD) is less than 10,000 ug/L and groundwater ammonia concentration is less than 2,000 ug/L. Consult the ERD Field Operation Section for further guidance if needed.

ID = *Inadequate data* to develop criterion.

IP = Development of generic GSI value *in process*. This notation is used for those hazardous substances on the Rule 57 Water Quality Values table where the NLS (no literature search) notation is indicated for one or more of the endpoints required for development of a generic GSI. Additional work needed to address these endpoints may either be underway, or not yet initiated by the Surface Water Quality Division.

NA = Criterion or value is *not available* or, as is the case for Csat, *not applicable*.

NLL = Hazardous substance is *not likely to leach* under most soil conditions.

NLV = Hazardous substance is *not likely to volatilize* under most conditions.