BASELINE PUBLIC HEALTH RISK ASSESSMENT SPREADSHEETS

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C-1 TOXICITY SCREENING TABLES

TABLE C.1-1
CONTAMINANT SCREEN
ON-SITE FACILITY SURFACE SOIL
OLIN CHEMICALS PHASE 1 RI REPORT

OSSS-SC	31-Aug-94

COMPOUND	REFERENCE DOSE[1] (mg/kg/day)	SLOPE FACTOR[1] (mg/kg/day)$^{-1}$	WEIGHT OF EVIDENCE[1]	MAXIMUM CONCENTRATION (mg/kg)	RiNC	RiC	ERiNC	ERiC
2,6-Dichloropyridine	1.0E-03		ND	0.56	5.60E+02		7.06E-04	
2-Chloropyridine	1.0E-03		ND	0.62	6.20E+02		7.82E-04	
3-Chloropyridine	1.0E-03		ND	0.069	6.90E+01		8.70E-05	
2-Methylnaphthalene	3.0E-02		ND	0.54	1.80E+01		2.27E-05	
4-Methylphenol	5.0E-03	ND	C	0.02	4.00E+00		5.04E-06	
Acenaphthylene	3.0E-02		ND	0.087	2.90E+00		3.66E-06	
Acenaphthene	6.0E-02		P	3.9	6.50E+01		8.20E-05	
Anthracene	3.0E-01		D	10	3.33E+01		4.20E-05	
Arsenic	3.0E-04	1.75E+00	A	4.8	1.60E+04	8.40E+00	2.02E-02 *	2.74E-02 *
Barium	7.0E-02		ND	210	3.00E+03		3.78E-03	
Benzo(a)anthracene	3.0E-02	7.3E-01	B2	34	1.13E+03	2.48E+01	1.43E-03	8.09E-02 *
Benzo(a)pyrene	3.0E-02	7.3E+00	B2	27	9.00E+02	1.97E+02	1.13E-03	6.42E-01 *
Benzo(b)fluoranthene	3.0E-02	7.3E-01	B2	35	1.17E+03	2.56E+01	1.47E-03	8.32E-02 *
Benzo(g,h,i)perylene	3.0E-02		D	11	3.67E+02		4.62E-04	
Benzo(k)fluoranthene	3.0E-02	7.3E-01	B2	22	7.33E+02	1.61E+01	9.25E-04	5.23E-02 *
Bis(2-ethylhexyl)phthalate	2.0E-02	1.4E-02	B2	4.4	2.20E+02	6.16E-02	2.77E-04	2.01E-04
Cadmium	5.0E-04	ND	B1	1.8	3.60E+03		4.54E-03	
Carbazole	ND	2.0E-02	B2	6.7		1.34E-01		4.37E-04
Chloroform	1.0E-02	6.1E-04	B2	0.001	1.00E-01	6.10E-07	1.26E-07	1.99E-09
Chromium	5.0E-03	ND	A	180	3.60E+04		4.54E-02 *	
Chrysene	3.0E-02	7.3E-02	B2	37	1.23E+03	2.70E+00	1.56E-03	8.80E-03
Cobalt	ND		ND	15				
Copper	3.7E-02		D	56	1.51E+03		1.91E-03	
Dibenzofuran	ND		D	2.3				
Dibenzo(a,h)anthracene	3.0E-02	7.3E+00	B2	2.9	9.67E+01	2.12E+01	1.22E-04	6.90E-02 *
Dimethylphthalate	1.0E+01		D	4.6	4.60E-01		5.80E-07	
Di-n-butyl phthalate	1.0E-01		D	0.36	3.60E+00		4.54E-06	
Fluoranthene	4.0E-02		D	74	1.85E+03		2.33E-03	
Fluorene	4.0E-02		D	4.8	1.20E+02		1.51E-04	
Hexachlorobutadiene	ND	7.8E-02	C	0.059		4.60E-03		1.50E-05
Hexachloroethane	1.0E-03	1.4E-02	C	0.029	2.90E+01	4.06E-04	3.66E-05	1.32E-06
Indeno(1,2,3-cd)pyrene	3.0E-02	7.3E-01	B2	15	5.00E+02	1.09E+01	6.30E-04	3.57E-02 *
Lead	ND	ND	B2	530				
Manganese	1.4E-01		ND	1200	8.57E+03		1.08E-02 *	
Mercury	3.0E-04		D	210	7.00E+05		8.83E-01 *	
Naphthalene	3.0E-02		D	0.37	1.23E+01		1.56E-05	
Nickel	2.0E-02		ND	50	2.50E+03		3.15E-03	
Phenanthrene	3.0E-02		D	48	1.60E+03		2.02E-03	
Pyrene	3.0E-02		D	62	2.07E+03		2.61E-03	
Pyridine	1.0E-03		ND	0.11	1.10E+02		1.39E-04	
Silver	5.0E-03		D	0.6	1.20E+02		1.51E-04	
Vanadium	7.0E-03		ND	43	6.14E+03		7.75E-03	
Zinc	3.0E-01		D	640	2.13E+03		2.69E-03	
SUM all RI VALUES					**7.93E+05**	**3.07E+02**		

NOTES:
[1] - see Dose-Response Tables in Appendix D.2
RiNC = Noncarcinogenic risk value (i.e., Maximum concentration / Reference Dose)
RiC = Carcinogenic risk value (i.e., Maximum concentration x Slope Factor)
ERiNC = Proportion of contribution to total noncarcinogenic risk
ERiC = Percentage of contribution to carcinogenic risk
* - Contribution of compound to total risk exceeds 0.01 cutoff level; compound will be evaluated quantitatively

TABLE C.1-2
CONTAMINANT SCREEN
ONSITE NON-FACILITY SURFACE SOIL
OLIN CHEMICALS PHASE I RI REPORT

NPSS-SC | 31-Aug-94

COMPOUND	REFERENCE DOSE[1] (mg/kg/day)	SLOPE FACTOR[1] (mg/kg/day)$^{-1}$	WEIGHT OF EVIDENCE[1]	MAXIMUM CONCENTRATION (mg/kg)	RiNC	RiC	ERiNC	ERiC
1,2,4-Trichlorobenzene	1.0E-03		D	0.022	2.20E+01		2.44E-04	
2-Methylnaphthalene	3.0E-02		ND	0.087	2.90E+00		3.21E-05	
2,6-Dichloropyridine	1.0E-03		ND	0.17	1.70E+02		1.88E-03	
2-Chloropyridine	1.0E-03		ND	0.57	5.70E+02		6.31E-03	
3-Chloropyridine	1.0E-03		ND	0.063	6.30E+01		6.98E-04	
Acenaphthylene	3.0E-02		ND	0.17	5.67E+00		6.28E-05	
Acenaphthene	6.0E-02		P	0.27	4.50E+00		4.99E-05	
Anthracene	3.0E-01		D	0.48	1.60E+00		1.77E-05	
Arsenic	3.0E-04	1.75E+00	A	12	4.00E+04	2.10E+01	4.43E-01 *	6.04E-01 *
Barium	7.0E-02		ND	110	1.57E+03		1.74E-02 *	
Benzo(a)anthracene	3.0E-02	7.3E-01	B2	1.6	5.33E+01	1.17E+00	5.91E-04	3.36E-02 *
Benzo(a)pyrene	3.0E-02	7.3E+00	B2	1.2	4.00E+01	8.76E+00	4.43E-04	2.52E-01 *
Benzo(b)fluoranthene	3.0E-02	7.3E-01	B2	2	6.67E+01	1.46E+00	7.39E-04	4.20E-02 *
Benzo(g,h,i)perylene	3.0E-02		D	0.22	7.33E+00		8.12E-05	
Benzo(k)fluoranthene	3.0E-02	7.3E-01	B2	1.3	4.33E+01	9.49E-01	4.80E-04	2.73E-02 *
Bis(2-ethylhexyl)phthalate	2.0E-02	1.4E-02	B2	9.5	4.75E+02	1.33E-01	5.26E-03	3.83E-03
Cadmium	5.0E-04	ND	B1	0.8	1.60E+03		1.77E-02 *	
Carbazole	ND	2.0E-02	B2	0.33		6.60E-03		1.90E-04
Chloroform	1.0E-02	6.1E-03	B2	0.0005	5.00E-02	3.05E-06	5.54E-07	8.78E-08
Chromium	5.0E-03	ND	A	150	3.00E+04		3.32E-01 *	
Chrysene	3.0E-02	7.3E-02	B2	1.5	5.00E+01	1.10E-01	5.54E-04	3.15E-03
Cobalt	ND		ND	7.1				
Copper	3.7E-02		D	48	1.30E+03		1.44E-02 *	
Dibenzofuran	ND		D	0.15				
Dibenzo(a,h)anthracene	3.0E-02	7.3E+00	B2	0.11	3.67E+00	8.03E-01	4.06E-05	2.31E-02 *
Di-n-butyl phthalate	1.0E-01		D	0.33	3.30E+00		3.66E-05	
Di-n-octylphthalate	2.0E-02		ND	0.43	2.15E+01		2.38E-04	
Fluoranthene	4.0E-02		D	2.8	7.00E+01		7.75E-04	
Fluorene	4.0E-02		D	0.27	6.75E+00		7.48E-05	
Hexachlorobenzene	8.0E-04	1.6E+00	B2	0.039	4.88E+01	6.24E-02	5.40E-04	1.80E-03
Indeno(1,2,3-cd)pyrene	3.0E-02	7.3E-01	B2	0.4	1.33E+01	2.92E-01	1.48E-04	8.40E-03
Manganese	1.4E-01		ND	760	5.43E+03		6.01E-02 *	
Mercury	3.0E-04		D	0.4	1.33E+03		1.48E-02 *	
Naphthalene	3.0E-02		D	0.061	2.03E+00		2.25E-05	
Nickel	2.0E-02		ND	62	3.10E+03		3.43E-02 *	
Phenanthrene	3.0E-02		D	1.9	6.33E+01		7.02E-04	
Pyrene	3.0E-02		D	3	1.00E+02		1.11E-03	
Pyridine	1.0E-03		ND	0.074	7.40E+01		8.20E-04	
Selenium	5.0E-03		D	0.8	1.60E+02		1.77E-03	
Silver	5.0E-03		D	0.7	1.40E+02		1.55E-03	
Vanadium	7.0E-03		ND	20	2.86E+03		3.17E-02 *	
Zinc	3.0E-01		D	240	8.00E+02		8.86E-03	
SUM all RI VALUES					**9.05E+04**	**3.47E+01**		

NOTES:
[1] - see Dose-Response Tables in Appendix D.2
RiNC = Noncarcinogenic risk value (i.e., Maximum concentration / Reference Dose)
RiC = Carcinogenic risk value (i.e., Maximum concentration x Slope Factor)
ERiNC = Proportion of contribution to total noncarcinogenic risk
ERiC = Percentage of contribution to carcinogenic risk
* - Contribution of compound to total risk exceeds 0.01 cutoff level; compound will be evaluated quantitatively

TABLE C.1-3
CONTAMINANT SCREEN
ONSITE SOIL 0-10 feet bgs
OLIN CHEMICALS PHASE I RI REPORT

SUBS-SC | 31-Aug-94

COMPOUND	REFERENCE DOSE[1] (mg/kg/day)	SLOPE FACTOR[1] (mg/kg/day)$^{-1}$	WEIGHT OF EVIDENCE[1]	MAXIMUM CONCENTRATION (mg/kg)	RiNC	RiC	ERiNC	ERiC
2,6-Dichloropyridine	1.0E-03		ND	3.1	3.10E+03		3.68E-03	
2-Chloropyridine	1.0E-03		ND	12	1.20E+04		1.42E-02 *	
3-Chloropyridine	1.0E-03		ND	2.9	2.90E+03		3.44E-03	
1,2,4-Trichlorobenzene	1.0E-03		D	0.024	2.40E+01		2.85E-05	
1,2-Dichloroethene (cis and trans)	9.0E-03		D	0.009	1.00E+00		1.19E-06	
1,2-Dichloropropane	ND	6.8E-02	B2	0.007		4.76E-04		1.49E-06
2-Butanone (Methyl Ethyl Ketone)	6.0E-01		D	0.036	6.00E-02		7.11E-08	
2-Methylnaphthalene	3.0E-02		ND	0.54	1.80E+01		2.13E-05	
4-Methylphenol	5.0E-03	ND	C	0.31	6.20E+01		7.35E-05	
Acenaphthylene	3.0E-02		ND	0.17	5.67E+00		6.72E-06	
Acenaphthene	6.0E-02		P	3.9	6.50E+01		7.71E-05	
Acetone	1.0E-01		D	0.13	1.30E+00		1.54E-06	
Anthracene	3.0E-01		D	10	3.33E+01		3.95E-05	
Arsenic	3.0E-04	1.75E+00	A	12	4.00E+04	2.10E+01	4.74E-02 *	6.57E-02 *
Barium	7.0E-02		ND	210	3.00E+03		3.56E-03	
Benzene	ND	2.9E-02	A	0.009		2.61E-04		8.16E-07
Benzo(a)anthracene	3.0E-02	7.3E-01	B2	34	1.13E+03	2.48E+01	1.34E-03	7.76E-02 *
Benzo(a)pyrene	3.0E-02	7.3E+00	B2	27	9.00E+02	1.97E+02	1.07E-03	6.16E-01 *
Benzo(b)fluoranthene	3.0E-02	7.3E-01	B2	35	1.17E+03	2.56E+01	1.38E-03	7.99E-02 *
Benzo(g,h,i)perylene	3.0E-02		D	11	3.67E+02		4.35E-04	
Benzo(k)fluoranthene	3.0E-02	7.3E-01	B2	22	7.33E+02	1.61E+01	8.69E-04	5.02E-02 *
Bis(2-ethylhexyl)phthalate	2.0E-02	1.4E-02	B2	9.5	4.75E+02	1.33E-01	5.63E-04	4.16E-04
Cadmium	5.0E-04	ND	B1	1.8	3.60E+03		4.27E-03	
Carbazole	ND	2.0E-02	B2	6.7		1.34E-01		4.19E-04
Carbon Disulfide	1.0E-01		ND	0.003	3.00E-02		3.56E-08	
Chlorobenzene	2.0E-02		D	0.038	1.90E+00		2.25E-06	
Chloroform	1.0E-02	6.1E-03	B2	0.57	5.70E+01	3.48E-03	6.76E-05	1.09E-05
Chromium	5.0E-03	ND	A	180	3.60E+04		4.27E-02 *	
Chrysene	3.0E-02	7.3E-02	B2	37	1.23E+03	2.70E+00	1.46E-03	8.44E-03
Cobalt	ND		ND	15				
Copper	3.7E-02		D	56	1.51E+03		1.79E-03	
Dibenzofuran	ND		D	2.3				
Dibenzo(a,h)anthracene	3.0E-02	7.3E+00	B2	2.9	9.67E+01	2.12E+01	1.15E-04	6.62E-02 *
Dimethylphthalate	1.0E+01		D	4.6	4.60E-01		5.45E-07	
Di-n-butyl phthalate	1.0E-01		D	0.36	3.60E+00		4.27E-06	
Di-n-octylphthalate	2.0E-02		ND	0.43	2.15E+01		2.55E-05	
Ethylbenzene	1.0E-01		D	0.0004	4.00E-03		4.74E-09	
Fluoranthene	4.0E-02		D	74	1.85E+03		2.19E-03	
Fluorene	4.0E-02		D	4.8	1.20E+02		1.42E-04	
Hexachlorobenzene	8.0E-04	1.6E+00	B2	0.039	4.88E+01	6.24E-02	5.78E-05	1.95E-04
Hexachlorobutadiene	ND	7.8E-02	C	1.8		1.40E-01		4.39E-04
Hexachloroethane	1.0E-03	1.4E-02	C	0.029	2.90E+01	4.06E-04	3.44E-05	1.27E-06
Indeno(1,2,3-cd)pyrene	3.0E-02	7.3E-01	B2	15	5.00E+02	1.09E+01	5.93E-04	3.42E-02 *
Lead	ND	ND	B2	530				
Manganese	1.4E-01		ND	1200	8.57E+03		1.02E-02 *	
Mercury	3.0E-04		D	210	7.00E+05		8.30E-01 *	
Methylene Chloride	6.0E-02	7.5E-03	B2	0.11	1.83E+00	8.25E-04	2.17E-06	2.58E-06
Naphthalene	3.0E-02		D	0.37	1.23E+01		1.46E-05	
Nickel	2.0E-02		ND	62	3.10E+03		3.68E-03	
Phenanthrene	3.0E-02		D	48	1.60E+03		1.90E-03	
Pyrene	3.0E-02		D	62	2.07E+03		2.45E-03	
Pyridine	1.0E-03		ND	8.4	8.40E+03		9.96E-03	
Selenium	5.0E-03		D	0.8	1.60E+02		1.90E-04	
Silver	5.0E-03		D	0.7	1.40E+02		1.66E-04	
Tetrachloroethene	1.0E-02	5.2E-02	B2	0.24	2.40E+01	1.25E-02	2.85E-05	3.90E-05
Toluene	2.0E-01		D	0.007	3.50E-02		4.15E-08	
Trichloroethene	ND	1.1E-02	B2	0.009		9.90E-05		3.10E-07
Vanadium	7.0E-03		ND	43	6.14E+03		7.28E-03	
Xylenes (total)	2.0E+00		D	0.002	1.00E-03		1.19E-09	
Zinc	3.0E-01		D	640	2.13E+03		2.53E-03	
SUM all RI VALUES					**8.43E+05**	**3.20E+02**		

NOTES:
[1] - see Dose-Response Tables in Appendix D.2
RiNC = Noncarcinogenic risk value (i.e., Maximum concentration / Reference Dose)
RiC = Carcinogenic risk value (i.e., Maximum concentration x Slope Factor)
ERiNC = Proportion of contribution to total noncarcinogenic risk
ERiC = Percentage of contribution to carcinogenic risk
* - Contribution of compound to total risk exceeds 0.01 cutoff level; compound will be evaluated quantitatively

TABLE C.1-4
CONTAMINANT SCREEN
ONSITE OVERBURDEN GROUNDWATER
OLIN CHEMICALS PHASE I RI REPORT

GWOON-SC	31-Aug-94

COMPOUND	REFERENCE DOSE[1] (mg/kg/day)	SLOPE FACTOR[1] $(mg/kg/day)^{-1}$	WEIGHT OF EVIDENCE[1]	MAXIMUM CONCENTRATION (mg/kg)	RiNC	RiC	ERiNC	ERiC
1,2,4-Trichlorobenzene	1.0E-03		D	1.4	1.40E+03		2.33E-03	
1,1-Dichloroethene	9.0E-03	1.2E+00	C	0.002	2.22E-01	2.40E-03	3.69E-07	1.69E-04
1,2-Dichlorobenzene	9.0E-02		D	2.4	2.67E+01		4.43E-05	
1,2-Dichloroethene (cis and trans)	9.0E-03		D	0.028	3.11E+00		5.17E-06	
1,3-Dichlorobenzene	ND		D	0.063				
1,4-Dichlorobenzene	ND	2.4E-02	B2	0.12		2.88E-03		2.03E-04
2,6-Dichloropyridine	1.0E-03		ND	44	4.40E+04		7.31E-02 *	
2-Chloropyridine	1.0E-03		ND	400	4.00E+05		6.64E-01 *	
3-Chloropyridine	1.0E-03		ND	18	1.80E+04		2.99E-02 *	
4-Chloropyridine	1.0E-03		ND	1.3	1.30E+03		2.16E-03	
2-Butanone (Methyl Ethyl Ketone)	6.0E-01		D	0.042	7.00E-02		1.16E-07	
2-Methylnaphthalene	3.0E-02		ND	0.046	1.53E+00		2.55E-06	
4,4-DDT	5.0E-04	3.4E-01	B2	0.0001	2.00E-01	3.40E-05	3.32E-07	2.39E-06
4-Chloroaniline	4.0E-03		ND	1.2	3.00E+02		4.98E-04	
4-Methylphenol	5.0E-03	ND	C	0.12	2.40E+01		3.99E-05	
4-Methyl-2-Pentanone	2.0E-02		ND	0.07	3.50E+00		5.81E-06	
Acenaphthene	6.0E-02		P	0.042	7.00E-01		1.16E-06	
Acetone	1.0E-01		D	0.33	3.30E+00		5.48E-06	
Aldrin	3.0E-05	1.7E+01	B2	0.0001	3.33E+00	1.70E-03	5.54E-06	1.20E-04
beta-BHC	ND	1.8E+00	C	0.3		5.40E-01		3.80E-02 *
Anthracene	3.0E-01		D	0.16	5.33E-01		8.86E-07	
Antimony	4.0E-04		ND	0.009	2.25E+01		3.74E-05	
Arsenic	3.0E-04	1.75E+00	A	0.92	3.07E+03	1.61E+00	5.09E-03	1.13E-01 *
Barium	7.0E-02		ND	8.6	1.23E+02		2.04E-04	
Benzene	ND	2.9E-02	A	0.062		1.80E-03		1.27E-04
Benzo(a)anthracene	3.0E-02	7.3E-01	B2	0.41	1.37E+01	2.99E-01	2.27E-05	2.11E-02 *
Benzo(a)pyrene	3.0E-02	7.3E+00	B2	0.34	1.13E+01	2.48E+00	1.88E-05	1.75E-01 *
Benzo(b)fluoranthene	3.0E-02	7.3E-01	B2	0.47	1.57E+01	3.43E-01	2.60E-05	2.42E-02 *
Benzo(g,h,i)perylene	3.0E-02		D	0.045	1.50E+00		2.49E-06	
Benzo(k)fluoranthene	3.0E-02	7.3E-01	B2	0.19	6.33E+00	1.39E-01	1.05E-05	9.77E-03
Benzoic Acid	4.0E+00		D	0.068	1.70E-02		2.82E-08	
Beryllium	5.0E-03	4.3E+00	B2	0.029	5.80E+00	1.25E-01	9.63E-06	8.78E-03
Bis(2-chloroethyl)ether	ND	1.1E+00	B2	0.69		7.59E-01		5.34E-02 *
Bis(2-ethylhexyl)phthalate	2.0E-02	1.4E-02	B2	0.34	1.70E+01	4.76E-03	2.82E-05	3.35E-04
Bromoform	2.0E-02	7.9E-03	B2	0.54	2.70E+01	4.27E-03	4.48E-05	3.00E-04
Cadmium	5.0E-04	ND	B1	0.11	2.20E+02		3.65E-04	
Carbon Disulfide	1.0E-01		ND	1.9	1.90E+01		3.16E-05	
Carbon Tetrachloride	7.0E-04	1.3E-01	B2	17	2.43E+04	2.21E+00	4.03E-02 *	1.56E-01 *
Chlorobenzene	2.0E-02		D	2.5	1.25E+02		2.08E-04	
Chloroform	1.0E-02	8.1E-02	B2	50	5.00E+03	4.05E+00	8.30E-03	2.85E-01 *
Chromium	5.0E-03	ND	A	2.3	4.60E+02		7.64E-04	
Chrysene	3.0E-02	7.3E-02	B2	0.33	1.10E+01	2.41E-02	1.83E-05	1.70E-03
Cobalt	ND		ND	0.45				
Copper	3.7E-02		D	3.6	9.73E+01		1.62E-04	
Cyanide	2.0E-02		D	0.084	4.20E+00		6.98E-06	
Dibenzo(a,h)anthracene	3.0E-02	7.3E+00	B2	0.019	6.33E-01	1.39E-01	1.05E-06	9.77E-03
Dieldrin	5.0E-05	1.6E+01	B2	0.007	1.40E+02	1.12E-01	2.33E-04	7.89E-03
Endosulfan I	6.0E-03		ND	0.26	4.33E+01		7.20E-05	
Ethylbenzene	1.0E-01		D	0.051	5.10E-01		8.47E-07	
Fluoranthene	4.0E-02		D	0.99	2.48E+01		4.11E-05	
Fluorene	4.0E-02		D	0.061	1.52E+00		2.53E-06	
gamma-BHC (Lindane)	3.0E-04	1.3E+00	B2-C	0.042	1.40E+02	5.46E-02	2.33E-04	3.84E-03
Heptachlor Epoxide	1.3E-05	9.1E+00	B2	0.015	1.15E+03	1.36E-01	1.92E-03	9.61E-03
Indeno(1,2,3-cd)pyrene	3.0E-02	7.3E-01	B2	0.069	2.30E+00	5.04E-02	3.82E-06	3.55E-03
Lead	ND	ND	B2	2.7				
Manganese	1.4E-01		ND	56	4.00E+02		6.64E-04	
Mercury	3.0E-04		D	0.63	2.10E+03		3.49E-03	
Methylene Chloride	6.0E-02	7.5E-03	B2	35	5.83E+02	2.63E-01	9.69E-04	1.85E-02 *
Naphthalene	3.0E-02		D	0.006	2.00E-01		3.32E-07	
Nickel	2.0E-02		ND	1.8	9.00E+01		1.49E-04	
Phenanthrene	3.0E-02		D	0.3	1.00E+01		1.66E-05	
Phenol	6.0E-01		D	0.25	4.17E-01		6.92E-07	
Pyrene	3.0E-02		D	0.66	2.20E+01		3.65E-05	
Pyridine	1.0E-03		ND	98	9.80E+04		1.63E-01 *	
Selenium	5.0E-03		D	0.004	8.00E-01		1.33E-06	
Silver	5.0E-03		D	0.056	1.12E+01		1.86E-05	
Tetrachloroethene	1.0E-02	5.2E-02	B2	2	2.00E+02	1.04E-01	3.32E-04	7.32E-03
Toluene	2.0E-01		D	4.6	2.30E+01		3.82E-05	
Trichloroethene	ND	1.1E-02	B2	0.39		4.29E-03		3.02E-04
Vanadium	7.0E-03		ND	3.4	4.86E+02		8.07E-04	
Xylenes (total)	2.0E+00		D	0.12	6.00E-02		9.97E-08	
Vinyl Chloride	ND	1.9E+00	A	0.39		7.41E-01		5.22E-02 *
Zinc	3.0E-01		D	22	7.33E+01		1.22E-04	
SUM all RI VALUES					**6.02E+05**	**1.42E+01**		

NOTES:
[1] - see Dose-Response Tables in Appendix D.2
RiNC = Noncarcinogenic risk value (i.e., Maximum concentration / Reference Dose)
RiC = Carcinogenic risk value (i.e., Maximum concentration x Slope Factor)
ERiNC = Proportion of contribution to total noncarcinogenic risk
ERiC = Percentage of contribution to carcinogenic risk
* - Contribution of compound to total risk exceeds 0.01 cutoff level; compound will be evaluated quantitatively

TABLE C.1-5
CONTAMINANT SCREEN
OVERBURDEN GROUNDWATER OFF-SITE
OLIN CHEMICALS PHASE I RI REPORT

COMPOUND	REFERENCE DOSE[1] (mg/kg/day)	SLOPE FACTOR[1] (mg/kg/day)$^{-1}$	WEIGHT OF EVIDENCE[1]	MAXIMUM CONCENTRATION (mg/kg)	RiNC	RiC	ERiNC	ERiC
1,2,4-Trichlorobenzene	1.0E-03		D	0.006	6.00E+00		7.01E-05	
1,1-Dichloroethane	1.0E-01	ND	C	0.002	2.00E-02		2.34E-07	
1,1-Dichloroethene	9.0E-03	1.2E+00	C	0.005	5.56E-01	6.00E-03	6.49E-06	8.83E-03
1,2-Dichlorobenzene	9.0E-02		D	0.21	2.33E+00		2.73E-05	
1,2-Dichloroethane	ND	9.1E-02	B2	0.17		1.55E-02		2.28E-02 *
1,2-Dichloroethene (cis and trans)	9.0E-03		D	0.039	4.33E+00		5.06E-05	
1,2-Dichloropropane	ND	6.8E-02	B2	0.002		1.36E-04		2.00E-04
1,3-Dichlorobenzene	ND		D	0.002				
1,4-Dichlorobenzene	ND	2.4E-02	B2	0.013		3.12E-04		4.59E-04
2,6-Dichloropyridine	1.0E-03		ND	6	6.00E+03		7.01E-02 *	
2-Chloropyridine	1.0E-03		ND	60	6.00E+04		7.01E-01 *	
3-Chloropyridine	1.0E-03		ND	4.5	4.50E+03		5.26E-02 *	
2-Methylnaphthalene	3.0E-02		ND	0.001	3.33E-02		3.89E-07	
Acenaphthene	6.0E-02		P	0.007	1.17E-01		1.36E-06	
Acetone	1.0E-01		D	0.57	5.70E+00		6.66E-05	
Anthracene	3.0E-01		D	0.002	6.67E-03		7.79E-08	
Antimony	4.0E-04		ND	0.003	7.50E+00		8.76E-05	
Arsenic	3.0E-04	1.75E+00	A	0.15	5.00E+02	2.63E-01	5.84E-03	3.86E-01 *
Barium	7.0E-02		ND	3.1	4.43E+01		5.17E-04	
Benzene	ND	2.9E-02	A	0.21		6.09E-03		8.96E-03
Benzo(b)fluoranthene	3.0E-02	7.3E-01	B2	0.003	1.00E-01	2.19E-03	1.17E-06	3.22E-03
Benzo(g,h,i)perylene	3.0E-02		D	0.001	3.33E-02		3.89E-07	
Benzo(k)fluoranthene	3.0E-02	7.3E-01	B2	0.001	3.33E-02	7.30E-04	3.89E-07	1.07E-03
Beryllium	5.0E-03	4.3E+00	B2	0.011	2.20E+00	4.73E-02	2.57E-05	6.96E-02 *
Bis(2-chloroethyl)ether	ND	1.1E+00	B2	0.13		1.43E-01		2.10E-01 *
Bis(2-ethylhexyl)phthalate	2.0E-02	1.4E-02	B2	0.026	1.30E+00	3.64E-04	1.52E-05	5.36E-04
Cadmium	5.0E-04	ND	B1	0.03	6.00E+01		7.01E-04	
Carbon Disulfide	1.0E-01		ND	0.008	8.00E-02		9.34E-07	
Chlorobenzene	2.0E-02		D	0.62	3.10E+01		3.62E-04	
Chloroform	1.0E-02	8.1E-02	B2	1.5	1.50E+02	1.22E-01	1.75E-03	1.79E-01 *
Chromium	5.0E-03	ND	A	0.52	1.04E+02		1.21E-03	
Cobalt	ND		ND	0.23				
Copper	3.7E-02		D	0.67	1.81E+01		2.12E-04	
Cyanide	2.0E-02		D	0.18	9.00E+00		1.05E-04	
Dibenzofuran	ND		D	0.003				
Di-n-octylphthalate	2.0E-02		ND	0.0009	4.50E-02		5.26E-07	
Ethylbenzene	1.0E-01		D	0.008	8.00E-02		9.34E-07	
Fluoranthene	4.0E-02		D	0.004	1.00E-01		1.17E-06	
Fluorene	4.0E-02		D	0.006	1.50E-01		1.75E-06	
Lead	ND	ND	B2	0.64				
Manganese	5.0E-03		ND	37	7.40E+03		8.64E-02 *	
Mercury	3.0E-04		D	0.013	4.33E+01		5.06E-04	
Methylene Chloride	6.0E-02	7.5E-03	B2	2.5	4.17E+01	1.87E-02	4.87E-04	2.76E-02 *
Naphthalene	3.0E-02		D	0.001	3.33E-02		3.89E-07	
Nickel	2.0E-02		ND	0.61	3.05E+01		3.56E-04	
Phenanthrene	3.0E-02		D	0.011	3.67E-01		4.28E-06	
Pyrene	3.0E-02		D	0.003	1.00E-01		1.17E-06	
Pyridine	1.0E-03		ND	6.5	6.50E+03		7.59E-02 *	
Selenium	5.0E-03		D	0.007	1.40E+00		1.64E-05	
Silver	5.0E-03		D	0.015	3.00E+00		3.50E-05	
Tetrachloroethene	1.0E-02	5.2E-02	B2	0.34	3.40E+01	1.77E-02	3.97E-04	2.60E-02 *
Toluene	2.0E-01		D	0.61	3.05E+00		3.56E-05	
Trichloroethene	ND	1.1E-02	B2	0.3		3.30E-03		4.86E-03
Vanadium	7.0E-03		ND	0.69	9.86E+01		1.15E-03	
Vinyl Chloride	ND	1.9E+00	A	0.018		3.42E-02		5.03E-02 *
Xylenes (total)	2.0E+00		D	0.063	3.15E-02		3.68E-07	
Zinc	3.0E-01		D	2	6.67E+00		7.79E-05	
SUM all RI VALUES					**8.56E+04**	**6.80E-01**		

NOTES:
[1] – see Dose-Response Tables in Appendix D.2
RiNC = Noncarcinogenic risk value (i.e., Maximum concentration / Reference Dose)
RiC = Carcinogenic risk value (i.e., Maximum concentration x Slope Factor)
ERiNC = Proportion of contribution to total noncarcinogenic risk
ERiC = Percentage of contribution to carcinogenic risk
* – Contribution of compound to total risk exceeds 0.01 cutoff level; compound will be evaluated quantitatively

C-2 DOSE-RESPONSE TABLES

TABLE C.2-1
ORAL DOSE/RESPONSE INFORMATION FOR CARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	Weight of Evidence	Oral Slope Factor $(mg/kg/day)^{-1}$	Test Species	Study Type	Tumor Type	Source
1,1,1-Trichloroethane	D					IRIS
1,1-Dichloroethane	C	ND				IRIS
1,1-Dichloroethene	C	6.0E-01	Rat	Oral-gavage	Adrenal pheochromocytomas	IRIS
1,2,4-Trichlorobenzene	D					IRIS
1,2-Dichlorobenzene	D					IRIS
1,2-Dichloroethane	B2	9.1E-02	Rat	Oral-gavage	Hemangiosarcomas	IRIS
1,2-Dichloroethene (total)	ND					HEAST
1,2-Dichloropropane	B2	6.8E-02 R	Mouse	Oral-gavage	Liver tumors	HEAST
1,3-Dichlorobenzene	D					IRIS
1,4-Dichlorobenzene	B2	2.4E-02 R	Mouse	Oral-gavage	Liver tumors	HEAST
2,4,6-Trichlorophenol	B2	1.1E-02	Rat	Oral-diet	Leukemia	IRIS
2,4-Dichlorophenol	ND					IRIS
2,4-Dimethylphenol	ND					IRIS
2,4-Dinitrotoluene	B2	6.8E-01 +	Rat	Oral-diet	Liver, mammary gland	IRIS
2,6-Dichloropyridine	Not Listed					
2-Butanone (Methyl ethyl ketone)	D					IRIS
2-Chloroethyl Vinyl Ether	Not Listed					
2-Chlorophenol	ND					IRIS
2-Chloropyridine	Not Listed					
2-Hexanone	ND					IRIS
2-Methylnaphthalene	ND					IRIS
2-Methylphenol	C	ND				IRIS
3-Chloropyridine	Not Listed					
4,4'-DDE	B2	3.4E-01	Mouse	Oral-diet	Liver tumors	IRIS
4,4'-DDT	B2	3.4E-01	Mouse	Oral-diet	Liver tumors	IRIS
4-Chloroaniline	ND					IRIS
4-Chloropyridine	Not Listed					
4-Methylphenol (p-Cresol)	C	ND				IRIS
4-Methyl-2-pentanone (MIBK)	ND					HEAST
Acenaphthene	P					IRIS
Acenaphthylene	D					IRIS
Acetone	D					IRIS
Aldrin	B2	1.7E+01	Mice	Oral-diet	Liver carcinomas	IRIS
Aluminum	ND					HEAST
Anthracene	D					IRIS
Antimony	ND					IRIS
Arsenic	A	1.75E+00 *R	Human	DW	Skin tumors	IRIS
Barium	ND					IRIS
Benzene	A	2.9E-02	Human	Occupational	Leukemia	IRIS
Benzoic Acid	D					IRIS
Benzo(a)anthracene	B2	ND **				IRIS
Benzo(a)pyrene	B2	7.3E+00	Mouse	Oral-diet	Stomach tumors	IRIS

TABLE C.2-1
ORAL DOSE/RESPONSE INFORMATION FOR CARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	Weight of Evidence	Oral Slope Factor $(mg/kg/day)^{-1}$	Test Species	Study Type	Tumor Type	Source
Benzo(b)fluoranthene	B2	ND **				IRIS
Benzo(g,h,i)perylene	D					IRIS
Benzo(k)fluoranthene	B2	ND **				IRIS
Beryllium	B2	4.3E+00	Rat	DW	Total tumors	IRIS
Bis(2-chloroethyl)ether	B2	1E+00	Mouse	Oral-gavage	Hepatomas	IRIS
Bis(2-ethylhexyl)phthalate (BEHP)	B2	1.4E-02	Mouse	Oral-diet	Hepatocellular carcinoma	IRIS
Bromodichloromethane	B2	6.2E-02	Mouse	Oral-gavage	Kidney tubular cell adenomas and adenocarcinoma	IRIS
Bromoform	B2	7.9E-03	Rat	Oral-gavage	Neoplastic lesions in large intestine	IRIS
Butyl Benzyl Phthalate	C	ND				IRIS
Cadmium	B1	NA				IRIS
Carbazole	B2	2.0E-02	Mouse	Oral-diet	Liver tumors	HEAST
Carbon Disulfide	ND					IRIS
Carbon Tetrachloride	B2	1.3E-01	Several	Oral-gavage	Liver tumors	IRIS
Chlorobenzene	D					IRIS
Chloroform	B2	6.1E-03	Rat	DW	Kidney tumors	IRIS
Chloromethane	C	1.3E-02	Mouse	Inhalation	Kidney tumors	HEAST
Chromium III	P					IRIS
Chromium VI	A	NA				IRIS
Chrysene	B2	NA **				IRIS
Cobalt	ND					IRIS
Copper	D					IRIS
Cyanide	D					IRIS
Diberzofuran	D					IRIS
Dibenzo(a,h)anthracene	B2	ND **				IRIS
Dibromochloromethane	C	8.4E-02	Mouse	Oral-gavage	Hepatocellular adenoma or carcinoma	IRIS
Dieldrin	B2	1.6E+01	Mouse	Oral-diet	Liver tumors	IRIS
Dimethyl phthalate	D					IRIS
Di-n-butyl Phthalate	D					IRIS
Di-n-octyl Phthalate	ND					IRIS
Endosulfan	ND					IRIS
Endosulfan Sulfate	Not Listed					
Endrin	D					IRIS
Ethylbenzene	D					IRIS
p-Fluoraniline	Not Listed					
Fluoranthene	D					IRIS
Fluorene	D					IRIS
beta-HCH	C	1.8E+00	Mouse	Oral-diet	Liver tumors	IRIS
Heptachlor Epoxide	B2	9.1E+00	Mouse	Oral-diet	Hepatocellular carcinomas	IRIS
Hexachlorobenzene	B2	1.6E+00	Rat	Oral-diet	Hepatocellular carcinomas	IRIS
Hexachlorobutadiene	C	7.8E-02	Rat	Oral-diet	Kidney tumors	IRIS
Hexachloroethane	C	1.4E-02	Mouse	Oral-gavage	Hepatocellular carcinomas	IRIS
Indeno(1,2,3-cd)pyrene	B2	ND **				IRIS

TABLE C.2-1
ORAL DOSE/RESPONSE INFORMATION FOR CARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	Weight of Evidence	Oral Slope Factor $(mg/kg/day)^{-1}$	Test Species	Study Type	Tumor Type	Source
Isophorone	C	9.50E-04	Rat	Oral-gavage	Preputial gland carcinomas	IRIS
Lead	B2	ND				IRIS
Lindane (gamma-HCH)	B2-C	1.3E+00 P	Mouse	Oral-diet	Liver tumors	HEAST
Manganese	D					IRIS
Mercury	D					IRIS
Methoxychlor	D					IRIS
Methylene Chloride (Dichloromethane)	B2	7.5E-03	Mouse	DW	Hepatocellular cancer	IRIS
Naphthalene	D					IRIS
Nickel	ND					IRIS
Nitroaniline (2-, 3-, 4-)	ND					HEAST
n-Nitrosodiphenylamine	B2	4.9E-03	Rat	Oral-diet	Urinary bladder	IRIS
p-Chloroaniline	ND					IRIS
Phenanthrene	D					IRIS
Phenol	ND					IRIS
Pyrene	D					IRIS
Pyridine	ND					IRIS
Selenium	D					IRIS
Silver	D					IRIS
Tetrachloroethene	B2	5.2E-02 W	Mouse	Oral-gavage	Liver tumors	ECAO, 1992
Toluene	D					IRIS
Trichloroethene	B2	1.1E-02 W	Mouse	Oral-gavage	Liver tumors	ECAO, 1992
Vanadium	ND					HEAST
Vinyl Chloride	A	1.9E+00 R	Rat	Oral-diet	Lung, liver	HEAST
Xylenes (total)	D					IRIS
Zinc	D					IRIS

NA - Not Applicable
ND - Not Determined
W - Withdrawn from IRIS
P - IRIS input pending
R - Under review on IRIS
DW - Drinking water
mg - milligram
kg - kilogram
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
ECAO - Environmental Criteria and Assessment Office

\+ - Based on IRIS for 2,4-; 2,6-Dinitrotoluene mixture
* - calculated from unit risk of 5E-5 ug/L
** - Slope Factor for Benzo(a)Pyrene used for other carcinogenic PAHs, adjusted by Relative Slope Factors of 1.0 [benzo(a)pyrene, dibenz(a,h)anthracene]; 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene]; 0.01 [benzo(k)fluoranthene]; 0.001 [chrysene].

Weight of Evidence:
A - Human carcinogen
B - Probable human carcinogen (B1 - limited evidence of cancer in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)
C - Possible human carcinogen
D - Not classifiable as to human carcinogenicity
E - Evidence of lack of carcinogenicity to humans

SOURCES:
IRIS as of 7/94
HEAST, 1994
ECAO, 1992

TABLE C.2-2

ORAL DOSE-RESPONSE INFORMATION FOR NONCARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT

ROCHESTER, N.Y.

COMPOUND	CHRONIC ORAL RfD (mg/kg-day)	SUBCHRONIC ORAL RfD[1] (mg/kg-day)	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
1,1,1-Trichloroethane	ND W	ND						IRIS
1,1-Dichloroethane	1E-01 R	1E+00	Inhalation		None observed	Rat	1,000	HEAST
1,1-Dichloroethene	9E-03 R	9E-03	Oral-DW	Medium	Hepatic lesions	Rat	1,000 H,A,L	IRIS
1,2,4-Trichlorobenzene	1E-02	1E-02	DW	Medium	Increased adrenal weights	Rat	1,000 H,A,S	IRIS
1,2-Dichlorobenzene	9E-02	ND	Oral-diet	Low	No adverse effects observed	Rat	1,000 H,A,D	IRIS
1,2-Dichloroethane	ND	ND						IRIS
1,2-Dichloroethene (mixed isomers)	9E-03	9E-03	Oral-DW		Liver lesions	Rat	1,000	HEAST
1,2-Dichloropropane	ND	ND						IRIS
1,3-Dichlorobenzene	ND R	ND						IRIS
1,4-Dichlorobenzene	ND	ND						HEAST
2,4,6-Trichlorophenol	ND							IRIS
2,4-Dichlorophenol	3E-03	3E-03	Oral-DW	Low	Altered immune function	Rat	100 H,A	IRIS
2,4-Dimethylphenol	2E-02	2E-01	Oral-gavage	Low	Clinical signs and hematological changes	Mouse	3,000 H,A,D	IRIS
2,4-Dinitrotoluene	2E-03	2E-03	Oral-diet	High	Neurotoxicity	Dog	100 H,A	IRIS
2,6-Dichloropyridine	Not Listed ***	Not Listed***						
2-Butanone (Methyl Ethyl Ketone)	6E-01	2E+00	Oral-DW	Low	Decreased fetal birth weight	Rat	3,000 H,A,S,D	IRIS
2-Chloroethyl Vinyl Ether	Not Listed ***	Not Listed***						
2-Chlorophenol	5E-03	5E-02	Oral-DW	Low	Reproductive effects	Rat	1,000 H,A,S	IRIS
2-Chloropyridine	Not Listed ***	Not Listed***						
2-Hexanone	ND	ND						HEAST
2-Methylnaphthalene	ND *	ND*						
2-Methylphenol	5E-02	5E-01	Oral-gavage	Medium	Decreased body weights and neurotoxicity	Rat	1,000 H,A,S	IRIS
3-Chloropyridine	Not Listed ***	Not Listed***						
4,4'-DDE	ND **	ND**						IRIS
4,4'-DDT	5E-04	5E-04	Oral-diet	Medium	Liver lesions	Rat	100 H,A	IRIS
4-Chloroaniline	4E-03	4E-03	Oral-diet	Low	Nonneoplastic lesions of splenic capsule	Rat	3,000 H,A,L,D	IRIS
4-Chloropyridine	Not Listed ***	Not Listed***						
4-Methylphenol (p-Cresol)	5E-03 W	5E-03	Oral-gavage		Maternal death; respiratory distress; CNS hypoactivity	Rabbit	1,000	HEAST
4-Methyl-2-pentanone (MIBK)	8E-02 W	8E-01	Oral-gavage		Liver and kidney effects, lethargy	Rat	3,000	HEAST
Acenaphthene	6E-02	6E-01	Oral-gavage	Low	Hepatoxicity	Mouse	3,000 H,A,S,D	IRIS
Acenaphthylene	ND *P	ND						IRIS
Acetone	1E-01	1E+00	Oral-gavage	Low	Increased liver and kidney weights, nephrotoxicity	Rat	1,000 H,A,S	IRIS
Aldrin	3E-05	3E-05	Oral-diet	Medium	Liver lesions	Rat	1,000 H,A,L	IRIS
Aluminum	ND	ND						HEAST
Anthracene	3E-01	3E+00	Oral-gavage	Low	No effects	Mouse	3,000 H,A,S	IRIS
Antimony	4E-04	4E-04	Oral-DW		Reduced lifespan, altered blood chemistries	Rat	1,000 H,A,L	IRIS
Arsenic	3E-04	3E-04	Oral-diet	Medium	Keratosis and hyperpigmentation	Human	3 H	IRIS
Barium	7E-02	7E-02	Oral-DW	Medium	Increased blood pressure	Human	3 H	IRIS
Benzene	ND P	ND						IRIS
Benzoic Acid	4E+00	4E+00	Oral-diet	Medium	No adverse effects observed	Human	1	IRIS
Benzo(a)anthracene	ND *	ND*						IRIS
Benzo(a)pyrene	ND *	ND*						IRIS

TABLE C.2-2

ORAL DOSE-RESPONSE INFORMATION FOR NONCARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT

ROCHESTER, N.Y.

COMPOUND	CHRONIC ORAL RfD (mg/kg-day)	SUBCHRONIC ORAL RfD[1] (mg/kg-day)	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
Benzo(b)fluoranthene	ND *	ND*						IRIS
Benzo(g,h,i)perylene	ND *	ND*						IRIS
Benzo(k)fluoranthene	ND *	ND*						IRIS
Beryllium	5E-03	5E-03	DW	Low	None observed	Rat	100 H,A	IRIS
Bis(2-chloroethyl)ether	ND	ND						IRIS
Bis(2-ethylhexyl)phthalate (BEHP)	2E-02	ND	Oral-diet	Medium	Increased liver weight	Guinea Pig	1,000 H,A,S	IRIS
Bromodichloromethane	2E-02	2E-02	Oral-gavage	Medium	Renal cytomegaly	Mouse	1,000 H,A,L,D	IRIS
Bromoform	2E-02	2E-01	Oral-gavage	Medium	Hepatic lesions	Rat	1,000 H,A,S	IRIS
Butyl Benzyl Phthalate	2E-01	2E+00	Oral-diet	Low	Effects on body weight gain, testes, liver, kidney	Rat	1,000 H,A,S	IRIS
Cadmium (food)	1E-03	None	Oral-diet	High	Significant proteinuria	Human	10 H	IRIS
Cadmium (water)	5E-04	None	Oral-DW	High	Significant proteinuria	Human	10 H	IRIS
Carbazole	ND	ND						HEAST
Carbon Disulfide	1E-01 R	1E-01	Inhalation	Medium	Fetal toxicity/malformation	Rabbit	100 H,A	IRIS
Carbon Tetrachloride	7E-04	ND	Oral-gavage	Medium	Liver lesions	Rat	1,000 H,A,S	IRIS
Chlorobenzene	2E-02	ND	Oral	Medium	Histopathologic changes in liver	Dog	1,000 H,A,S	IRIS
Chloroform	1E-02	1E-02	Oral	Medium	Fatty cyst formation in liver	Dog	1,000 H,A,S	IRIS
Chloromethane	ND	ND						HEAST
Chromium III	1E+00	1E+00	Oral-diet	Low	No effects observed	Rat	100 H,A; MF=10	IRIS
Chromium VI	5E-03	2E-02	Oral-DW	Low	No effects reported	Rat	500 H,A,S	IRIS
Chrysene	ND *	ND*			Data inadequate for risk assessment			HEAST
Cobalt	ND	ND						IRIS
Copper	3.7E-02 ~ ~	3.7E-02	Oral		Gastrointestinal irritation	Human		HEAST
Cyanide	2E-02	2E-02	Oral-diet	Medium	Weight loss, thyroid effects	Rat	100 H,A; MF=5	IRIS
Dibenzofuran	ND	ND						IRIS
Dibenzo(a,h)anthracene	ND *	ND*						IRIS
Dibromochloromethane	2.0E-02	2.0E-01	Oral-gavage	Medium	Hepatic lesions	Rat	1,000 H,A,S	IRIS
Dieldrin	5E-05	5E-05	Oral	Medium	Liver lesions	Rat	100 H,A	IRIS
Dimethyl phthalate	1E+01 R	1E+01	Oral-diet		Kidney effects	Rat	100	HEAST
Di-n-butyl phthalate	1E-01	1E+00	Oral-diet	Low	Increased mortality	Rat	1,000 H,A,S	IRIS
Di-n-octyl phthalate	2E-02 R	2E-02	Oral-diet		Elevated SGOT, SGPT, liver & kidney wEIGHT	Rat	1,000	HEAST
Endosulfan	6E-03 W	6E-03	Oral-diet	Medium	Decreased weight gain (dog & rat); kidney and blood effects (rat)	Dog; rat	100	HEAST
Endosulfan Sulfate	Not Listed ~	Not Listed ~						
Endrin	3E-04	3E-04	Diet		Convulsions & liver lesions	Dog	100 H,A	IRIS
Ethylbenzene	1E-01	ND	Oral-diet	Low	Liver and kidney toxicity	Rat	1,000 H,A,S	IRIS
p-Fluoraniline	Not Listed							
Fluoranthene	4E-02	4E-01	Oral-gavage	Medium	Increased liver weights, hematologic changes	Mouse	3,000 H,A,S	IRIS
Fluorene	4E-02	4E-01	Oral-gavage	Low	Hematologic changes, decreased RBC	Mouse	3,000 H,A,S	IRIS
beta-HCH	ND	ND						IRIS
Heptachlor Epoxide	1.3E-05	1.3E-05	Oral-diet	Low	Increased liver-to-body weight ratio	Dog	1,000 H,A,N	IRIS
Hexachlorobenzene	8E-04	ND	Oral-diet	Medium	Liver effects	Rat	100 H,A	IRIS
Hexachlorobutadiene	ND W	ND						IRIS
Hexachloroethane	1E-03	1E-02	Oral-diet	Medium	Atrophy and degeneration of the renal tubules	Rat	1,000 H,A,S	IRIS

TABLE C.2-2

ORAL DOSE-RESPONSE INFORMATION FOR NONCARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT

ROCHESTER, N.Y.

COMPOUND	CHRONIC ORAL RfD (mg/kg-day)	SUBCHRONIC ORAL RfD[1] (mg/kg-day)	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
Indeno(1,2,3-cd)pyrene	ND *	ND*						IRIS
Isophorone	2E-01	2E+00	Oral-diet	Low	Kidney lesions	Dog	1,000 H,A,S	IRIS
Lead	ND	ND						IRIS
Lindane (gamma-HCH)	3E-04	3E-03	Oral-diet		Liver and kidney toxicity	Rat	1,000 H,A,S	IRIS
Manganese (food)	1.4E-01	1.4E-01	Oral-diet	Medium	CNS effects	Human	1	IRIS
Manganese (water)	5E-03	5E-03	Oral-diet	Medium	CNS effects	Human	1	IRIS
Mercury	3E-04 R	3E-04	Parenteral		Kidney effects	Rat	1,000	HEAST
Methoxychlor	5E-03	5E-03	Oral-gavage		Excessive loss of filters	Rabbit	1,000 H,A,D	IRIS
Methylene Chloride (Dichloromethane)	6E-02	6E-02	DW	Medium	Liver toxicity	Rat	100 H,A	IRIS
Naphthalene	ND *W	ND*						IRIS
Nickel	2E-02	2E-02	Oral-diet	Medium	Decreased body and organ weights	Rat	300 H,A,D	IRIS
Nitroaniline(2-, 3-, 4-)	ND	ND						HEAST
n-Nitrosodiphenylamine	ND	ND						IRIS
Phenanthrene	ND *	ND*						IRIS
Phenol	6E-01	6E-01	Oral-gavage	Low	Decreased fetal body weight	Rat	100 H,A	IRIS
Pyrene	3E-02	3E-01	Oral-gavage	Low	Kidney effects, renal tubular pathology	Mouse	3,000 H,A,S	IRIS
Pyridine	1E-03	1E-02	Oral-gavage	Medium	Increased liver weight	Rat	1,000 H,A,S	IRIS
Selenium	5E-03	5E-03	Epidemiologic	Medium	Clinical selenosis	Human	3 H	IRIS
Silver	5E-03	5E-03	Therapeutic	Medium	Argyria	Human	2 L	IRIS
Tetrachloroethene	1E-02	1E-01	Oral-gavage	Medium	Hepatotoxicity	Mouse	1,000 H,A,S	IRIS
Toluene	2E-01	2E+00	Oral-gavage	Medium	Weight change in liver and kidneys	Rat	1,000 H,A,S	IRIS
Trichloroethene	ND R	ND						IRIS
Vanadium	7E-03 P	7E-03	Oral-DW		None observed	Rat	100	HEAST
Vinyl Chloride	ND	ND						HEAST
Xylenes (total)	2E+00	ND	Oral-gavage	Medium	Hyperactivity, decreased body weight	Rat	100 H,A	IRIS
Zinc	3E-01	3E-01	Oral-diet	Medium	Decreased erythrocyte superoxide dimutase	Human	3 L	IRIS

ND - No data available

W - RfD withdrawn from IRIS

P - RfD pending in IRIS

R - an RfD under review by IRIS

mg - milligram

kg - kilogram

DW - Drinking Water

L - Liter

IRIS - Integrated Risk Information System

HEAST - Health Effects Assessment Summary Tables

[1] - Source for all subchronic RfDs is HEAST, 1994

*RfD for pyrene is used as surrogate for PAHs without assigned RfD

**RfD for DDT is used as surrogate

***RfD for pyridine used as surrogate

~RfD for Endosulfan used as surrogate

~~ Calculated from drinking water standard of 1.3 mg/L

SOURCES:

IRIS as of 7/94

HEAST, 1994

Uncertainty factors: H - variation in human sensitivity

A - animal to human extrapolation

S - extrapolation from subchronic to chronic NOAEL

L - extrapolation from LOAEL to NOAEL

N - NOEL not attained

D - Lack of supporting data

Additional uncertainty factors or modifying factors (MF) of 1 to 10 may be added to account for other uncertainties such as inadequacies in the database or the severity of the effect.

TABLE C.2-3
INHALATION DOSE/RESPONSE INFORMATION FOR CARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	Weight of Evidence	Inhalation Slope Factor* $(mg/kg-day)^{-1}$	Unit Risk $(\mu g/m^3)^{-1}$	Test Species	Study Type	Tumor Type	Source
1,2-Dichloroethane	B2	9.1E-02	2.6E-05	Rat	Gavage	Hemangiosarcomas	IRIS
1,2-Dichlorobenzene	D						IRIS
1,4-Dichlorobenzene	C		ND				HEAST
2,6-Dichloropyridine	Not Listed						
2-Chloropyridine	Not Listed						
2-Methylnaphthalene	ND						IRIS
3-Chlorpyridine	Not Listed						
Acenaphthene	ND						IRIS
Acenaphthylene	D						IRIS
Anthracene	D						IRIS
Arsenic	A	5.0E+01 +	4.3E-03	Human	Occupational	Respiratory tract	IRIS
Barium	ND						IRIS
Benzene	A	2.9E-02	8.3E-06	Human	Occupational	Leukemia	IRIS
Benzo(a)anthracene	B2		ND				IRIS
Benzo(a)pyrene	B2		W				HEAST
Benzo(b)fluoranthene	B2		ND				IRIS
Benzo(g,h,i)perylene	D						IRIS
Benzo(k)fluoranthene	B2		ND				IRIS
Bromoform	B2	3.9E-03	1.1E-06	Rat	Oral-gavage	Neoplastic lesion in large intestine	IRIS
Cadmium	B1	6.1E+00	1.8E-03	Human	Occupational	Respiratory tract	IRIS
Carbon Tetrachloride	B2	5.3E-02	1.5E-05	Several	Gavage	Liver tumors	IRIS
Chlorobenzene	D						IRIS
Chloroform	B2	8.1E-02	2.3E-05	Mouse	Gavage	Liver tumors	IRIS
Chromium III	ND						IRIS
Chromium VI	A	4.1E+01	1.2E-02	Human	Occupational	Lung tumors	IRIS
Chrysene	B2		ND				IRIS
Copper	D						IRIS
Dibenzo(a,h)anthracene	B2		ND				IRIS
Fluoranthene	D						IRIS
Fluorene	D						IRIS
Indeno(1,2,3-cd)pyrene	B2		ND				IRIS
Manganese	D						IRIS
Mercury	D						IRIS
Methylene chloride (Dichloromethane)	B2	1.65E-03 c	4.7E-07	Mouse	Inhalation	Adenomas & carcinomas	IRIS
Naphthalene	D						IRIS
Nickel	ND						IRIS
Phenanthrene	D						IRIS
Pyrene	D						IRIS
Pyridine	ND						IRIS
Tetrachloroethene	ND		ND P				IRIS

TABLE C.2-3
INHALATION DOSE/RESPONSE INFORMATION FOR CARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	Weight of Evidence	Inhalation Slope Factor* $(mg/kg-day)^{-1}$	Unit Risk $(\mu g/m^3)^{-1}$	Test Species	Study Type	Tumor Type	Source
Toluene	D						IRIS
Trichloroethene	B2	6.0E-03	1.7E-06 W				ECAO
Vanadium	ND						IRIS
Vinyl Chloride	A	3.0E-01	8.4E-05 R	Rat	Inhalation	Liver tumors	HEAST

ND – Not Determined
W – Withdrawn from IRIS
P – IRIS input pending
R – Under review on IRIS
mg – milligram
kg – kilogram
μg – microgram
m^3 – cubic meter
IRIS – Integrated Risk Information System
HEAST – Health Effects Assessment Summary Tables
ECAO – Environmental Criteria and Assessment Office

* – Source of slope factor is HEAST, 1994 unless otherwise noted.
+ – Assumed a 30% absorption of inhaled arsenic
c – Calculated from unit risk [slope = (unit risk x 70 kg)/(20 m^3/day x 0.001 mg/ug)]

Weight of Evidence: A – Human carcinogen
B – Probable human carcinogen (B1 – limited evidence in humans;
B2 – sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)
C – Possible human carcinogen
D – Not classifiable as to human carcinogenicity
E – Evidence of lack of carcinogenicity to humans

Sources:
IRIS as of 7/94
HEAST, 1994
ECAO, 1992.

TABLE C.2-4
INHALATION DOSE/RESPONSE INFORMATION FOR NONCARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

COMPOUND	CHRONIC INHALATION RfC (mg/m^3)	CHRONIC INHALATION RfC (mg/kg-day) [1]	SUBCHRONIC[2] INHALATION RfC (mg/m^3)	SUBCHRONIC[2] INHALATION RfC (mg/kg-day) [1]	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
1,2-Dichloroethane	ND		ND							IRIS
1,2-Dichlorobenzene	2E-01	5.7E-02	2E+00	5.7E-01	Inhalation		Decreased weight gain	Rat	1,000	HEAST[3]
1,4-Dichlorobenzene	8E-01	2.3E-01	2.5E+00	7.1E-01	Inhalation		Liver and kidney effects	Rat	100	IRIS
2,6-Dichloropyridine	Not Listed									
2-Chloropyridine	Not Listed									
2-Methylnaphthalene	Not listed									
3-Chloropyridine	Not listed									
Acenaphthene	ND		ND							IRIS
Acenaphthylene	ND		ND							IRIS
Anthracene	ND		ND							IRIS
Arsenic	ND		ND							IRIS
Barium	5E-04	1.4E-04	5E-03	1.4E-03	Inhalation		Fetotoxicity	Rat	1,000	HEAST[3]
Benzene	ND P		ND							IRIS
Benzo(a)anthracene	ND		ND							IRIS
Benzo(a)pyrene	ND		ND							IRIS
Benzo(b)fluoranthene	ND		ND							IRIS
Benzo(g,h,i)perylene	ND		ND							IRIS
Benzo(k)fluoranthene	ND		ND							IRIS
Bromoform	ND		ND							IRIS
Cadmium (food)	ND P		ND							IRIS
Carbon Tetrachloride	ND		ND							IRIS
Chlorobenzene	2E-02 P	5.7E-03	ND		Inhalation		Liver and kidney effects	Rat	10,000	HEAST[3]
Chloroform	ND P		ND							IRIS
Chromium VI	ND P		ND							IRIS
Chrysene	ND		ND							IRIS
Copper	ND		ND							IRIS
Dibenzo(a,h)anthracene	ND		ND							IRIS
Fluoranthene	ND		ND							IRIS
Fluorene	ND		ND							IRIS
Indeno(1,2,3-cd)pyrene	ND		ND							IRIS
Manganese	5E-05	1.4E-05	5E-05	1.4E-05	Occupational	Medium	Neurobehavioral function impairment	Human	1,000 H,L,D	IRIS
Mercury[5]	3E-04 P	8.6E-05	3E-04	8.6E-05	Inhalation		Neurotoxicity	Human	30	HEAST[4]
Methylene Chloride (Dichloromethane)	3E+00	8.6E-01	3E+00	8.6E-01	Inhalation		Liver toxicity	Rat	100	HEAST[4]
Naphthalene	ND		ND							IRIS
Nickel	ND P		ND							IRIS
Phenanthrene	ND		ND							IRIS
Pyrene	ND		ND							IRIS
Pyridine	ND		ND							IRIS
Tetrachloroethene	ND		ND							IRIS
Toluene	4E-01	1.1E-01	ND		Inhalation	Medium	Neurological effects	Human	300 H,L,D	IRIS
Trichloroethene	ND P		ND							IRIS

TABLE C.2-4
INHALATION DOSE/RESPONSE INFORMATION FOR NONCARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

COMPOUND	CHRONIC INHALATION RfC (mg/m^3)	CHRONIC INHALATION RfC (mg/kg-day) [1]	SUBCHRONIC[2] INHALATION RfC (mg/m^3)	SUBCHRONIC[2] INHALATION RfC (mg/kg-day) [1]	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
Vanadium	ND		ND							HEAST[3]
Vinyl Chloride	Not Listed									

ND – No data available
W – RfD withdrawn from IRIS
P – RfD pending in IRIS
mg – milligram
m^3 – cubic meter
IRIS – Integrated Risk Information System
HEAST – Health Effects Assessment Summary Tables
SOURCES:
IRIS as of 7/94
HEAST, 1994

[1] – Calculated by dividing RfC in mg/m^3 by 70 kg and multiplying by 20 m^3/day.
[2] – Source for all subchronic RfCs is HEAST, 1993
[3] – HEAST Table 2: Alternate Methods; RfC values were derived from methodology not current with interim methodology used by RfD/RfC Work Group
[4] – HEAST Table 1: Subchronic and Chronic Toxicity
[5] – value is specifically for elemental mercury

Uncertainty factors: H – variation in human sensitivity
A – animal to human extrapolation
S – extrapolation from subchronic to chronic NOAEL
L – extrapolation from LOAEL to NOAEL
N – NOEL not attained
D – Lack of supporting data
Additional uncertainty factors or modifying factors (MF) of 1 to 10 may be added to account for other uncertainties such as inadequacies in the database or the severity of the effect.

TABLE C.2-5
DERMAL DOSE-RESPONSE INFORMATION FOR CARCINOGENIC AND NONCARCINOGENIC EFFECTS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

COMPOUND	ORAL ABSORPTION EFFICIENCY	SUBCHRONIC ORAL RfD[1] (mg/kg-day)	SUBCHRONIC DERMAL RfD[2] (mg/kg-day)	ORAL CSF[1] $(mg/kg-day)^{-1}$	DERMAL CSF[3] $(mg/kg-day)^{-1}$
1,2,4-trichlorobenzene	1	1.0E-02	1.0E-02	ND	ND
1,2-dichlorobenzene	1	9.0E-02	9.0E-02	ND	ND
1,2-dichloroethane	0.95	ND	ND	9.1E-02	9.6E-02
1,4-dichlorobenzene	1	ND	ND	2.4E-02	2.4E-02
2,6-dichloropyridine	1	1.0E-02	1.0E-02	ND	ND
2-chloropyridine	1	1.0E-02	1.0E-02	ND	ND
2-methylnaphthalene	0.91	3.0E-01	2.7E-01	ND	ND
3-chloropyridine	1	1.0E-02	1.0E-02	ND	ND
4-chloropyridine	1	1.0E-02	1.0E-02	ND	ND
acenaphthene	0.91	6.0E-01	5.5E-01	ND	ND
anthracene	0.91	3.0E+00	2.7E+00	ND	ND
antimony	0.1	4.0E-04	4.0E-05	ND	ND
arsenic	0.98	3.0E-04	2.9E-04	1.75E+00	1.79E+00
barium	0.07	7.0E-02	4.9E-03	ND	ND
benzene	1	ND	ND	2.9E-02	2.9E-02
benzo(a)anthracene	0.91	3.0E-01	2.7E-01	7.3E-01	8.0E-01
benzo(a)pyrene	0.91	3.0E-01	2.7E-01	7.3E+00	8.0E+00
benzo(b)fluroanthene	0.91	3.0E-01	2.7E-01	7.3E-01	8.0E-01
benzo(g,h,i)perylene	0.91	3.0E-01	2.7E-01	ND	ND
benzo(k)fluroanthene	0.91	3.0E-01	2.7E-01	7.3E-02	8.0E-02
beryllium	0.01	5.0E-03	5.0E-05	4.3E+00	4.3E+02
beta-hexachlorocyclohexane	1	ND	ND	1.8E+00	1.8E+00
bis(2-chloroethyl)ether	0.98	ND	ND	1.0E+00	1.0E+00
bis(2-ethylhexyl)phthalate	1	2.0E-02	2.0E-02	1.4E-02	1.4E-02
bromoform	1	2.0E-01	2.0E-01	7.9E-03	7.9E-03
cadmium--soil (chronic exposure)	0.05	1.0E-03	5.0E-05	ND	ND
cadmium--water	0.05	ND	ND	ND	ND
carbon tetrachloride	0.8	7.0E-04	5.6E-04	1.3E-01	1.6E-01
chlorobenzene	1	2.0E-02	2.0E-02	ND	ND
chloroform	1	1.0E-02	1.0E-02	6.1E-03	6.1E-03
chromium (hexavalent)	0.11	2.0E-02	2.2E-03	ND	ND
chrysene	0.91	3.0E-01	2.7E-01	7.3E-03	8.0E-03
copper	0.5	3.7E-02	1.8E-02	ND	ND
dibenz(a,h)anthracene	0.91	3.0E-01	2.7E-01	7.3E+00	8.0E+00
fluoranthene	0.91	4.0E-01	3.6E-01	ND	ND
fluorene	0.91	4.0E-01	3.6E-01	ND	ND
gamma-hexachlorocyclohexane	1	3.0E-03	3.0E-03	1.3E+00	1.3E+00
heptachlor epoxide	0.66	1.3E-05	8.6E-06	9.1E+00	1.4E+01
indeno(1,2,3-c,d)pyrene	0.91	3.0E-01	2.7E-01	7.3E-01	8.0E-01
manganese (water)	0.04	5.0E-03	2.0E-04	ND	ND
mercury	0.15	3.0E-04	4.5E-05	ND	ND
methylene chloride	1	6.0E-02	6.0E-02	7.5E-03	7.5E-03
naphthalene	0.91	3.0E-01	2.7E-01	ND	ND
nickel	0.05	2.0E-02	1.0E-03	ND	ND
phenanthrene	0.91	3.0E-01	2.7E-01	ND	ND
pyrene	0.91	3.0E-01	2.7E-01	ND	ND
pyridine	1	1.0E-02	1.0E-02	ND	ND
tetrachloroethene	0.7	1.0E-01	7.0E-02	5.2E-02	7.4E-02
toluene	1	2.0E+00	2.0E+00	ND	ND
trichloroethene	1	ND	ND	1.1E-02	1.1E-02
vinyl chloride	1	ND	ND	1.9E+00	1.9E+00
zinc	0.34	3.0E-01	1.0E-01	ND	ND

NOTES:

[1] - see preceding Dose-Response Tables

[2] Dermal RfD = Oral RfD*Oral Absorption Efficiency

[3] Dermal CSF = Oral CSF/Oral Absorption Efficiency

RfD - reference dose

CSF - cancer slope factor

mg - milligram

kg - kilogram

ND - no value available

C-3 EXPOSURE PARAMETERS AND EQUATIONS

TABLE C.3-1
HUMAN HEALTH EXPOSURE PARAMETERS AND EQUATIONS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CONSTRUCTION WORKER: SOIL EXPOSURE

PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CHEMICAL CONCENTRATION IN SOIL	CS	Mean or Maximum	mg/kg	Site specific
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m^3	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m^3	USEPA, 1991b
VOLATILIZATION FACTOR[1]	VF	Calculated	m^3/kg	USEPA, 1991b
24 HOUR AVERAGE PM10 STANDARD	PM10	5000	ug/m^3	OSHA, 1993
CONVERSION FACTOR 1	CF1	1E-09	kg/ug	
INGESTION RATE	IR	480	mg/day	USEPA, 1991a
FRACTION INGESTED	FI	100%		Assumption
INHALATION RATE	IhR	2.5	m^3/hour	USEPA, 1991a
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2	USEPA, 1992
SURFACE AREA EXPOSED	SA	5,800	cm^2/day	USEPA, 1992
DERMAL ABSORPTION EFFICIENCY[2]	AE	Chemical-specific	unitless	USEPA, 1992
CONVERSION FACTOR 2	CF2	0.000001	kg/mg	
BODY WEIGHT	BW	70	kg	USEPA, 1989a
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY - SIX MONTH	EF	180	days/year	Assumption
EXPOSURE FREQUENCY - ONE MONTH	EF	30	days/year	Assumption
EXPOSURE DURATION	ED	1	years	Assumption
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1989a
NONCANCER[3] - SIX MONTH	AT	0.49	years	USEPA, 1989a
NONCANCER[3] - ONE MONTH	AT	0.08	years	USEPA, 1989a

Notes:

[1] Volatilization factor used only for volatile compounds of potential concern

[2] Dermal absorption efficiencies for dermal contact with soil are available for only three analytes (cadmium; 1,2,4-trichlorobenzene; and 2,3,7,8-tetrachlorodibenzo-p-dioxin). The dermal route of exposure was evaluated if any of these analytes were present.

[3] For noncarcinogenic effects: AT = EF/365 days per year

mg = milligrams
kg = kilogram
cm^2 = square centimeters
μg = micrograms
m^3 = cubic meter

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}}$$

$$\text{INTAKE-INHALATION} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}}$$

where:

$CAp = CS \times PM10 \times CF$
$CAv = CS \times 1/VF$

TABLE C.3-1, continued
HUMAN HEALTH EXPOSURE PARAMETERS AND EQUATIONS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.
COMMERCIAL/INDUSTRIAL WORKER: SOIL EXPOSURE

PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CHEMICAL CONCENTRATION IN SOIL	CS	Mean or Maximum	mg/kg	Site specific
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m^3	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m^3	USEPA, 1991b
VOLATILIZATION FACTOR[1]	VF	Calculated	m^3/kg	USEPA, 1991b
PARTICULATE EMISSION FACTOR	PEF	4.63E+09	m^3/kg	USEPA, 1991b
CONVERSION FACTOR 1	CF1	1E-09	kg/ug	
INGESTION RATE	IR	50	mg/day	USEPA, 1991a
FRACTION INGESTED	FI	100%		Assumption
INHALATION RATE	IhR	2.5	m^3/hour	USEPA, 1991a
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2	USEPA, 1992
SURFACE AREA EXPOSED	SA	2,200	cm^2/day	USEPA, 1992
DERMAL ABSORPTION EFFICIENCY[2]	AE	Chemical-specific	unitless	USEPA, 1992
CONVERSION FACTOR 2	CF2	0.000001	kg/mg	
BODY WEIGHT	BW	70	kg	USEPA, 1989a
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	250	days/year	Assumption
EXPOSURE DURATION	ED	25	years	Assumption
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1989a
NONCANCER	AT	25	years	USEPA, 1989a

Notes:
[1] Volatilization factor used only for volatile compounds of potential concern
[2] Dermal absorption efficiencies for dermal contact with soil are available for only three analytes (cadmium; 1,2,4-trichlorobenzene; and 2,3,7,8-tetrachlorodibenzo-p-dioxin). The dermal route of exposure was evaluated if any of these analytes were present.

mg = milligrams
kg = kilogram
cm^2 = square centimeters
µg = micrograms
m^3 = cubic meter

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-INHALATION} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

where:

$CAp = CS \times PM10 \times CF$
$CAv = CS \times 1/VF$

TABLE C.3-1, continued
HUMAN HEALTH EXPOSURE PARAMETERS AND EQUATIONS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CONSTRUCTION WORKER: GROUNDWATER EXPOSURE

PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CHEMICAL CONCENTRATION IN GROUNDWATER	CW	Mean or Maximum	mg/L	Site specific
CONCENTRATION AIR VOLATILES	CAv	Modeled	mg/m^3	
CONVERSION FACTOR	CF	1E-03	L/cm^3	
INGESTION RATE	IR	0.2	L/day	Assumption
FRACTION INGESTED	FI	100%		Assumption
INHALATION RATE	IhR	2.5	m^3/hour	USEPA, 1991a
SURFACE AREA EXPOSED	SA	5,800	cm^2/day	USEPA, 1992
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour	USEPA, 1992
BODY WEIGHT	BW	70	kg	USEPA, 1989a
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY - SIX MONTH	EF	180	days/year	Assumption
EXPOSURE FREQUENCY - ONE MONTH	EF	30	days/year	Assumption
EXPOSURE DURATION	ED	1	years	Assumption
AVERAGING TIME	BW	70	kg	USEPA, 1989a
CANCER	AT	70	years	USEPA, 1989a
NONCANCER[1] - SIX MONTH	AT	0.49	years	USEPA, 1989a
NONCANCER[1] - ONE MONTH	AT	0.08	years	USEPA, 1989a

Notes:
[1] For noncarcinogenic effects: AT = EF/365 days per year

mg = milligrams
kg = kilogram
cm^2 = square centimeters
L = Liters
m^3 = cubic meter
cm^3 = cubic centimeters

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-INHALATION} = \frac{CAv \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

C-4 SUPPORTING CALCULATIONS

TABLE C.4-1
PERMEABILITY COEFFICIENTS FOR CPCs IN OVERBURDEN GROUNDWATER

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	Kp[1] (cm/hr)
ORGANICS	
1,2-Dichlorobenzene	6.1E-02
1,2-Dichloroethane	5.3E-03
1,4-Dichlorobenzene	6.2E-02
Benzene	2.1E-02
Bromoform	2.6E-03
Carbon tetrachloride	2.2E-02
Chlorobenzene	4.1E-02
Chloroform	8.9E-03
Methylene chloride	4.5E-03
Tetrachloroethene	4.8E-02
Toluene	4.5E-02
Trichloroethene	1.6E-02
Vinyl chloride	7.3E-03
1,2,4-Trichlorobenzene	1.0E-01
2,6-Dichloropyridine	ND [2]
2-Chloropyridine	ND [2]
2-Methylnaphthalene	ND
3-Chloropyridine	ND [2]
4-Chloropyridine	ND [2]
Acenaphthene	1.3E-01 [3]
Anthracene	2.6E-01 [3]
Benzo(a)anthracene	8.1E-01
Benzo(a)pyrene	1.2E+00
Benzo(b)fluoranthene	1.2E+00
Benzo(g,h,i)perylene	1.6E+00 [3]
Benzo(k)fluoranthene	1.1E+00 [3]
Bis(2-Chloroethyl)ether	2.1E-03
Bis(2-ethylhexyl)phthalate	3.3E-02
Chrysene	8.1E-01
Dibenzo(a,h)Anthracene	2.7E+00
Fluoranthene	3.6E-01
Fluorene	1.7E-01 [3]
Indeno(1,2,3-c,d)Pyrene	1.9E+00
Naphthalene	6.9E-02
Phenanthrene	2.3E-01
Pyrene	5.3E-01 [3]
Pyridine	2.0E-03 [3]
Heptachlor Epoxide	7.0E-04 [3]
beta-BHC	2.0E-02 [3]
gamma-BHC (Lindane)	1.4E-02
INORGANICS	
Antimony	1.0E-03
Arsenic	1.0E-03
Barium	1.0E-03
Beryllium	1.0E-03
Cadmium	1.0E-03
Chromium	1.0E-03
Copper	1.0E-03
Manganese	1.0E-03
Mercury	1.0E-03
Nickel	1.0E-04
Zinc	6.0E-04

Notes:
1 Unless otherwise noted, values are from USEPA, 1992.
2 Permeability Coefficient for pyridine will be used as a surrogate value
3 See next page for calculations per USEPA, 1992.
Kp = Permeability Coefficient
cm = centimeters
hr = hour

TABLE C.4-1, continued
PERMEABILITY COEFFICIENTS FOR CPCs IN OVERBURDEN GROUNDWATER

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Chemical Name	MW	LogKow	LogKow Sources	LogKp	Kp
Acenaphthene	154	3.92	a	−0.8762	0.13
Anthracene	178.08	4.54	b	−0.582888	0.26
Benzo(g,h,i)perylene	276	6.51	d	0.2185	1.65
Benzo(k)fluoranthene	252.32	6.06	d	0.043448	1.11
Fluorene	166.08	4.18	e	−0.765288	0.17
Heptachlor Epoxide	389	2.7	f	−3.1759	0.0007
Pyrene	202.08	5.18	b	−0.274888	0.53
Pyridine	79.1	0.69	c	−2.71261	0.002
beta−BHC	290.83	3.9	f	−1.725063	0.02

NOTES:
Equation:

$$\text{Log Kp} = -2.72 + 0.71 \log \text{Kow} - 0.0061 \text{ MW}$$

Kp = Permeability Coefficient
Kow = Octanol/water partitioning coefficient
MW = molecular weight

SOURCES:

a Banerjee, S., Yalkowsky, S.H., Valvani, S.C. 1980. Water Solubility and Octanol/Water Partition Coefficients of Organic Limitations of the Solubility Partition Correlation. Environ. Sci. Technol. 14: 1227−9.

b Chiou, C.T., and Schmedding, D.W. 1982. Partitioning of Organic Compounds in Octanol−Water Systems. Environ. Sci. Technol. 16:4−10.

c Data extracted from the Log P Parameter Data base. Pomona College of Medicinal Chemistry Project. Hardcopy of 1983 version. Geometric means were calculated for those chemicals with ranges of values listed.

d From the table of calculated Log Kow

e Hansch, C. and Leo, A. 1979. Substituent Constants for Correlation Analysis in Chemistry and Biology. John Wiley and Sons, Inc. New York.

f Mabey, W.R., Smith, J.H., Podoll, R.T., Johnson, H.L., Mill, T., Chou, T.W., Gates, J., Patridge, I.W., Jaber, H., and Vandenberg, D. 1982. Aquatic Fate Process Data for Organic Priority Pollutants. Prepared by SRI International. Prepared for Monitoring and Data Support Division, Office of Water Regulations and Standards. Washington, D.C. EPA Contract Nos. 68−01−3867 and 68−03−2981.

TABLE C.4-2
GROUNDWATER CONTAMINANT RELEASE ANALYSIS - CONSTRUCTION SCENARIO

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, NY

The purpose of this table is to estimate air concentrations of volatile contaminants released from exposed groundwater with the use of a simple box model. During future excavation at the site, groundwater from the superficial aquifer may be exposed. Any volatile contaminants present within the exposed water may volatilize into outdoor air and potentially contaminate the breathing space of construction workers on-site.

The simple box model is used to conservatively estimate concentrations of VOCs in air above the surface of exposed groundwater. The model assumes the placement of a hypothetical "box", 2 meters in height, above a excavation of a defined length and width, containing a defined volume of contaminated water within the excavation. Air is presumed to move through the "box" (across the surface of the excavation) at a defined rate. Conservatively, all VOCs present within the volume of water are assumed to volatilize into the "box" within a 24 hour day, with 50 percent of volatilization assumed to occur within the 8 hour workday. The resultant air concentrations calculated (air EPCs) are used in the quantitative risk assessment. The assumptions, equations, and calculations used for the model follow.

Assumptions:

(1) The excavation area is a hole 10 meters in width by 10 meters in length (area 100 m^2)

(2) Water within the hole is present at a depth of 3 meters (volume of groundwater in the hole [V] = 300 m^3)

(3) Volatilization of 50 percent of total VOCs present within V in an 8 hour workday

(4) The average wind speed [Air_{ws}] of air moving through the "box" is 3 meters/sec

(5) The area of a face the "box" through which the air flows is 20 $meters^2$ (2 meter height X 10 meter width)

(6) The exposure time (ET) for the construction worker scenario is an 8 hour workday

Equations:

(1) The mass (M) of a contaminant present in the defined volume of groundwater and assumed to volatilize in an 8 hour workday is:

$$M = C_{gw} \times V \times 0.5$$

where:

M	=	mass of contaminant volatilizing from groundwater per 8 hour workday (mg/workday)
C_{gw}	=	maximum or mean concentration in groundwater (mg/m^3)
V	=	volume of groundwater (m^3)
0.5	=	50 percent volatilization in 8 hours (unitless)

(2) The air flow (AF) through the "box" in an 8 hour word day is:

$$AF = Air_{ws} \times A \times ET \times CF$$

where:

AF	=	air flow through the box in 8 hours (m^3/workday)
Air_{ws}	=	air speed (m/sec)
A	=	area of the face of the "box" (m^2)
ET	=	time of exposure (hr/day)
CF	=	conversion factor (3600 sec/hr)

Based on the above assumptions, AF = 1.73E+06 m^3/workday is:

$$C_{air} = M/AF$$

where:

C_{air} = EPC in air (mg/m^3)

Equations:

(1) The mass (M) of a contaminant present in the defined volume of groundwater and assumed to volatilize in an 8 hour workday is:

$$M = C_{gw} \times V \times 0.5$$

where:

M	=	mass of contaminant volatilizing from groundwater per 8 hour workday (mg/workday)
C_{gw}	=	maximum or mean concentration in groundwater (mg/m^3) ~~(from Table X-X)~~
V	=	volume of groundwater (m^3)
0.5	=	50 percent volatilization in 8 hours (unitless)

(2) The air flow (AF) through the "box" in an 8 hour word day is:

$$AF = Air_{ws} \times A \times ET \times CF$$

where:

AF	=	air flow through the box in 8 hours (m^3/workday)
Air_{ws}	=	air speed (m/sec)
A	=	area of the face of the "box" (m^2)
ET	=	time of exposure (hr/day)
CF	=	conversion factor (3600 sec/hr)

Based on the above assumptions, AF = 1.73E+06 m^3/workday is:

$$C_{air} = M/AF$$

where:

C_{air} = EPC in air (mg/m^3)

TABLE C.4-2
GROUNDWATER CONTAMINANT RELEASE ANALYSIS - CONSTRUCTION SCENARIO

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, NEW YORK

Compound	Maximum Cgw (mg/m^3)	Mean Cgw (mg/m^3)	Maximum M (mg/workday)	Mean M (mg/workday)	Maximum Cair (mg/m^3)	Mean Cair (mg/m^3)
ONSITE OVERBURDEN GROUNDWATER						
1,2-Dichlorobenzene	2.4	0.0870	360	13.05	2.1E-04	7.5E-06
1,2-Dichloroethane	0.093	0.0086	13.95	1.29	8.1E-06	7.5E-07
1,4-Dichlorobenzene	0.12	0.0068	18	1.02	1.0E-05	5.9E-07
Benzene	0.062	0.0117	9.3	1.76	5.4E-06	1.0E-06
Bromoform	0.54	0.0267	81	4.01	4.7E-05	2.3E-06
Carbon tetrachloride	17	0.7747	2550	116.21	1.5E-03	6.7E-05
Chlorobenzene	2.5	0.1422	375	21.33	2.2E-04	1.2E-05
Chloroform	50	2.1966	7500	329.49	4.3E-03	1.9E-04
Methylene chloride	35	1.0144	5250	152.16	3.0E-03	8.8E-05
Tetrachloroethene	2	0.1018	300	15.27	1.7E-04	8.8E-06
Toluene	4.6	0.1763	690	26.45	4.0E-04	1.5E-05
Trichloroethene	0.39	0.0137	58.5	2.06	3.4E-05	1.2E-06
Vinyl chloride	0.012	0.0057	1.8	0.86	1.0E-06	5.0E-07
OFFSITE OVERBURDEN GROUNDWATER						
1,2-Dichloroethane	0.17	0.0068	25.5	1.02	1.5E-05	5.9E-07
Benzene	0.21	0.0207	31.5	3.10	1.8E-05	1.8E-06
Chlorobenzene	0.62	0.0441	93	6.62	5.4E-05	3.8E-06
Chloroform	1.5	0.0845	225	12.67	1.3E-04	7.3E-06
Methylene chloride	2.5	0.0877	375	13.16	2.2E-04	7.6E-06
Tetrachloroethene	0.34	0.0161	51	2.42	2.9E-05	1.4E-06
Trichloroethene	0.3	0.0200	45	3.00	2.6E-05	1.7E-06
Vinyl chloride	0.018	0.0022	2.7	0.33	1.6E-06	1.9E-07
KODAK PROPERTY GROUNDWATER						
1,1-Dichloroethane	0.003	0.003	0.45	0.45	2.6E-07	2.6E-07
1,1-Dichloroethene	0.003	0.003	0.45	0.45	2.6E-07	2.6E-07
1,2-Dichlorobenzene	0.027	0.005	4.05	0.75	2.3E-06	4.3E-07
1,2-Dichloroethane	0.015	0.0047	2.25	0.71	1.3E-06	4.1E-07
1,2-Dichloroethene (to	0.062	0.0114	9.3	1.71	5.4E-06	9.9E-07
1,2-Dichloropropene	0.002	0.002	0.3	0.30	1.7E-07	1.7E-07
1,4-Dichlorobenzene	0.003	0.002	0.45	0.30	2.6E-07	1.7E-07
2-Butanone	0.041	0.0135	6.15	2.03	3.6E-06	1.2E-06
4-Methyl-2-Pentanor	0.019	0.0066	2.85	0.99	1.6E-06	5.7E-07
Acetone	1.3	0.1867	195	28.01	1.1E-04	1.6E-05
Benzene	0.14	0.0219	21	3.28	1.2E-05	1.9E-06
Carbon Tetrachloride	0.0006	0.002	0.09	0.30	5.2E-08	1.7E-07
Chlorobenzene	0.22	0.0006	33	0.09	1.9E-05	5.2E-08
Chloroform	3.4	0.3443	510	51.64	2.9E-04	3.0E-05
Ethylbenzene	0.0009	0.0009	0.135	0.14	7.8E-08	7.8E-08
Methylene Chloride	5.6	0.5614	840	84.21	4.9E-04	4.9E-05
Tetrachloroethene	0.32	0.0336	48	5.04	2.8E-05	2.9E-06
Toluene	1.8	0.208	270	31.20	1.6E-04	1.8E-05
Total Xylenes	0.013	0.0075	1.95	1.13	1.1E-06	6.5E-07
Trichloroethene	0.37	0.0671	55.5	10.07	3.2E-05	5.8E-06
Vinyl Chloride	0.085	0.0103	12.75	1.55	7.4E-06	8.9E-07

C-5 RISK CALCULATIONS

ONSSC-M	31-Aug-94

TABLE C.5-1
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
INGESTION RATE	IR	50	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2
SURFACE AREA EXPOSED	SA	2,200	cm^2
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	unitless

Notes:
For noncarcinogenic effects: AT = ED

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-1, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	34	5.9E-06	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	4.3E-06	Not Evaluated	4.3E-06	8.56%
Benzo(a)pyrene	27	4.7E-06			7.3E+00		3.4E-05		3.4E-05	68.00%
Benzo(b)fluoranthene	35	6.1E-06			7.3E-01		4.5E-06		4.5E-06	8.81%
Benzo(k)fluoranthene	22	3.8E-06			7.3E-02		2.8E-07		2.8E-07	0.55%
Chrysene	37	6.5E-06			7.3E-03		4.7E-08		4.7E-08	0.09%
Dibenzo(a,h)Anthracene	2.9	5.1E-07			7.3E+00		3.7E-06		3.7E-06	7.30%
Indeno(1,2,3-c,d)Pyrene	15	2.6E-06			7.3E-01		1.9E-06		1.9E-06	3.78%
Arsenic	4.8	8.4E-07			1.75E+00		1.5E-06		1.5E-06	2.90%
						SUMMARY CANCER RISK	5E-05	0E+00	5E-05	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.54	2.6E-07	Not Evaluated	Not Evaluated	3.0E-02	Not Evaluated	8.81E-06	Not Evaluated	8.81E-06	0.00%
Acenaphthene	3.9	1.9E-06			6.0E-02		3.18E-05		3.18E-05	0.01%
Acenaphthylene	0.087	4.3E-08			3.0E-02		1.42E-06		1.42E-06	0.00%
Anthracene	10	4.9E-06			3.0E-01		1.63E-05		1.63E-05	0.00%
Benzo(a)anthracene	34	1.7E-05			3.0E-02		5.54E-04		5.54E-04	0.15%
Benzo(a)pyrene	27	1.3E-05			3.0E-02		4.40E-04		4.40E-04	0.12%
Benzo(b)fluoranthene	35	1.7E-05			3.0E-02		5.71E-04		5.71E-04	0.15%
Benzo(g,h,i)perylene	11	5.4E-06			3.0E-02		1.79E-04		1.79E-04	0.05%
Benzo(k)fluoranthene	22	1.1E-05			3.0E-02		3.59E-04		3.59E-04	0.09%
Chrysene	37	1.8E-05			3.0E-02		6.03E-04		6.03E-04	0.16%
Dibenzo(a,h)Anthracene	2.9	1.4E-06			3.0E-02		4.73E-05		4.73E-05	0.01%
Fluoranthene	74	3.6E-05			4.0E-02		9.05E-04		9.05E-04	0.24%
Fluorene	4.8	2.3E-06			4.0E-02		5.87E-05		5.87E-05	0.02%
Indeno(1,2,3-c,d)Pyrene	15	7.3E-06			3.0E-02		2.45E-04		2.45E-04	0.06%
Naphthalene	0.37	1.8E-07			3.0E-02		6.03E-06		6.03E-06	0.00%
Phenanthrene	48	2.3E-05			3.0E-02		7.83E-04		7.83E-04	0.21%
Pyrene	62	3.0E-05			3.0E-02		1.01E-03		1.01E-03	0.27%
Arsenic	4.8	2.3E-06			3.0E-04		7.83E-03		7.83E-03	2.07%
Chromium	180	8.8E-05			5.0E-03		1.76E-02		1.76E-02	4.66%
Manganese	1200	5.9E-04			1.4E-01		4.19E-03		4.19E-03	1.11%
Mercury	210	1.0E-04			3.0E-04		3.42E-01		3.42E-01	90.62%
						SUMMARY HAZARD INDEX	0.4	0	0.4	

TABLE C.5-2

INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ON-SITE FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
VOLATILIZATION FACTOR*	VF	Calculated	m³/kg
PARTICULATE EMISSION FACTOR	PEF	4.63E+09	m³/kg
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x 1/PEF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-2, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ON-SITE FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	34			7.34E-09	5.1E-10	ND		
Benzo(a)pyrene	27			5.83E-09	4.1E-10	ND		
Benzo(b)fluoranthene	35			7.56E-09	5.3E-10	ND		
Benzo(k)fluoranthene	22			4.75E-09	3.3E-10	ND		
Chrysene	37			7.99E-09	5.6E-10	ND		
Dibenzo(a,h)Anthracene	2.9			6.26E-10	4.4E-11	ND		
Indeno(1,2,3-c,d)Pyrene	15			3.24E-09	2.3E-10	ND		
Arsenic	4.8			1.04E-09	7.2E-11	5.0E+01	3.6E-09	3.15%
Chromium	180			3.89E-08	2.7E-09	4.1E+01	1.1E-07	96.85%
						SUMMARY CANCER RISK	1E-07	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.54			1.17E-10	2.3E-11	ND		
Acenaphthene	3.9			8.42E-10	1.6E-10	ND		
Acenaphthylene	0.087			1.88E-11	3.7E-12	ND		
Anthracene	10			2.16E-09	4.2E-10	ND		
Benzo(a)anthracene	34			7.34E-09	1.4E-09	ND		
Benzo(a)pyrene	27			5.83E-09	1.1E-09	ND		
Benzo(b)fluoranthene	35			7.56E-09	1.5E-09	ND		
Benzo(g,h,i)perylene	11			2.38E-09	4.6E-10	ND		
Benzo(k)fluoranthene	22			4.75E-09	9.3E-10	ND		
Chrysene	37			7.99E-09	1.6E-09	ND		
Dibenzo(a,h)Anthracene	2.9			6.26E-10	1.2E-10	ND		
Fluoranthene	74			1.60E-08	3.1E-09	ND		
Fluorene	4.8			1.04E-09	2.0E-10	ND		
Indeno(1,2,3-c,d)Pyrene	15			3.24E-09	6.3E-10	ND		
Naphthalene	0.37			7.99E-11	1.6E-11	ND		
Phenanthrene	48			1.04E-08	2.0E-09	ND		
Pyrene	62			1.34E-08	2.6E-09	ND		
Arsenic	4.8			1.04E-09	2.0E-10	ND		
Chromium	180			3.89E-08	7.6E-09	ND		
Manganese	1200			2.59E-07	5.1E-08	1.4E-05	3.6E-03	97.22%
Mercury	210			4.54E-08	8.9E-09	8.6E-05	1.0E-04	2.78%
						SUMMARY HAZARD INDEX	0.004	

TABLE C.5-3

ONSSC-A	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ON-SITE FACILITY SURFACE SOIL (0-2 feet) - AVERAGE CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
INGESTION RATE	IR	50	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2
SURFACE AREA EXPOSED	SA	2,200	cm^2
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	unitless

Notes:
For noncarcinogenic effects: AT = ED

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-3, continued

ONSSC-A	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ON-SITE FACILITY SURFACE SOIL (0-2 feet) - AVERAGE CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	7.578	1.3E-06	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	9.7E-07	Not Evaluated	9.7E-07	7.84%
Benzo(a)pyrene	6.177	1.1E-06			7.3E+00		7.9E-06		7.9E-06	63.94%
Benzo(b)fluoranthene	8.322	1.5E-06			7.3E-01		1.1E-06		1.1E-06	8.61%
Benzo(k)fluoranthene	5.050	8.8E-07			7.3E-02		6.4E-08		6.4E-08	0.52%
Chrysene	8.290	1.4E-06			7.3E-03		1.1E-08		1.1E-08	0.09%
Dibenzo(a,h)Anthracene	0.710	1.2E-07			7.3E+00		9.0E-07		9.0E-07	7.34%
Indeno(1,2,3-c,d)Pyrene	3.347	5.8E-07			7.3E-01		4.3E-07		4.3E-07	3.46%
Arsenic	3.3	5.8E-07			1.75E+00		1.0E-06		1.0E-06	8.19%
					SUMMARY CANCER RISK		1E-05	0E+00	1E-05	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.219	1.1E-07	Not Evaluated	Not Evaluated	3.0E-02	Not Evaluated	3.57E-06	Not Evaluated	3.57E-06	0.00%
Acenaphthene	0.881	4.3E-07			6.0E-02		7.18E-06		7.18E-06	0.01%
Acenaphthylene	0.156	7.6E-08			3.0E-02		2.55E-06		2.55E-06	0.00%
Anthracene	2.169	1.1E-06			3.0E-01		3.54E-06		3.54E-06	0.00%
Benzo(a)anthracene	7.578	3.7E-06			3.0E-02		1.24E-04		1.24E-04	0.15%
Benzo(a)pyrene	6.177	3.0E-06			3.0E-02		1.01E-04		1.01E-04	0.12%
Benzo(b)fluoranthene	8.322	4.1E-06			3.0E-02		1.36E-04		1.36E-04	0.16%
Benzo(g,h,i)perylene	2.508	1.2E-06			3.0E-02		4.09E-05		4.09E-05	0.05%
Benzo(k)fluoranthene	5.050	2.5E-06			3.0E-02		8.24E-05		8.24E-05	0.10%
Chrysene	8.290	4.1E-06			3.0E-02		1.35E-04		1.35E-04	0.16%
Dibenzo(a,h)Anthracene	0.710	3.5E-07			3.0E-02		1.16E-05		1.16E-05	0.01%
Fluoranthene	16.274	8.0E-06			4.0E-02		1.99E-04		1.99E-04	0.24%
Fluorene	1.100	5.4E-07			4.0E-02		1.35E-05		1.35E-05	0.02%
Indeno(1,2,3-c,d)Pyrene	3.347	1.6E-06			3.0E-02		5.46E-05		5.46E-05	0.07%
Naphthalene	0.169	8.3E-08			3.0E-02		2.76E-06		2.76E-06	0.00%
Phenanthrene	10.400	5.1E-06			3.0E-02		1.70E-04		1.70E-04	0.20%
Pyrene	14.000	6.8E-06			3.0E-02		2.28E-04		2.28E-04	0.28%
Arsenic	3.3	1.6E-06			3.0E-04		5.38E-03		5.38E-03	6.50%
Chromium	52.8	2.6E-05			5.0E-03		5.16E-03		5.16E-03	6.24%
Manganese	455.0	2.2E-04			1.4E-01		1.59E-03		1.59E-03	1.92%
Mercury	42.49	2.1E-05			3.0E-04		6.93E-02		6.93E-02	83.74%
					SUMMARY HAZARD INDEX		0.08	0	0.08	

ONSSIC–A	31–Aug–94

TABLE C.5–4
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ON–SITE FACILITY SURFACE SOIL (0–2 feet) – AVERAGE CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
VOLATILIZATION FACTOR*	VF	Calculated	m³/kg
PARTICULATE EMISSION FACTOR	PEF	4.63E+09	m³/kg
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg–day) x CANCER SLOPE FACTOR (mg/kg–day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg–day) / REFERENCE DOSE (mg/kg–day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x 1/PEF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-4, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ON-SITE FACILITY SURFACE SOIL (0-2 feet) - AVERAGE CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	7.578			1.64E-09	1.1E-10	ND		
Benzo(a)pyrene	6.177			1.33E-09	9.3E-11	ND		
Benzo(b)fluoranthene	8.322			1.80E-09	1.3E-10	ND		
Benzo(k)fluoranthene	5.050			1.09E-09	7.6E-11	ND		
Chrysene	8.290			1.79E-09	1.3E-10	ND		
Dibenzo(a,h)Anthracene	0.710			1.53E-10	1.1E-11	ND		
Indeno(1,2,3-c,d)Pyrene	3.347			7.23E-10	5.1E-11	ND		
Arsenic	3.3			7.13E-10	5.0E-11	5.0E+01	2.5E-09	7.08%
Chromium	52.8			1.14E-08	8.0E-10	4.1E+01	3.3E-08	92.92%
						SUMMARY CANCER RISK	4E-08	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.219			4.73E-11	9.2E-12	ND		
Acenaphthene	0.881			1.90E-10	3.7E-11	ND		
Acenaphthylene	0.087			1.88E-11	3.7E-12	ND		
Anthracene	2.169			4.69E-10	9.2E-11	ND		
Benzo(a)anthracene	7.578			1.64E-09	3.2E-10	ND		
Benzo(a)pyrene	6.177			1.33E-09	2.6E-10	ND		
Benzo(b)fluoranthene	8.322			1.80E-09	3.5E-10	ND		
Benzo(g,h,i)perylene	2.508			5.42E-10	1.1E-10	ND		
Benzo(k)fluoranthene	5.050			1.09E-09	2.1E-10	ND		
Chrysene	8.290			1.79E-09	3.5E-10	ND		
Dibenzo(a,h)Anthracene	0.710			1.53E-10	3.0E-11	ND		
Fluoranthene	16.274			3.51E-09	6.9E-10	ND		
Fluorene	1.100			2.38E-10	4.6E-11	ND		
Indeno(1,2,3-c,d)Pyrene	3.347			7.23E-10	1.4E-10	ND		
Naphthalene	0.169			3.66E-11	7.2E-12	ND		
Phenanthrene	10.400			2.25E-09	4.4E-10	ND		
Pyrene	14.000			3.02E-09	5.9E-10	ND		
Arsenic	3.3			7.13E-10	1.4E-10	ND		
Chromium	52.8			1.14E-08	2.2E-09	ND		
Manganese	455.0			9.83E-08	1.9E-08	1.4E-05	1.4E-03	98.50%
Mercury	42.49			9.18E-09	1.8E-09	8.6E-05	2.1E-05	1.50%
						SUMMARY HAZARD INDEX	0.001	

TABLE C.5-5

OFSSC-M	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE NON-FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
INGESTION RATE	IR	50	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2
SURFACE AREA EXPOSED	SA	2,200	cm^2
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	unitless

Notes:
For noncarcinogenic effects: AT = ED

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-5, continued | OFSSC-M | 31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE NON-FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	1.6	2.8E-07	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	2.0E-07	Not Evaluated	2.0E-07	3.48%
Benzo(a)pyrene	1.2	2.1E-07			7.3E+00		1.5E-06		1.5E-06	26.08%
Benzo(b)fluoranthene	2	3.5E-07			7.3E-01		2.6E-07		2.6E-07	4.35%
Benzo(k)fluoranthene	1.3	2.3E-07			7.3E-02		1.7E-08		1.7E-08	0.28%
Chrysene	1.5	2.6E-07			7.3E-03		1.9E-09		1.9E-09	0.03%
Dibenzo(a,h)Anthracene	0.11	1.9E-08			7.3E+00		1.4E-07		1.4E-07	2.39%
Indeno(1,2,3-c,d)Pyrene	0.4	7.0E-08			7.3E-01		5.1E-08		5.1E-08	0.87%
Arsenic	12	2.1E-06			1.75E+00		3.7E-06		3.7E-06	62.52%
Cadmium	0.8	1.4E-07	0.01	6.2E-08	ND	ND				
Chromium	150	2.6E-05			ND					
					SUMMARY CANCER RISK		6E-06	0E+00	6E-06	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.087	4.3E-08	Not Evaluated	Not Evaluated	3.0E-02	Not Evaluated	1.42E-06	Not Evaluated	1.42E-06	0.00%
Acenaphthene	0.27	1.3E-07			6.0E-02		2.20E-06		2.20E-06	0.01%
Acenaphthylene	0.17	8.3E-08			3.0E-02		2.77E-06		2.77E-06	0.01%
Anthracene	0.48	2.3E-07			3.0E-01		7.83E-07		7.83E-07	0.00%
Benzo(a)anthracene	1.6	7.8E-07			3.0E-02		2.61E-05		2.61E-05	0.06%
Benzo(a)pyrene	1.2	5.9E-07			3.0E-02		1.96E-05		1.96E-05	0.05%
Benzo(b)fluoranthene	2	9.8E-07			3.0E-02		3.26E-05		3.26E-05	0.08%
Benzo(g,h,i)perylene	0.22	1.1E-07			3.0E-02		3.59E-06		3.59E-06	0.01%
Benzo(k)fluoranthene	1.3	6.4E-07			3.0E-02		2.12E-05		2.12E-05	0.05%
Chrysene	1.5	7.3E-07			3.0E-02		2.45E-05		2.45E-05	0.06%
Dibenzo(a,h)Anthracene	0.11	5.4E-08			3.0E-02		1.79E-06		1.79E-06	0.00%
Fluoranthene	2.8	1.4E-06			4.0E-02		3.42E-05		3.42E-05	0.08%
Fluorene	0.27	1.3E-07			4.0E-02		3.30E-06		3.30E-06	0.01%
Indeno(1,2,3-c,d)Pyrene	0.4	2.0E-07			3.0E-02		6.52E-06		6.52E-06	0.02%
Naphthalene	0.061	3.0E-08			3.0E-02		9.95E-07		9.95E-07	0.00%
Phenanthrene	1.9	9.3E-07			3.0E-02		3.10E-05		3.10E-05	0.07%
Pyrene	3	1.5E-06			3.0E-02		4.89E-05		4.89E-05	0.11%
Arsenic	12	5.9E-06			3.0E-04		1.96E-02		1.96E-02	45.83%
Barium	110	5.4E-05			7.0E-02		7.69E-04		7.69E-04	1.80%
Cadmium	0.8	3.9E-07	0.01	1.7E-07	1.0E-03	5E-05	3.91E-04	1.72E-04	5.64E-04	1.32%
Chromium	150	7.3E-05			5.0E-03		1.47E-02		1.47E-02	34.37%
Copper	48	2.3E-05			3.7E-02		6.35E-04		6.35E-04	1.49%
Manganese	760	3.7E-04			1.4E-01		2.66E-03		2.66E-03	6.22%
Mercury	0.4	2.0E-07			3.0E-04		6.52E-04		6.52E-04	1.53%
Nickel	62	3.0E-05			2.0E-02		1.52E-03		1.52E-03	3.55%
Vanadium	20	9.8E-06			7.0E-03		1.40E-03		1.40E-03	3.27%
					SUMMARY HAZARD INDEX		0.04	0.0002	0.04	

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TABLE C.5–6
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ONSITE NON–FACILITY SURFACE SOIL (0–2 feet) – MAXIMUM CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
VOLATILIZATION FACTOR*	VF	Calculated	m³/kg
PARTICULATE EMISSION FACTOR	PEF	4.63E+09	m³/kg
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg–day) x CANCER SLOPE FACTOR (mg/kg–day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg–day) / REFERENCE DOSE (mg/kg–day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

AIR CONCENTRATION PARTICULATES = CS x 1/PEF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-6, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ONSITE NON-FACILITY SURFACE SOIL (0-2 feet) - MAXIMUM CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	1.6			3.46E-10	2.4E-11	ND		
Benzo(a)pyrene	1.2			2.59E-10	1.8E-11	ND		
Benzo(b)fluoranthene	2			4.32E-10	3.0E-11	ND		
Benzo(k)fluoranthene	1.3			2.81E-10	2.0E-11	ND		
Chrysene	1.5			3.24E-10	2.3E-11	ND		
Dibenzo(a,h)Anthracene	0.11			2.38E-11	1.7E-12	ND		
Indeno(1,2,3-c,d)Pyrene	0.4			8.64E-11	6.0E-12	ND		
Arsenic	12			2.59E-09	1.8E-10	5.0E+01	9.1E-09	8.88%
Cadmium	0.8			1.73E-10	1.2E-11	6.1E+00	7.4E-11	0.07%
Chromium	150			3.24E-08	2.3E-09	4.1E+01	9.3E-08	91.05%
						SUMMARY CANCER RISK	**1E-07**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.087			1.88E-11	3.7E-12	ND		
Acenaphthene	0.27			5.83E-11	1.1E-11	ND		
Acenaphthylene	0.17			3.67E-11	7.2E-12	ND		
Anthracene	0.48			1.04E-10	2.0E-11	ND		
Benzo(a)anthracene	1.6			3.46E-10	6.8E-11	ND		
Benzo(a)pyrene	1.2			2.59E-10	5.1E-11	ND		
Benzo(b)fluoranthene	2			4.32E-10	8.5E-11	ND		
Benzo(g,h,i)perylene	0.22			4.75E-11	9.3E-12	ND		
Benzo(k)fluoranthene	1.3			2.81E-10	5.5E-11	ND		
Chrysene	1.5			3.24E-10	6.3E-11	ND		
Dibenzo(a,h)Anthracene	0.11			2.38E-11	4.6E-12	ND		
Fluoranthene	2.8			6.05E-10	1.2E-10	ND		
Fluorene	0.27			5.83E-11	1.1E-11	ND		
Indeno(1,2,3-c,d)Pyrene	0.4			8.64E-11	1.7E-11	ND		
Naphthalene	0.061			1.32E-11	2.6E-12	ND		
Phenanthrene	1.9			4.10E-10	8.0E-11	ND		
Pyrene	3			6.48E-10	1.3E-10	ND		
Arsenic	12			2.59E-09	5.1E-10	ND		
Barium	110			2.38E-08	4.6E-09	1.0E-04	4.6E-05	1.99%
Cadmium	0.8			1.73E-10	3.4E-11	ND		
Chromium	150			3.24E-08	6.3E-09	ND		
Copper	48			1.04E-08	2.0E-09	ND		
Manganese	760			1.64E-07	3.2E-08	1.4E-05	2.3E-03	98.01%
Mercury	0.4			8.64E-11	1.7E-11	8.6E-05	2.0E-07	0.01%
Nickel	62			1.34E-08	2.6E-09	ND		
Vanadium	20			4.32E-09	8.5E-10	ND		
						SUMMARY HAZARD INDEX	**0.002**	

TABLE C.5-7

OFSSC-A	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE NON-FACILITY SURFACE SOIL (0-2 feet) - AVERAGE CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
INGESTION RATE	IR	50	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2
SURFACE AREA EXPOSED	SA	2,200	cm^2
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	unitless

Notes:
For noncarcinogenic effects: AT = ED

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-7, continued | OFSSC-A | 31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE NON-FACILITY SURFACE SOIL (0-2 feet) - AVERAGE CONCENTRATION
CURRENT AND FUTURE INDUSTRIAL/COMMERCIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	0.643	1.1E-07	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	8.2E-08	Not Evaluated	8.2E-08	2.96%
Benzo(a)pyrene	0.563	9.8E-08			7.3E+00		7.2E-07		7.2E-07	25.98%
Benzo(b)fluoranthene	1.003	1.8E-07			7.3E-01		1.3E-07		1.3E-07	4.62%
Benzo(k)fluoranthene	0.703	1.2E-07			7.3E-02		9.0E-09		9.0E-09	0.32%
Chrysene	0.761	1.3E-07			7.3E-03		9.7E-10		9.7E-10	0.04%
Dibenzo(a,h)Anthracene	0.11	1.9E-08			7.3E+00		1.4E-07		1.4E-07	5.07%
Indeno(1,2,3-c,d)Pyrene	0.198	3.5E-08			7.3E-01		2.5E-08		2.5E-08	0.91%
Arsenic	5.4	9.5E-07			1.75E+00		1.7E-06		1.7E-06	60.08%
Cadmium	0.5	8.3E-08	0.01	3.7E-08	ND	ND				
Chromium	28.0	4.9E-06			ND					
					SUMMARY CANCER RISK		3E-06	0E+00	3E-06	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.087	4.3E-08	Not Evaluated	Not Evaluated	3.0E-02	Not Evaluated	1.42E-06	Not Evaluated	1.42E-06	0.01%
Acenaphthene	0.103	5.1E-08			6.0E-02		8.42E-07		8.42E-07	0.01%
Acenaphthylene	0.110	5.4E-08			3.0E-02		1.79E-06		1.79E-06	0.01%
Anthracene	0.179	8.7E-08			3.0E-01		2.91E-07		2.91E-07	0.00%
Benzo(a)anthracene	0.643	3.1E-07			3.0E-02		1.05E-05		1.05E-05	0.06%
Benzo(a)pyrene	0.563	2.8E-07			3.0E-02		9.19E-06		9.19E-06	0.06%
Benzo(b)fluoranthene	1.003	4.9E-07			3.0E-02		1.63E-05		1.63E-05	0.10%
Benzo(g,h,i)perylene	0.147	7.2E-08			3.0E-02		2.40E-06		2.40E-06	0.01%
Benzo(k)fluoranthene	0.703	3.4E-07			3.0E-02		1.15E-05		1.15E-05	0.07%
Chrysene	0.761	3.7E-07			3.0E-02		1.24E-05		1.24E-05	0.08%
Dibenzo(a,h)Anthracene	0.11	5.4E-08			3.0E-02		1.79E-06		1.79E-06	0.01%
Fluoranthene	1.226	6.0E-07			4.0E-02		1.50E-05		1.50E-05	0.09%
Fluorene	0.175	8.5E-08			4.0E-02		2.14E-06		2.14E-06	0.01%
Indeno(1,2,3-c,d)Pyrene	0.198	9.7E-08			3.0E-02		3.23E-06		3.23E-06	0.02%
Naphthalene	0.061	3.0E-08			3.0E-02		9.95E-07		9.95E-07	0.01%
Phenanthrene	0.672	3.3E-07			3.0E-02		1.10E-05		1.10E-05	0.07%
Pyrene	1.178	5.8E-07			3.0E-02		1.92E-05		1.92E-05	0.12%
Arsenic	5.4	2.7E-06			3.0E-04		8.86E-03		8.86E-03	54.25%
Barium	60.0	2.9E-05			7.0E-02		4.19E-04		4.19E-04	2.57%
Cadmium	0.5	2.3E-07	0.01	1.0E-07	1.0E-03	5E-05	2.32E-04	1.02E-04	3.35E-04	2.05%
Chromium	28.0	1.4E-05			5.0E-03		2.74E-03		2.74E-03	16.80%
Copper	20.6	1.0E-05			3.7E-02		2.72E-04		2.72E-04	1.67%
Manganese	428.3	2.1E-04			1.4E-01		1.50E-03		1.50E-03	9.16%
Mercury	0.20	9.8E-08			3.0E-04		3.26E-04		3.26E-04	2.00%
Nickel	23.6	1.2E-05			2.0E-02		5.77E-04		5.77E-04	3.53%
Vanadium	16.9	8.3E-06			7.0E-03		1.18E-03		1.18E-03	7.24%
					SUMMARY HAZARD INDEX		0.02	0.0001	0.02	

TABLE C.5–8
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ONSITE NON–FACILITY SURFACE SOIL (0–2 feet) – AVERAGE CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m^3
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m^3
VOLATILIZATION FACTOR*	VF	Calculated	m^3/kg
PARTICULATE EMISSION FACTOR	PEF	4.63E+09	m^3/kg
INHALATION RATE	IhR	2.5	m^3/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	250	days/year
EXPOSURE DURATION	ED	25	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	25	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg–day) x CANCER SLOPE FACTOR $(mg/kg–day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg–day) / REFERENCE DOSE (mg/kg–day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x 1/PEF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-8, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN ONSITE NON-FACILITY SURFACE SOIL (0-2 feet) - AVERAGE CONCENTRATION
CURRENT AND FUTURE COMMERCIAL/INDUSTRIAL WORKER
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	0.643			1.39E-10	9.7E-12	ND		
Benzo(a)pyrene	0.563			1.22E-10	8.5E-12	ND		
Benzo(b)fluoranthene	1.003			2.17E-10	1.5E-11	ND		
Benzo(k)fluoranthene	0.703			1.52E-10	1.1E-11	ND		
Chrysene	0.761			1.64E-10	1.1E-11	ND		
Dibenzo(a,h)Anthracene	0.11			2.38E-11	1.7E-12	ND		
Indeno(1,2,3-c,d)Pyrene	0.198			4.28E-11	3.0E-12	ND		
Arsenic	5.4			1.17E-09	8.2E-11	5.0E+01	4.1E-09	19.08%
Cadmium	0.5			1.03E-10	7.2E-12	6.1E+00	4.4E-11	0.20%
Chromium	28.0			6.05E-09	4.2E-10	4.1E+01	1.7E-08	80.72%
						SUMMARY CANCER RISK	**2E-08**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2-Methylnaphthalene	0.087			1.88E-11	3.7E-12	ND		
Acenaphthene	0.103			2.23E-11	4.4E-12	ND		
Acenaphthylene	0.110			2.37E-11	4.6E-12	ND		
Anthracene	0.179			3.86E-11	7.5E-12	ND		
Benzo(a)anthracene	0.643			1.39E-10	2.7E-11	ND		
Benzo(a)pyrene	0.563			1.22E-10	2.4E-11	ND		
Benzo(b)fluoranthene	1.003			2.17E-10	4.2E-11	ND		
Benzo(g,h,i)perylene	0.147			3.17E-11	6.2E-12	ND		
Benzo(k)fluoranthene	0.703			1.52E-10	3.0E-11	ND		
Chrysene	0.761			1.64E-10	3.2E-11	ND		
Dibenzo(a,h)Anthracene	0.11			2.38E-11	4.6E-12	ND		
Fluoranthene	1.226			2.65E-10	5.2E-11	ND		
Fluorene	0.175			3.77E-11	7.4E-12	ND		
Indeno(1,2,3-c,d)Pyrene	0.198			4.28E-11	8.4E-12	ND		
Naphthalene	0.061			1.32E-11	2.6E-12	ND		
Phenanthrene	0.672			1.45E-10	2.8E-11	ND		
Pyrene	1.178			2.54E-10	5.0E-11	ND		
Arsenic	5.4			1.17E-09	2.3E-10	ND		
Barium	60.0			1.30E-08	2.5E-09	1.0E-04	2.5E-05	1.92%
Cadmium	0.5			1.03E-10	2.0E-11	ND		
Chromium	28.0			6.05E-09	1.2E-09	ND		
Copper	20.6			4.45E-09	8.7E-10	ND		
Manganese	428.3			9.25E-08	1.8E-08	1.4E-05	1.3E-03	98.07%
Mercury	0.20			4.32E-11	8.5E-12	8.6E-05	9.8E-08	0.01%
Nickel	23.6			5.09E-09	1.0E-09	ND		
Vanadium	16.9			3.65E-09	7.2E-10	ND		
						SUMMARY HAZARD INDEX	**0.001**	

TABLE C.5-9
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
INGESTION RATE	IR	480	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	Unitless

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-9, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	34	2.7E-07	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	2.0E-07	Not Evaluated	2.0E-07	8.21%
Benzo(a)pyrene	27	2.2E-07			7.3E+00		1.6E-06		1.6E-06	65.16%
Benzo(b)fluoranthene	35	2.8E-07			7.3E-01		2.1E-07		2.1E-07	8.45%
Benzo(k)fluoranthene	22	1.8E-07			7.3E-02		1.3E-08		1.3E-08	0.53%
Chrysene	37	3.0E-07			7.3E-03		2.2E-09		2.2E-09	0.09%
Dibenzo(a,h)Anthracene	2.9	2.3E-08			7.3E+00		1.7E-07		1.7E-07	7.00%
Indeno(1,2,3-c,d)Pyrene	15	1.2E-07			7.3E-01		8.8E-08		8.8E-08	3.62%
Arsenic	12	9.7E-08			1.75E+00		1.7E-07		1.7E-07	6.94%
Chromium	180	1.4E-06			ND					
					SUMMARY CANCER RISK		**2E-06**	**0E+00**	**2E-06**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	3.1	2.2E-05	Not Evaluated	Not Evaluated	1.0E-03	Not Evaluated	2.18E-02	Not Evaluated	2.18E-02	0.41%
2-Chloropyridine	12	8.5E-05			1.0E-02		8.45E-03		8.45E-03	0.16%
2-Methylnaphthalene	0.54	3.8E-06			3.0E-01		1.27E-05		1.27E-05	0.00%
3-Chloropyridine	2.9	2.0E-05			1.0E-02		2.04E-03		2.04E-03	0.04%
Acenaphthene	3.9	2.7E-05			6.0E-01		4.58E-05		4.58E-05	0.00%
Acenaphthylene	0.17	1.2E-06			3.0E-01		3.99E-06		3.99E-06	0.00%
Anthracene	10	7.0E-05			3.0E+00		2.35E-05		2.35E-05	0.00%
Benzo(a)anthracene	34	2.4E-04			3.0E-01		7.98E-04		7.98E-04	0.01%
Benzo(a)pyrene	27	1.9E-04			3.0E-01		6.34E-04		6.34E-04	0.01%
Benzo(b)fluoranthene	35	2.5E-04			3.0E-01		8.22E-04		8.22E-04	0.02%
Benzo(g,h,i)perylene	11	7.7E-05			3.0E-01		2.58E-04		2.58E-04	0.00%
Benzo(k)fluoranthene	22	1.5E-04			3.0E-01		5.17E-04		5.17E-04	0.01%
Chrysene	37	2.6E-04			3.0E-01		8.69E-04		8.69E-04	0.02%
Dibenzo(a,h)Anthracene	2.9	2.0E-05			3.0E-01		6.81E-05		6.81E-05	0.00%
Fluoranthene	74	5.2E-04			4.0E-01		1.30E-03		1.30E-03	0.02%
Fluorene	4.8	3.4E-05			4.0E-01		8.45E-05		8.45E-05	0.00%
Indeno(1,2,3-c,d)Pyrene	15	1.1E-04			3.0E-01		3.52E-04		3.52E-04	0.01%
Naphthalene	0.37	2.6E-06			3.0E-01		8.69E-06		8.69E-06	0.00%
Phenanthrene	48	3.4E-04			3.0E-01		1.13E-03		1.13E-03	0.02%
Pyrene	62	4.4E-04			3.0E-01		1.46E-03		1.46E-03	0.03%
Pyridine	8.4	5.9E-05			1.0E-02		5.92E-03		5.92E-03	0.11%
Arsenic	12	8.5E-05			3.0E-04		2.82E-01		2.82E-01	5.23%
Chromium	180	1.3E-03			2.0E-02		6.34E-02		6.34E-02	1.18%
Manganese	1200	8.5E-03			1.4E-01		6.04E-02		6.04E-02	1.12%
Mercury	210	1.5E-03			3.0E-04		4.93E+00		4.93E+00	91.60%
						SUMMARY HAZARD INDEX	**5**	**0**	**5**	

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TABLE C.5-10
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - MAXIMUM CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m^3
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m^3
VOLATILIZATION FACTOR*	VF	Calculated	m^3/kg
24 HOUR AVERAGE PM10 STANDARD	PM10	5000	ug/m^3
CONVERSION FACTOR	CF	1E-09	kg/ug
INHALATION RATE	IhR	2.5	m^3/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x PM10 x CF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5–10, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0–10 feet) – MAXIMUM CONCENTRATIONS
FUTURE CONSTRUCTION WORKER – ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg–day)	CANCER SLOPE FACTOR (mg/kg–day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	34			0.00017	5.7E–08	ND		
Benzo(a)pyrene	27			0.000135	4.5E–08	ND		
Benzo(b)fluoranthene	35			0.000175	5.9E–08	ND		
Benzo(k)fluoranthene	22			0.00011	3.7E–08	ND		
Chrysene	37			0.000185	6.2E–08	ND		
Dibenzo(a,h)Anthracene	2.9			0.0000145	4.9E–09	ND		
Indeno(1,2,3–c,d)Pyrene	15			0.000075	2.5E–08	ND		
Arsenic	12			0.00006	2.0E–08	5.0E+01	1.0E–06	7.52%
Chromium	180			0.0009	3.0E–07	4.1E+01	1.2E–05	92.48%
						SUMMARY CANCER RISK	**1E–05**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg–day)	REFERENCE DOSE (mg/kg–day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6–Dichloropyridine	3.1			0.0000155	4.5E–06	ND		
2–Chloropyridine	12			0.00006	1.8E–05	ND		
2–Methylnaphthalene	0.54			0.0000027	7.9E–07	ND		
3–Chloropyridine	2.9			0.0000145	4.3E–06	ND		
Acenaphthene	3.9			0.0000195	5.7E–06	ND		
Acenaphthylene	0.17			0.00000085	2.5E–07	ND		
Anthracene	10			0.00005	1.5E–05	ND		
Benzo(a)anthracene	34			0.00017	5.0E–05	ND		
Benzo(a)pyrene	27			0.000135	4.0E–05	ND		
Benzo(b)fluoranthene	35			0.000175	5.1E–05	ND		
Benzo(g,h,i)perylene	11			0.000055	1.6E–05	ND		
Benzo(k)fluoranthene	22			0.00011	3.2E–05	ND		
Chrysene	37			0.000185	5.4E–05	ND		
Dibenzo(a,h)Anthracene	2.9			0.0000145	4.3E–06	ND		
Fluoranthene	74			0.00037	1.1E–04	ND		
Fluorene	4.8			0.000024	7.0E–06	ND		
Indeno(1,2,3–c,d)Pyrene	15			0.000075	2.2E–05	ND		
Naphthalene	0.37			0.00000185	5.4E–07	ND		
Phenanthrene	48			0.00024	7.0E–05	ND		
Pyrene	62			0.00031	9.1E–05	ND		
Pyridine	8.4			0.000042	1.2E–05	ND		
Arsenic	12			0.00006	1.8E–05	ND		
Chromium	180			0.0009	2.6E–04	ND		
Manganese	1200			0.006	1.8E–03	1.4E–05	1.3E+02	97.23%
Mercury	210			0.00105	3.1E–04	8.6E–05	3.6E+00	2.77%
						SUMMARY HAZARD INDEX	**129**	

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TABLE C.5-11
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
INGESTION RATE	IR	480	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm²
SURFACE AREA EXPOSED	SA	5,800	cm²/day
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	Unitless

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-11, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

O-SBC-A1	31-Aug-94

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	1.909	1.5E-08	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	1.1E-08	Not Evaluated	1.1E-08	5.43%
Benzo(a)pyrene	1.573	1.3E-08			7.3E+00		9.2E-08		9.2E-08	44.73%
Benzo(b)fluoranthene	2.184	1.8E-08			7.3E-01		1.3E-08		1.3E-08	6.21%
Benzo(k)fluoranthene	1.364	1.1E-08			7.3E-02		8.0E-10		8.0E-10	0.39%
Chrysene	2.085	1.7E-08			7.3E-03		1.2E-10		1.2E-10	0.06%
Dibenzo(a,h)Anthracene	0.264	2.1E-09			7.3E+00		1.6E-08		1.6E-08	7.50%
Indeno(1,2,3-c,d)Pyrene	0.837	6.7E-09			0.73		4.9E-09		4.9E-09	2.38%
Arsenic	4.9	3.9E-08			1.75E+00		6.9E-08		6.9E-08	33.30%
Chromium	36.1	2.9E-07			ND					
						SUMMARY CANCER RISK	2E-07	0E+00	2E-07	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	0.227	1.6E-06	Not Evaluated	Not Evaluated	1.0E-03	Not Evaluated	1.60E-03	Not Evaluated	1.60E-03	0.30%
2-Chloropyridine	0.787	5.5E-06			1.0E-02		5.54E-04		5.54E-04	0.10%
2-Methylnaphthalene	0.159	1.1E-06			3.0E-01		3.75E-06		3.75E-06	0.00%
3-Chloropyridine	0.265	1.9E-06			1.0E-02		1.87E-04		1.87E-04	0.03%
Acenaphthene	0.307	2.2E-06			6.0E-01		3.60E-06		3.60E-06	0.00%
Acenaphthylene	0.151	1.1E-06			3.0E-01		3.54E-06		3.54E-06	0.00%
Anthracene	0.612	4.3E-06			3.0E+00		1.44E-06		1.44E-06	0.00%
Benzo(a)anthracene	1.909	1.3E-05			3.0E-01		4.48E-05		4.48E-05	0.01%
Benzo(a)pyrene	1.573	1.1E-05			3.0E-01		3.69E-05		3.69E-05	0.01%
Benzo(b)fluoranthene	2.184	1.5E-05			3.0E-01		5.13E-05		5.13E-05	0.01%
Benzo(g,h,i)perylene	0.635	4.5E-06			3.0E-01		1.49E-05		1.49E-05	0.00%
Benzo(k)fluoranthene	1.364	9.6E-06			3.0E-01		3.20E-05		3.20E-05	0.01%
Chrysene	2.085	1.5E-05			3.0E-01		4.90E-05		4.90E-05	0.01%
Dibenzo(a,h)Anthracene	0.264	1.9E-06			3.0E-01		6.19E-06		6.19E-06	0.00%
Fluoranthene	4.014	2.8E-05			4.0E-01		7.07E-05		7.07E-05	0.01%
Fluorene	0.389	2.7E-06			4.0E-01		6.85E-06		6.85E-06	0.00%
Indeno(1,2,3-c,d)Pyrene	0.837	5.9E-06			3.0E-01		1.97E-05		1.97E-05	0.00%
Naphthalene	0.155	1.1E-06			3.0E-01		3.64E-06		3.64E-06	0.00%
Phenanthrene	2.609	1.8E-05			3.0E-01		6.13E-05		6.13E-05	0.01%
Pyrene	3.502	2.5E-05			3.0E-01		8.22E-05		8.22E-05	0.02%
Pyridine	0.484	3.4E-06			1.0E-02		3.41E-04		3.41E-04	0.06%
Arsenic	4.9	3.4E-05			3.0E-04		1.15E-01		1.15E-01	21.27%
Chromium	36.1	2.5E-04			2.0E-02		1.27E-02		1.27E-02	2.36%
Manganese	440.4	3.1E-03			1.4E-01		2.22E-02		2.22E-02	4.11%
Mercury	16.46	1.2E-04			3.0E-04		3.87E-01		3.87E-01	71.67%
						SUMMARY HAZARD INDEX	0.5	0	0.5	

TABLE C.5-12
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - AVERAGE CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
VOLATILIZATION FACTOR*	VF	Calculated	m³/kg
24 HOUR AVERAGE PM10 STANDARD	PM10	5000	ug/m³
CONVERSION FACTOR	CF	1E-09	kg/ug
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x PM10 x CF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-12, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - AVERAGE CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	1.909			0.0000095447	3.2E-09	ND		
Benzo(a)pyrene	1.573			0.0000078649	2.6E-09	ND		
Benzo(b)fluoranthene	2.184			0.0000109192	3.7E-09	ND		
Benzo(k)fluoranthene	1.364			0.0000068204	2.3E-09	ND		
Chrysene	2.085			0.0000104253	3.5E-09	ND		
Dibenzo(a,h)Anthracene	0.264			0.0000013186	4.4E-10	ND		
Indeno(1,2,3-c,d)Pyrene	0.837			0.0000041854	1.4E-09	ND		
Arsenic	4.9			0.0000244231	8.2E-09	5.0E+01	4.1E-07	14.17%
Chromium	36.1			0.0001804231	6.1E-08	4.1E+01	2.5E-06	85.83%
						SUMMARY CANCER RISK	**3E-06**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	0.227			0.0000011349	3.3E-07	ND		
2-Chloropyridine	0.787			0.0000039328	1.2E-06	ND		
2-Methylnaphthalene	0.159			0.0000007974	2.3E-07	ND		
3-Chloropyridine	0.265			0.0000013236	3.9E-07	ND		
Acenaphthene	0.307			0.0000015333	4.5E-07	ND		
Acenaphthylene	0.151			0.0000007545	2.2E-07	ND		
Anthracene	0.612			0.0000030594	9.0E-07	ND		
Benzo(a)anthracene	1.909			0.0000095447	2.8E-06	ND		
Benzo(a)pyrene	1.573			0.0000078649	2.3E-06	ND		
Benzo(b)fluoranthene	2.184			0.0000109192	3.2E-06	ND		
Benzo(g,h,i)perylene	0.635			0.0000031735	9.3E-07	ND		
Benzo(k)fluoranthene	1.364			0.0000068204	2.0E-06	ND		
Chrysene	2.085			0.0000104253	3.1E-06	ND		
Dibenzo(a,h)Anthracene	0.264			0.0000013186	3.9E-07	ND		
Fluoranthene	4.014			0.0000200708	5.9E-06	ND		
Fluorene	0.389			0.000001944	5.7E-07	ND		
Indeno(1,2,3-c,d)Pyrene	0.837			0.0000041854	1.2E-06	ND		
Naphthalene	0.155			0.0000007746	2.3E-07	ND		
Phenanthrene	2.609			0.0000130441	3.8E-06	ND		
Pyrene	3.502			0.0000175094	5.1E-06	ND		
Pyridine	0.484			0.0000024191	7.1E-07	ND		
Arsenic	4.9			0.0000244231	7.2E-06	ND		
Chromium	36.1			0.0001804231	5.3E-05	ND		
Manganese	440.4			0.0022019231	6.5E-04	1.4E-05	4.6E+01	99.40%
Mercury	16.46			0.0000822981	2.4E-05	8.6E-05	2.8E-01	0.60%
						SUMMARY HAZARD INDEX	**46**	

TABLE C.5-13
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
INGESTION RATE	IR	480	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm²
SURFACE AREA EXPOSED	SA	5,800	cm²/day
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	Unitless

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

$$\text{INTAKE-DERMAL} = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-13, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	34	1.6E-06	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	1.2E-06	Not Evaluated	1.2E-06	8.21%
Benzo(a)pyrene	27	1.3E-06			7.3E+00		9.5E-06		9.5E-06	65.16%
Benzo(b)fluoranthene	35	1.7E-06			7.3E-01		1.2E-06		1.2E-06	8.45%
Benzo(k)fluoranthene	22	1.1E-06			7.3E-02		7.8E-08		7.8E-08	0.53%
Chrysene	37	1.8E-06			7.3E-03		1.3E-08		1.3E-08	0.09%
Dibenzo(a,h)Anthracene	2.9	1.4E-07			7.3E+00		1.0E-06		1.0E-06	7.00%
Indeno(1,2,3-c,d)Pyrene	15	7.2E-07			7.3E-01		5.3E-07		5.3E-07	3.62%
Arsenic	12	5.8E-07			1.75E+00		1.0E-06		1.0E-06	6.94%
Chromium	180	8.7E-06			ND					
						SUMMARY CANCER RISK	**1E-05**	**0E+00**	**1E-05**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	3.1	2.1E-05	Not Evaluated	Not Evaluated	1.0E-03	Not Evaluated	2.14E-02	Not Evaluated	2.14E-02	0.41%
2-Chloropyridine	12	8.3E-05			1.0E-02		8.28E-03		8.28E-03	0.16%
2-Methylnaphthalene	0.54	3.7E-06			3.0E-01		1.24E-05		1.24E-05	0.00%
3-Chloropyridine	2.9	2.0E-05			1.0E-02		2.00E-03		2.00E-03	0.04%
Acenaphthene	3.9	2.7E-05			6.0E-01		4.49E-05		4.49E-05	0.00%
Acenaphthylene	0.17	1.2E-06			3.0E-01		3.91E-06		3.91E-06	0.00%
Anthracene	10	6.9E-05			3.0E+00		2.30E-05		2.30E-05	0.00%
Benzo(a)anthracene	34	2.3E-04			3.0E-01		7.82E-04		7.82E-04	0.01%
Benzo(a)pyrene	27	1.9E-04			3.0E-01		6.21E-04		6.21E-04	0.01%
Benzo(b)fluoranthene	35	2.4E-04			3.0E-01		8.05E-04		8.05E-04	0.02%
Benzo(g,h,i)perylene	11	7.6E-05			3.0E-01		2.53E-04		2.53E-04	0.00%
Benzo(k)fluoranthene	22	1.5E-04			3.0E-01		5.06E-04		5.06E-04	0.01%
Chrysene	37	2.6E-04			3.0E-01		8.51E-04		8.51E-04	0.02%
Dibenzo(a,h)Anthracene	2.9	2.0E-05			3.0E-01		6.67E-05		6.67E-05	0.00%
Fluoranthene	74	5.1E-04			4.0E-01		1.28E-03		1.28E-03	0.02%
Fluorene	4.8	3.3E-05			4.0E-01		8.28E-05		8.28E-05	0.00%
Indeno(1,2,3-c,d)Pyrene	15	1.0E-04			3.0E-01		3.45E-04		3.45E-04	0.01%
Naphthalene	0.37	2.6E-06			3.0E-01		8.51E-06		8.51E-06	0.00%
Phenanthrene	48	3.3E-04			3.0E-01		1.10E-03		1.10E-03	0.02%
Pyrene	62	4.3E-04			3.0E-01		1.43E-03		1.43E-03	0.03%
Pyridine	8.4	5.8E-05			1.0E-02		5.80E-03		5.80E-03	0.11%
Arsenic	12	8.3E-05			3.0E-04		2.76E-01		2.76E-01	5.23%
Chromium	180	1.2E-03			2.0E-02		6.21E-02		6.21E-02	1.18%
Manganese	1200	8.3E-03			1.4E-01		5.92E-02		5.92E-02	1.12%
Mercury	210	1.4E-03			3.0E-04		4.83E+00		4.83E+00	91.60%
						SUMMARY HAZARD INDEX	**5**	**0**	**5**	

TABLE C.5-14
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - MAXIMUM CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Maximum	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
VOLATILIZATION FACTOR*	VF	Calculated	m³/kg
24 HOUR AVERAGE PM10 STANDARD	PM10	5000	ug/m³
CONVERSION FACTOR	CF	1E-09	kg/ug
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x PM10 x CF

AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-14, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - MAXIMUM CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	34			0.00017	3.4E-07	ND		
Benzo(a)pyrene	27			0.000135	2.7E-07	ND		
Benzo(b)fluoranthene	35			0.000175	3.5E-07	ND		
Benzo(k)fluoranthene	22			0.00011	2.2E-07	ND		
Chrysene	37			0.000185	3.7E-07	ND		
Dibenzo(a,h)Anthracene	2.9			0.0000145	2.9E-08	ND		
Indeno(1,2,3-c,d)Pyrene	15			0.000075	1.5E-07	ND		
Arsenic	12			0.00006	1.2E-07	5.0E+01	6.0E-06	7.52%
Chromium	180			0.0009	1.8E-06	4.1E+01	7.4E-05	92.48%
						SUMMARY CANCER RISK	**8E-05**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	3.1			0.0000155	4.4E-06	ND		
2-Chloropyridine	12			0.00006	1.7E-05	ND		
2-Methylnaphthalene	0.54			0.0000027	7.7E-07	ND		
3-Chloropyridine	2.9			0.0000145	4.1E-06	ND		
Acenaphthene	3.9			0.0000195	5.6E-06	ND		
Acenaphthylene	0.17			0.00000085	2.4E-07	ND		
Anthracene	10			0.00005	1.4E-05	ND		
Benzo(a)anthracene	34			0.00017	4.9E-05	ND		
Benzo(a)pyrene	27			0.000135	3.9E-05	ND		
Benzo(b)fluoranthene	35			0.000175	5.0E-05	ND		
Benzo(g,h,i)perylene	11			0.000055	1.6E-05	ND		
Benzo(k)fluoranthene	22			0.00011	3.1E-05	ND		
Chrysene	37			0.000185	5.3E-05	ND		
Dibenzo(a,h)Anthracene	2.9			0.0000145	4.1E-06	ND		
Fluoranthene	74			0.00037	1.1E-04	ND		
Fluorene	4.8			0.000024	6.9E-06	ND		
Indeno(1,2,3-c,d)Pyrene	15			0.000075	2.1E-05	ND		
Naphthalene	0.37			0.00000185	5.3E-07	ND		
Phenanthrene	48			0.00024	6.9E-05	ND		
Pyrene	62			0.00031	8.9E-05	ND		
Pyridine	8.4			0.000042	1.2E-05	ND		
Arsenic	12			0.00006	1.7E-05	ND		
Chromium	180			0.0009	2.6E-04	ND		
Manganese	1200			0.006	1.7E-03	1.4E-05	1.2E+02	97.23%
Mercury	210			0.00105	3.0E-04	8.6E-05	3.5E+00	2.77%
						SUMMARY HAZARD INDEX	**126**	

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TABLE C.5-15
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
INGESTION RATE	IR	480	mg/day
FRACTION INGESTED	FI	100%	
SOIL ADHERENCE FACTOR	SAF	1	mg/cm^2
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.000001	kg/mg
BODY WEIGHT	BW	70	kg
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
DERMAL ABSORPTION EFFICIENCY	AE	Chemical-specific	Unitless

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)

INTAKE-INGESTION = $\dfrac{\text{CS x IR x FI x CF x EF x ED}}{\text{BW x AT x 365 days/yr}}$

INTAKE-DERMAL = $\dfrac{\text{CS x SA x SAF x AE x CF x EF x ED}}{\text{BW x AT x 365 days/yr}}$

CSF = Cancer Slope Factor
RfD = Reference Dose

TABLE C.5-15, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SOIL (0-10 feet) - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	CSF ORAL $(mg/kg-day)^{-1}$	CSF DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	1.909	9.2E-08	Not Evaluated	Not Evaluated	7.3E-01	Not Evaluated	6.7E-08	Not Evaluated	6.7E-08	5.43%
Benzo(a)pyrene	1.573	7.6E-08			7.3E+00		5.5E-07		5.5E-07	44.73%
Benzo(b)fluoranthene	2.184	1.1E-07			7.3E-01		7.7E-08		7.7E-08	6.21%
Benzo(k)fluoranthene	1.364	6.6E-08			7.3E-02		4.8E-09		4.8E-09	0.39%
Chrysene	2.085	1.0E-07			7.3E-03		7.4E-10		7.4E-10	0.06%
Dibenzo(a,h)Anthracene	0.264	1.3E-08			7.3E+00		9.3E-08		9.3E-08	7.50%
Indeno(1,2,3-c,d)Pyrene	0.837	4.0E-08			0.73		3.0E-08		3.0E-08	2.38%
Arsenic	4.9	2.4E-07			1.75E+00		4.1E-07		4.1E-07	33.30%
Chromium	36.1	1.7E-06			ND					
						SUMMARY CANCER RISK	1E-06	0E+00	1E-06	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	RfD ORAL (mg/kg-day)	RfD DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	0.227	1.6E-06	Not Evaluated	Not Evaluated	1.0E-03	Not Evaluated	1.57E-03	Not Evaluated	1.57E-03	0.30%
2-Chloropyridine	0.787	5.4E-06			1.0E-02		5.43E-04		5.43E-04	0.10%
2-Methylnaphthalene	0.159	1.1E-06			3.0E-01		3.67E-06		3.67E-06	0.00%
3-Chloropyridine	0.265	1.8E-06			1.0E-02		1.83E-04		1.83E-04	0.03%
Acenaphthene	0.307	2.1E-06			6.0E-01		3.53E-06		3.53E-06	0.00%
Acenaphthylene	0.151	1.0E-06			3.0E-01		3.47E-06		3.47E-06	0.00%
Anthracene	0.612	4.2E-06			3.0E+00		1.41E-06		1.41E-06	0.00%
Benzo(a)anthracene	1.909	1.3E-05			3.0E-01		4.39E-05		4.39E-05	0.01%
Benzo(a)pyrene	1.573	1.1E-05			3.0E-01		3.62E-05		3.62E-05	0.01%
Benzo(b)fluoranthene	2.184	1.5E-05			3.0E-01		5.02E-05		5.02E-05	0.01%
Benzo(g,h,i)perylene	0.635	4.4E-06			3.0E-01		1.46E-05		1.46E-05	0.00%
Benzo(k)fluoranthene	1.364	9.4E-06			3.0E-01		3.14E-05		3.14E-05	0.01%
Chrysene	2.085	1.4E-05			3.0E-01		4.80E-05		4.80E-05	0.01%
Dibenzo(a,h)Anthracene	0.264	1.8E-06			3.0E-01		6.07E-06		6.07E-06	0.00%
Fluoranthene	4.014	2.8E-05			4.0E-01		6.93E-05		6.93E-05	0.01%
Fluorene	0.389	2.7E-06			4.0E-01		6.71E-06		6.71E-06	0.00%
Indeno(1,2,3-c,d)Pyrene	0.837	5.8E-06			3.0E-01		1.93E-05		1.93E-05	0.00%
Naphthalene	0.155	1.1E-06			3.0E-01		3.56E-06		3.56E-06	0.00%
Phenanthrene	2.609	1.8E-05			3.0E-01		6.00E-05		6.00E-05	0.01%
Pyrene	3.502	2.4E-05			3.0E-01		8.06E-05		8.06E-05	0.02%
Pyridine	0.484	3.3E-06			1.0E-02		3.34E-04		3.34E-04	0.06%
Arsenic	4.9	3.4E-05			3.0E-04		1.12E-01		1.12E-01	21.27%
Chromium	36.1	2.5E-04			2.0E-02		1.25E-02		1.25E-02	2.36%
Manganese	440.4	3.0E-03			1.4E-01		2.17E-02		2.17E-02	4.11%
Mercury	16.46	1.1E-04			3.0E-04		3.79E-01		3.79E-01	71.67%
						SUMMARY HAZARD INDEX	0.5	0	0.5	

O-SBI-A	31-Aug-94

TABLE C.5-16
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - AVERAGE CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION SOIL	CS	Average	mg/kg
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
VOLATILIZATION FACTOR*	VF	Calculated	m³/kg
24 HOUR AVERAGE PM10 STANDARD	PM10	5000	ug/m³
CONVERSION FACTOR	CF	1E-09	kg/ug
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year
*Volatilization factor used only for volatile compounds of potential concern

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{(CAp + CAv) \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

AIR CONCENTRATION PARTICULATES = CS x PM10 x CF
AIR CONCENTRATION VOLATILES = CS x 1/VF

TABLE C.5-16, continued
INHALATION EXPOSURE TO PARTICULATES AND VOLATILES IN SOIL (0-10 feet) - AVERAGE CONCENTRATIONS
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
Benzo(a)anthracene	1.909			0.0000095447	1.9E-08	ND		
Benzo(a)pyrene	1.573			0.0000078649	1.6E-08	ND		
Benzo(b)fluoranthene	2.184			0.0000109192	2.2E-08	ND		
Benzo(k)fluoranthene	1.364			0.0000068204	1.4E-08	ND		
Chrysene	2.085			0.0000104253	2.1E-08	ND		
Dibenzo(a,h)Anthracene	0.264			0.0000013186	2.7E-09	ND		
Indeno(1,2,3-c,d)Pyrene	0.837			0.0000041854	8.4E-09	ND		
Arsenic	4.9			0.0000244231	4.9E-08	5.0E+01	2.5E-06	14.17%
Chromium	36.1			0.0001804231	3.6E-07	4.1E+01	1.5E-05	85.83%
						SUMMARY CANCER RISK	**2E-05**	

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m^3/kg)	AIR CONCENTRATION VOLATILES (mg/m^3)	AIR CONCENTRATION PARTICULATES (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
2,6-Dichloropyridine	0.227			0.0000011349	3.2E-07	ND		
2-Chloropyridine	0.787			0.0000039328	1.1E-06	ND		
2-Methylnaphthalene	0.159			0.0000007974	2.3E-07	ND		
3-Chloropyridine	0.265			0.0000013236	3.8E-07	ND		
Acenaphthene	0.307			0.0000015333	4.4E-07	ND		
Acenaphthylene	0.151			0.0000007545	2.2E-07	ND		
Anthracene	0.612			0.0000030594	8.7E-07	ND		
Benzo(a)anthracene	1.909			0.0000095447	2.7E-06	ND		
Benzo(a)pyrene	1.573			0.0000078649	2.2E-06	ND		
Benzo(b)fluoranthene	2.184			0.0000109192	3.1E-06	ND		
Benzo(g,h,i)perylene	0.635			0.0000031735	9.1E-07	ND		
Benzo(k)fluoranthene	1.364			0.0000068204	1.9E-06	ND		
Chrysene	2.085			0.0000104253	3.0E-06	ND		
Dibenzo(a,h)Anthracene	0.264			0.0000013186	3.8E-07	ND		
Fluoranthene	4.014			0.0000200708	5.7E-06	ND		
Fluorene	0.389			0.000001944	5.6E-07	ND		
Indeno(1,2,3-c,d)Pyrene	0.837			0.0000041854	1.2E-06	ND		
Naphthalene	0.155			0.0000007746	2.2E-07	ND		
Phenanthrene	2.609			0.0000130441	3.7E-06	ND		
Pyrene	3.502			0.0000175094	5.0E-06	ND		
Pyridine	0.484			0.0000024191	6.9E-07	ND		
Arsenic	4.9			0.0000244231	7.0E-06	ND		
Chromium	36.1			0.0001804231	5.2E-05	ND		
Manganese	440.4			0.0022019231	6.3E-04	1.4E-05	4.5E+01	99.40%
Mercury	16.46			0.0000822981	2.4E-05	8.6E-05	2.7E-01	0.60%
						SUMMARY HAZARD INDEX	**45**	

TABLE C.5-17

OGWCW-M1

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-17, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.093	3.1E-07	5.3E-03	3.8E-07	9.1E-02	9.6E-02	2.8E-08	3.7E-08	6.5E-08	0.00%
1,4-Dichlorobenzene	0.077	2.6E-07	6.2E-02	3.7E-06	2.4E-02	2.4E-02	6.2E-09	8.9E-08	9.5E-08	0.00%
Benzene	0.062	2.1E-07	2.1E-02	1.0E-06	2.9E-02	2.9E-02	6.0E-09	2.9E-08	3.5E-08	0.00%
Bromoform	0.54	1.8E-06	2.6E-03	1.1E-06	7.9E-03	7.9E-03	1.4E-08	8.6E-09	2.3E-08	0.00%
Carbon tetrachloride	17	5.7E-05	2.2E-02	2.9E-04	1.3E-01	1.6E-01	7.4E-06	4.7E-05	5.4E-05	1.49%
Chloroform	50	1.7E-04	8.9E-03	3.5E-04	6.1E-03	6.1E-03	1.0E-06	2.1E-06	3.1E-06	0.09%
Methylene chloride	35	1.2E-04	4.5E-03	1.2E-04	7.5E-03	7.5E-03	8.8E-07	9.2E-07	1.8E-06	0.05%
Tetrachloroethene	2	6.7E-06	4.8E-02	7.5E-05	5.2E-02	7.4E-02	3.5E-07	5.5E-06	5.9E-06	0.16%
Trichloroethene	0.39	1.3E-06	1.6E-02	4.9E-06	1.1E-02	1.1E-02	1.4E-08	5.3E-08	6.8E-08	0.00%
Vinyl chloride	0.012	4.0E-08	7.3E-03	6.8E-08	1.9E+00	1.9E+00	7.6E-08	1.3E-07	2.1E-07	0.01%
Benzo(a)anthracene	0.41	1.4E-06	8.1E-01	2.6E-04	7.3E-01	8.0E-01	1.0E-06	2.1E-04	2.1E-04	5.74%
Benzo(a)pyrene	0.34	1.1E-06	1.2E+00	3.2E-04	7.3E+00	8.0E+00	8.3E-06	2.5E-03	2.5E-03	70.36%
Benzo(b)fluoranthene	0.47	1.6E-06	1.2E+00	4.4E-04	7.3E-01	8.0E-01	1.2E-06	3.5E-04	3.5E-04	9.73%
Benzo(k)fluoranthene	0.19	6.4E-07	1.1E+00	1.6E-04	7.3E-02	8.0E-02	4.7E-08	1.3E-05	1.3E-05	0.36%
Bis(2-Chloroethyl)ether	0.69	2.3E-06	2.1E-03	1.1E-06	1.0E+00	1.0E+00	2.3E-06	1.1E-06	3.4E-06	0.10%
Bis(2-ethylhexyl)phthalate	0.34	1.1E-06	3.3E-02	8.7E-06	1.4E-02	1.4E-02	1.6E-08	1.2E-07	1.4E-07	0.00%
Chrysene	0.33	1.1E-06	8.1E-01	2.1E-04	7.3E-03	8.0E-03	8.1E-09	1.7E-06	1.7E-06	0.05%
Dibenzo(a,h)Anthracene	0.019	6.4E-08	2.7E+00	4.0E-05	7.3E+00	8.0E+00	4.7E-07	3.2E-04	3.2E-04	8.83%
Indeno(1,2,3-c,d)Pyrene	0.069	2.3E-07	1.9E+00	1.0E-04	7.3E-01	8.0E-01	1.7E-07	8.2E-05	8.2E-05	2.26%
Heptachlor Epoxide	0.015	5.0E-08	7.0E-04	8.2E-09	9.1E+00	1.4E+01	4.6E-07	1.1E-07	5.7E-07	0.02%
beta-BHC	0.3	1.0E-06	2.0E-02	4.7E-06	1.8E+00	1.8E+00	1.8E-06	8.4E-06	1.0E-05	0.28%
gamma-BHC (Lindane)	0.042	1.4E-07	1.4E-02	4.6E-07	1.3E+00	1.3E+00	1.8E-07	5.9E-07	7.8E-07	0.02%
Arsenic	0.92	3.1E-06	1.0E-03	7.2E-07	1.75E+00	1.8E+00	5.4E-06	1.3E-06	6.7E-06	0.18%
Beryllium	0.029	9.7E-08	1.0E-03	2.3E-08	4.3E+00	4.3E+02	4.2E-07	9.7E-06	1.0E-05	0.28%
					SUMMARY CANCER RISK		**3E-05**	**4E-03**	**4E-03**	

TABLE .1, continued

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	2.4	7.0E-03	6.1E-02	1.0E-01	9.0E-02	9.0E-02	7.83E-02	1.11E+00	1.19E+00	0.11%
1,2-Dichloroethane	0.093	2.7E-04	5.3E-03	3.4E-04	ND	ND				
1,4-Dichlorobenzene	0.077	2.3E-04	6.2E-02	3.3E-03	ND	ND				
Benzene	0.062	1.8E-04	2.1E-02	8.9E-04	ND	ND				
Bromoform	0.54	1.6E-03	2.6E-03	9.6E-04	2.0E-01	2.0E-01	7.93E-03	4.78E-03	1.27E-02	0.00%
Carbon tetrachloride	17	5.0E-02	2.2E-02	2.5E-01	7.0E-04	5.6E-04	7.13E+01	4.55E+02	5.26E+02	47.90%
Chlorobenzene	2.5	7.3E-03	4.1E-02	7.0E-02	2.0E-02	2.0E-02	3.67E-01	3.49E+00	3.86E+00	0.35%
Chloroform	50	1.5E-01	8.9E-03	3.0E-01	1.0E-02	1.0E-02	1.47E+01	3.03E+01	4.50E+01	4.10%
Methylene chloride	35	1.0E-01	4.5E-03	1.1E-01	6.0E-02	6.0E-02	1.71E+00	1.79E+00	3.50E+00	0.32%
Tetrachloroethene	2	5.9E-03	4.8E-02	6.5E-02	1.0E-01	7.0E-02	5.87E-02	9.34E-01	9.93E-01	0.09%
Toluene	4.6	1.4E-02	4.5E-02	1.4E-01	2.0E+00	2.0E+00	6.75E-03	7.05E-02	7.72E-02	0.01%
Trichloroethene	0.39	1.1E-03	1.6E-02	4.2E-03	ND	ND				
Vinyl chloride	0.012	3.5E-05	7.3E-03	6.0E-05	ND	ND				
1,2,4-Trichlorobenzene	1.4	4.1E-03	1.0E-01	9.5E-02	1.0E-02	1.0E-02	4.11E-01	9.53E+00	9.95E+00	0.91%
2,6-Dichloropyridine	44	1.3E-01	2.0E-03	6.0E-02	1.0E-02	1.0E-02	1.29E+01	5.99E+00	1.89E+01	1.72%
2-Chloropyridine	400	1.2E+00	2.0E-03	5.4E-01	1.0E-02	1.0E-02	1.17E+02	5.45E+01	1.72E+02	15.65%
2-Methylnaphthalene	0.046	1.4E-04	ND		3.0E-01	2.7E-01	4.50E-04		4.50E-04	0.00%
3-Chloropyridine	18	5.3E-02	2.0E-03	2.5E-02	1.0E-02	1.0E-02	5.28E+00	2.45E+00	7.74E+00	0.70%
4-Chloropyridine	1.3	3.8E-03	2.0E-03	1.8E-03	1.0E-02	1.0E-02	3.82E-01	1.77E-01	5.59E-01	0.05%
Acenaphthene	0.042	1.2E-04	1.3E-01	3.7E-03	6.0E-01	5.5E-01	2.05E-04	6.76E-03	6.97E-03	0.00%
Anthracene	0.16	4.7E-04	2.6E-01	2.8E-02	3.0E+00	2.7E+00	1.57E-04	1.05E-02	1.06E-02	0.00%
Benzo(a)anthracene	0.41	1.2E-03	8.1E-01	2.3E-01	3.0E-01	2.7E-01	4.01E-03	8.38E-01	8.42E-01	0.08%
Benzo(a)pyrene	0.34	1.0E-03	1.2E+00	2.8E-01	3.0E-01	2.7E-01	3.33E-03	1.03E+00	1.03E+00	0.09%
Benzo(b)fluoranthene	0.47	1.4E-03	1.2E+00	3.8E-01	3.0E-01	2.7E-01	4.60E-03	1.42E+00	1.43E+00	0.13%
Benzo(g,h,i)perylene	0.045	1.3E-04	1.6E+00	5.1E-02	3.0E-01	2.7E-01	4.40E-04	1.87E-01	1.88E-01	0.02%
Benzo(k)fluoranthene	0.19	5.6E-04	1.1E+00	1.4E-01	3.0E-01	2.7E-01	1.86E-03	5.32E-01	5.34E-01	0.05%
Bis(2-Chloroethyl)ether	0.69	2.0E-03	2.1E-03	9.9E-04	ND	ND				
Bis(2-ethylhexyl)phthalate	0.34	1.0E-03	3.3E-02	7.6E-03	2.0E-02	2.0E-02	4.99E-02	3.82E-01	4.32E-01	0.04%
Chrysene	0.33	9.7E-04	8.1E-01	1.8E-01	3.0E-01	2.7E-01	3.23E-03	6.74E-01	6.77E-01	0.06%
Dibenzo(a,h)Anthracene	0.019	5.6E-05	2.7E+00	3.5E-02	3.0E-01	2.7E-01	1.86E-04	1.29E-01	1.30E-01	0.01%
Fluoranthene	0.99	2.9E-03	3.6E-01	2.4E-01	4.0E-01	3.6E-01	7.27E-03	6.74E-01	6.81E-01	0.06%
Fluorene	0.061	1.8E-04	1.7E-01	7.1E-03	4.0E-01	3.6E-01	4.48E-04	1.96E-02	2.01E-02	0.00%
Indeno(1,2,3-c,d)Pyrene	0.069	2.0E-04	1.9E+00	8.9E-02	3.0E-01	2.7E-01	6.75E-04	3.31E-01	3.31E-01	0.03%
Naphthalene	0.006	1.8E-05	6.9E-02	2.8E-04	3.0E-01	2.7E-01	5.87E-05	1.04E-03	1.10E-03	0.00%
Phenanthrene	0.3	8.8E-04	2.3E-01	4.7E-02	3.0E-01	2.7E-01	2.94E-03	1.74E-01	1.77E-01	0.02%
Pyrene	0.66	1.9E-03	5.3E-01	2.4E-01	3.0E-01	2.7E-01	6.46E-03	8.82E-01	8.89E-01	0.08%
Pyridine	98	2.9E-01	2.0E-03	1.3E-01	1.0E-02	1.0E-02	2.88E+01	1.33E+01	4.21E+01	3.83%
Heptachlor Epoxide	0.015	4.4E-05	7.0E-04	7.2E-06	1.3E-05	8.6E-06	3.39E+00	8.31E-01	4.22E+00	0.38%
beta-BHC	0.3	8.8E-04	2.0E-02	4.1E-03	ND	ND				
gamma-BHC (Lindane)	0.042	1.2E-04	1.4E-02	4.0E-04	3.0E-03	3.0E-03	4.11E-02	1.33E-01	1.75E-01	0.02%
Antimony	0.009	2.6E-05	1.0E-03	6.1E-06	4.0E-04	4.0E-05	6.60E-02	1.53E-01	2.19E-01	0.02%
Arsenic	0.92	2.7E-03	1.0E-03	6.3E-04	3.0E-04	2.9E-04	9.00E+00	2.16E+00	1.12E+01	1.02%
Barium	8.6	2.5E-02	1.0E-03	5.9E-03	7.0E-02	4.9E-03	3.61E-01	1.20E+00	1.56E+00	0.14%
Beryllium	0.029	8.5E-05	1.0E-03	2.0E-05	5.0E-03	5.0E-05	1.70E-02	3.95E-01	4.12E-01	0.04%
Cadmium	0.11	3.2E-04	1.0E-03	7.5E-05	ND	ND				
Chromium	2.3	6.8E-03	1.0E-03	1.6E-03	2.0E-02	2.2E-03	3.38E-01	7.12E-01	1.05E+00	0.10%
Copper	3.6	1.1E-02	1.0E-03	2.5E-03	3.7E-02	1.8E-02	2.86E-01	1.36E-01	4.22E-01	0.04%
Manganese	56	1.6E-01	1.0E-03	3.8E-02	5.0E-03	2.0E-04	3.29E+01	1.91E+02	2.24E+02	20.35%
Mercury	0.63	1.8E-03	1.0E-03	4.3E-04	3.0E-04	4.5E-05	6.16E+00	9.53E+00	1.57E+01	1.43%
Nickel	1.8	5.3E-03	1.0E-04	1.2E-04	2.0E-02	1.0E-03	2.64E-01	1.23E-01	3.87E-01	0.04%
Zinc	22	6.5E-02	6.0E-04	9.0E-03	3.0E-01	1.0E-01	2.15E-01	8.99E-02	3.05E-01	0.03%
						SUMMARY HAZARD INDEX	306	792	1098	

TABLE C.5-18
INHALATION EXPOSURE TO VOLATILES IN ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{CAv \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TAB 18, continued
INHA ON EXPOSURE TO VOLATILES IN ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.093	0.0000081	2.7E-09	9.1E-02	2.5E-10	0.17%
1,4-Dichlorobenzene	0.077	0.00001	3.4E-09	ND		
Benzene	0.062	0.0000054	1.8E-09	2.9E-02	5.3E-11	0.04%
Bromoform	0.54	0.000047	1.6E-08	3.9E-03	6.1E-11	0.04%
Carbon tetrachloride	17	0.0015	5.0E-07	5.3E-02	2.7E-08	18.52%
Chloroform	50	0.0043	1.4E-06	8.1E-02	1.2E-07	81.12%
Methylene chloride	35	0.003	1.0E-06	ND		
Tetrachloroethene	2	0.00017	5.7E-08	ND		
Trichloroethene	0.39	0.000034	1.1E-08	6.0E-03	6.8E-11	0.05%
Vinyl chloride	0.012	0.000001	3.4E-10	3.0E-01	1.0E-10	0.07%
				SUMMARY CANCER RISK	1E-07	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	2.4	0.00021	6.2E-05	5.7E-01	1.1E-04	9.52%
1,2-Dichloroethane	0.093	0.0000081	2.4E-06	ND		
1,4-Dichlorobenzene	0.077	0.00001	2.9E-06	7.1E-01	4.1E-06	0.36%
Benzene	0.062	0.0000054	1.6E-06	ND		
Bromoform	0.54	0.000047	1.4E-05	ND		
Carbon tetrachloride	17	0.0015	4.4E-04	ND		
Chlorobenzene	2.5	0.00022	6.5E-05	ND		
Chloroform	50	0.0043	1.3E-03	ND		
Methylene chloride	35	0.003	8.8E-04	8.6E-01	1.0E-03	90.12%
Tetrachloroethene	2	0.00017	5.0E-05	ND		
Toluene	4.6	0.0004	1.2E-04	ND		
Trichloroethene	0.39	0.000034	1.0E-05	ND		
Vinyl chloride	0.012	0.000001	2.9E-07	ND		
				SUMMARY HAZARD INDEX	0.001	

TABLE C.5-19

OGWCW-A1

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MEAN CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Mean	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-19, continued

OGWCW-A1	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MEAN CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0086	2.9E-08	5.3E-03	3.5E-08	9.1E-02	9.6E-02	2.6E-09	3.4E-09	6.0E-09	0.00%
1,4-Dichlorobenzene	0.0068	2.3E-08	6.2E-02	3.3E-07	2.4E-02	2.4E-02	5.5E-10	7.9E-09	8.4E-09	0.01%
Benzene	0.0117	3.9E-08	2.1E-02	1.9E-07	2.9E-02	2.9E-02	1.1E-09	5.5E-09	6.7E-09	0.00%
Bromoform	0.0267	9.0E-08	2.6E-03	5.4E-08	7.9E-03	7.9E-03	7.1E-10	4.3E-10	1.1E-09	0.00%
Carbon tetrachloride	0.7747	2.6E-06	2.2E-02	1.3E-05	1.3E-01	1.6E-01	3.4E-07	2.1E-06	2.5E-06	1.77%
Chloroform	2.1966	7.4E-06	8.9E-03	1.5E-05	6.1E-03	6.1E-03	4.5E-08	9.3E-08	1.4E-07	0.10%
Methylene chloride	1.0144	3.4E-06	4.5E-03	3.6E-06	7.5E-03	7.5E-03	2.6E-08	2.7E-08	5.2E-08	0.04%
Tetrachloroethene	0.1018	3.4E-07	4.8E-02	3.8E-06	5.2E-02	7.4E-02	1.8E-08	2.8E-07	3.0E-07	0.22%
Trichloroethene	0.0137	4.6E-08	1.6E-02	1.7E-07	1.1E-02	1.1E-02	5.1E-10	1.9E-09	2.4E-09	0.00%
Vinyl chloride	0.0057	1.9E-08	7.3E-03	3.3E-08	1.9E+00	1.9E+00	3.6E-08	6.2E-08	9.8E-08	0.07%
Benzo(a)anthracene	0.0130	4.4E-08	8.1E-01	8.2E-06	7.3E-01	8.0E-01	3.2E-08	6.6E-06	6.6E-06	4.75%
Benzo(a)pyrene	0.0102	3.4E-08	1.2E+00	9.5E-06	7.3E+00	8.0E+00	2.5E-07	7.6E-05	7.6E-05	55.13%
Benzo(b)fluoranthene	0.0149	5.0E-08	1.2E+00	1.4E-05	7.3E-01	8.0E-01	3.6E-08	1.1E-05	1.1E-05	8.05%
Benzo(k)fluoranthene	0.0078	2.6E-08	1.1E+00	6.7E-06	7.3E-02	8.0E-02	1.9E-09	5.4E-07	5.4E-07	0.39%
Bis(2-Chloroethyl)ether	0.0627	2.1E-07	2.1E-03	1.0E-07	1.0E+00	1.0E+00	2.1E-07	1.0E-07	3.1E-07	0.23%
Bis(2-ethylhexyl)phthalate	0.0153	5.1E-08	3.3E-02	3.9E-07	1.4E-02	1.4E-02	7.2E-10	5.5E-09	6.2E-09	0.00%
Chrysene	0.0100	3.4E-08	8.1E-01	6.3E-06	7.3E-03	8.0E-03	2.4E-10	5.0E-08	5.1E-08	0.04%
Dibenzo(a,h)Anthracene	0.0019	6.4E-09	2.7E+00	4.0E-06	7.3E+00	8.0E+00	4.7E-08	3.2E-05	3.2E-05	23.06%
Indeno(1,2,3-c,d)Pyrene	0.0031	1.1E-08	1.9E+00	4.7E-06	7.3E-01	8.0E-01	7.7E-09	3.7E-06	3.7E-06	2.69%
Heptachlor Epoxide	0.0050	1.7E-08	7.0E-04	2.7E-09	9.1E+00	1.4E+01	1.5E-07	3.8E-08	1.9E-07	0.14%
beta-BHC	0.0671	2.3E-07	2.0E-02	1.0E-06	1.8E+00	1.8E+00	4.1E-07	1.9E-06	2.3E-06	1.65%
gamma-BHC (Lindane)	0.0152	5.1E-08	1.4E-02	1.7E-07	1.3E+00	1.3E+00	6.6E-08	2.1E-07	2.8E-07	0.20%
Arsenic	0.1167	3.9E-07	1.0E-03	9.1E-08	1.75E+00	1.8E+00	6.9E-07	1.6E-07	8.5E-07	0.61%
Beryllium	0.0033	1.1E-08	1.0E-03	2.6E-09	4.3E+00	4.3E+02	4.8E-08	1.1E-06	1.2E-06	0.84%
						SUMMARY CANCER RISK	2E-06	1E-04	1E-04	

TABLE C.5-19, continued

OGWCW-A1	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MEAN CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	0.0870	2.6E-04	6.1E-02	3.6E-03	9.0E-02	9.0E-02	2.84E-03	4.02E-02	4.30E-02	0.05%
1,2-Dichloroethane	0.0086	2.5E-05	5.3E-03	3.1E-05	ND	ND				
1,4-Dichlorobenzene	0.0068	2.0E-05	6.2E-02	2.9E-04	ND	ND				
Benzene	0.0117	3.4E-05	2.1E-02	1.7E-04	ND	ND				
Bromoform	0.0267	7.8E-05	2.6E-03	4.7E-05	2.0E-01	2.0E-01	3.92E-04	2.36E-04	6.28E-04	0.00%
Carbon tetrachloride	0.7747	2.3E-03	2.2E-02	1.2E-02	7.0E-04	5.6E-04	3.25E+00	2.07E+01	2.40E+01	29.73%
Chlorobenzene	0.1422	4.2E-04	4.1E-02	4.0E-03	2.0E-02	2.0E-02	2.09E-02	1.99E-01	2.19E-01	0.27%
Chloroform	2.1966	6.4E-03	8.9E-03	1.3E-02	1.0E-02	1.0E-02	6.45E-01	1.33E+00	1.98E+00	2.45%
Methylene chloride	1.0144	3.0E-03	4.5E-03	3.1E-03	6.0E-02	6.0E-02	4.96E-02	5.18E-02	1.01E-01	0.13%
Tetrachloroethene	0.1018	3.0E-04	4.8E-02	3.3E-03	1.0E-01	7.0E-02	2.99E-03	4.75E-02	5.05E-02	0.06%
Toluene	0.1763	5.2E-04	4.5E-02	5.4E-03	2.0E+00	2.0E+00	2.59E-04	2.70E-03	2.96E-03	0.00%
Trichloroethene	0.0137	4.0E-05	1.6E-02	1.5E-04	ND	ND				
Vinyl chloride	0.0057	1.7E-05	7.3E-03	2.8E-05	ND	ND				
1,2,4-Trichlorobenzene	0.0692	2.0E-04	1.0E-01	4.7E-03	1.0E-02	1.0E-02	2.03E-02	4.71E-01	4.92E-01	0.61%
2,6-Dichloropyridine	2.6813	7.9E-03	2.0E-03	3.7E-03	1.0E-02	1.0E-02	7.87E-01	3.65E-01	1.15E+00	1.43%
2-Chloropyridine	33.2327	9.8E-02	2.0E-03	4.5E-02	1.0E-02	1.0E-02	9.76E+00	4.53E+00	1.43E+01	17.71%
2-Methylnaphthalene	0.0032	9.4E-06	ND		3.0E-01	2.7E-01	3.13E-05		3.13E-05	0.00%
3-Chloropyridine	1.1521	3.4E-03	2.0E-03	1.6E-03	1.0E-02	1.0E-02	3.38E-01	1.57E-01	4.95E-01	0.61%
4-Chloropyridine	0.0556	1.6E-04	2.0E-03	7.6E-05	1.0E-02	1.0E-02	1.63E-02	7.57E-03	2.39E-02	0.03%
Acenaphthene	0.0032	9.5E-06	1.3E-01	2.9E-04	6.0E-01	5.5E-01	1.58E-05	5.20E-04	5.36E-04	0.00%
Anthracene	0.0059	1.7E-05	2.6E-01	1.0E-03	3.0E+00	2.7E+00	5.77E-06	3.87E-04	3.93E-04	0.00%
Benzo(a)anthracene	0.0130	3.8E-05	8.1E-01	7.2E-03	3.0E-01	2.7E-01	1.27E-04	2.66E-02	2.67E-02	0.03%
Benzo(a)pyrene	0.0102	3.0E-05	1.2E+00	8.3E-03	3.0E-01	2.7E-01	9.98E-05	3.09E-02	3.10E-02	0.04%
Benzo(b)fluoranthene	0.0149	4.4E-05	1.2E+00	1.2E-02	3.0E-01	2.7E-01	1.46E-04	4.51E-02	4.52E-02	0.06%
Benzo(g,h,i)perylene	0.0029	8.6E-06	1.6E+00	3.3E-03	3.0E-01	2.7E-01	2.87E-05	1.22E-02	1.22E-02	0.02%
Benzo(k)fluoranthene	0.0078	2.3E-05	1.1E+00	5.9E-03	3.0E-01	2.7E-01	7.63E-05	2.18E-02	2.19E-02	0.03%
Bis(2-Chloroethyl)ether	0.0627	1.8E-04	2.1E-03	9.0E-05	ND	ND				
Bis(2-ethylhexyl)phthalate	0.0153	4.5E-05	3.3E-02	3.4E-04	2.0E-02	2.0E-02	2.25E-03	1.72E-02	1.94E-02	0.02%
Chrysene	0.0100	2.9E-05	8.1E-01	5.5E-03	3.0E-01	2.7E-01	9.78E-05	2.04E-02	2.05E-02	0.03%
Dibenzo(a,h)Anthracene	0.0019	5.6E-06	2.7E+00	3.5E-03	3.0E-01	2.7E-01	1.86E-05	1.29E-02	1.30E-02	0.02%
Fluoranthene	0.0277	8.1E-05	3.6E-01	6.8E-03	4.0E-01	3.6E-01	2.03E-04	1.89E-02	1.91E-02	0.02%
Fluorene	0.0035	1.0E-05	1.7E-01	4.1E-04	4.0E-01	3.6E-01	2.57E-05	1.13E-03	1.15E-03	0.00%
Indeno(1,2,3-c,d)Pyrene	0.0031	9.2E-06	1.9E+00	4.1E-03	3.0E-01	2.7E-01	3.08E-05	1.51E-02	1.51E-02	0.02%
Naphthalene	0.0020	5.9E-06	6.9E-02	9.4E-05	3.0E-01	2.7E-01	1.96E-05	3.48E-04	3.68E-04	0.00%
Phenanthrene	0.0099	2.9E-05	2.3E-01	1.6E-03	3.0E-01	2.7E-01	9.69E-05	5.74E-03	5.84E-03	0.01%
Pyrene	0.0195	5.7E-05	5.3E-01	7.0E-03	3.0E-01	2.7E-01	1.91E-04	2.61E-02	2.63E-02	0.03%
Pyridine	4.0611	1.2E-02	2.0E-03	5.5E-03	1.0E-02	1.0E-02	1.19E+00	5.53E-01	1.75E+00	2.16%
Heptachlor Epoxide	0.0050	1.5E-05	7.0E-04	2.4E-06	1.3E-05	8.6E-06	1.13E+00	2.79E-01	1.41E+00	1.75%
beta-BHC	0.0671	2.0E-04	2.0E-02	9.1E-04	ND	ND				
gamma-BHC (Lindane)	0.0152	4.5E-05	1.4E-02	1.4E-04	3.0E-03	3.0E-03	1.48E-02	4.82E-02	6.30E-02	0.08%
Antimony	0.0026	7.6E-06	1.0E-03	1.8E-06	4.0E-04	4.0E-05	1.91E-02	4.43E-02	6.34E-02	0.08%
Arsenic	0.1167	3.4E-04	1.0E-03	7.9E-05	3.0E-04	2.9E-04	1.14E+00	2.74E-01	1.42E+00	1.76%
Barium	1.072	3.1E-03	1.0E-03	7.3E-04	7.0E-02	4.9E-03	4.50E-02	1.49E-01	1.94E-01	0.24%
Beryllium	0.0033	9.8E-06	1.0E-03	2.3E-06	5.0E-03	5.0E-05	1.96E-03	4.56E-02	4.75E-02	0.06%
Cadmium	0.0127	3.7E-05	1.0E-03	8.7E-06	ND	ND				
Chromium	0.1407	4.1E-04	1.0E-03	9.6E-05	2.0E-02	2.2E-03	2.07E-02	4.36E-02	6.42E-02	0.08%
Copper	0.3015	8.9E-04	1.0E-03	2.1E-04	3.7E-02	1.8E-02	2.39E-02	1.14E-02	3.53E-02	0.04%
Manganese	8.0019	2.3E-02	1.0E-03	5.4E-03	5.0E-03	2.0E-04	4.70E+00	2.72E+01	3.19E+01	39.62%
Mercury	0.0208	6.1E-05	1.0E-03	1.4E-05	3.0E-04	4.5E-05	2.04E-01	3.15E-01	5.19E-01	0.64%
Nickel	0.1763	5.2E-04	1.0E-04	1.2E-05	2.0E-02	1.0E-03	2.59E-02	1.20E-02	3.79E-02	0.05%
Zinc	1.5371	4.5E-03	6.0E-04	6.3E-04	3.0E-01	1.0E-01	1.50E-02	6.28E-03	2.13E-02	0.03%
						SUMMARY HAZARD INDEX	23	57	81	

TAB 20

INHA ION EXPOSURE TO VOLATILES IN ONSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CAv x IhR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

TABLE C.5-20, continued
INHALATION EXPOSURE TO VOLATILES IN ONSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0086	7.5E-07	2.5E-10	9.1E-02	2.3E-11	0.36%
1,4-Dichlorobenzene	0.0068	5.9E-07	2.0E-10	ND		
Benzene	0.0117	1.0E-06	3.4E-10	2.9E-02	9.7E-12	0.15%
Bromoform	0.0267	2.3E-06	7.7E-10	3.9E-03	3.0E-12	0.05%
Carbon tetrachloride	0.7747	6.7E-05	2.2E-08	5.3E-02	1.2E-09	18.49%
Chloroform	2.1966	1.9E-04	6.4E-08	8.1E-02	5.2E-09	80.14%
Methylene chloride	1.0144	8.8E-05	3.0E-08	ND		
Tetrachloroethene	0.1018	8.8E-06	3.0E-09	ND		
Trichloroethene	0.0137	1.2E-06	4.0E-10	6.0E-03	2.4E-12	0.04%
Vinyl chloride	0.0057	5.0E-07	1.7E-10	3.0E-01	5.0E-11	0.78%
				SUMMARY CANCER RISK	6E-09	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	0.087	7.5E-06	2.2E-06	5.7E-01	3.9E-06	11.31%
1,2-Dichloroethane	0.0086	7.5E-07	2.2E-07	ND		
1,4-Dichlorobenzene	0.0068	5.9E-07	1.7E-07	7.1E-01	2.4E-07	0.71%
Benzene	0.0117	1.0E-06	2.9E-07	ND		
Bromoform	0.0267	2.3E-06	6.8E-07	ND		
Carbon tetrachloride	0.7747	6.7E-05	2.0E-05	ND		
Chlorobenzene	0.1422	1.2E-05	3.5E-06	ND		
Chloroform	2.1966	1.9E-04	5.6E-05	ND		
Methylene chloride	1.0144	8.8E-05	2.6E-05	8.6E-01	3.0E-05	87.97%
Tetrachloroethene	0.1018	8.8E-06	2.6E-06	ND		
Toluene	0.1763	1.5E-05	4.4E-06	ND		
Trichloroethene	0.0137	1.2E-06	3.5E-07	ND		
Vinyl chloride	0.0057	5.0E-07	1.5E-07	ND		
				SUMMARY HAZARD INDEX	0.00003	

OGWCW-M	31-Aug-94

TABLE C.5-21
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-21, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.093	1.9E-06	5.3E-03	2.3E-06	9.1E-02	9.6E-02	1.7E-07	2.2E-07	3.9E-07	0.00%
1,4-Dichlorobenzene	0.077	1.5E-06	6.2E-02	2.2E-05	2.4E-02	2.4E-02	3.7E-08	5.4E-07	5.7E-07	0.00%
Benzene	0.062	1.2E-06	2.1E-02	6.1E-06	2.9E-02	2.9E-02	3.6E-08	1.8E-07	2.1E-07	0.00%
Bromoform	0.54	1.1E-05	2.6E-03	6.6E-06	7.9E-03	7.9E-03	8.6E-08	5.2E-08	1.4E-07	0.00%
Carbon tetrachloride	17	3.4E-04	2.2E-02	1.7E-03	1.3E-01	1.6E-01	4.4E-05	2.8E-04	3.2E-04	1.49%
Chloroform	50	1.0E-03	8.9E-03	2.1E-03	6.1E-03	6.1E-03	6.1E-06	1.3E-05	1.9E-05	0.09%
Methylene chloride	35	7.0E-04	4.5E-03	7.4E-04	7.5E-03	7.5E-03	5.3E-06	5.5E-06	1.1E-05	0.05%
Tetrachloroethene	2	4.0E-05	4.8E-02	4.5E-04	5.2E-02	7.4E-02	2.1E-06	3.3E-05	3.5E-05	0.16%
Trichloroethene	0.39	7.9E-06	1.6E-02	2.9E-05	1.1E-02	1.1E-02	8.6E-08	3.2E-07	4.1E-07	0.00%
Vinyl chloride	0.012	2.4E-07	7.3E-03	4.1E-07	1.9E+00	1.9E+00	4.6E-07	7.8E-07	1.2E-06	0.01%
Benzo(a)anthracene	0.41	8.3E-06	8.1E-01	1.6E-03	7.3E-01	8.0E-01	6.0E-06	1.2E-03	1.2E-03	5.74%
Benzo(a)pyrene	0.34	6.8E-06	1.2E+00	1.9E-03	7.3E+00	8.0E+00	5.0E-05	1.5E-02	1.5E-02	70.36%
Benzo(b)fluoranthene	0.47	9.5E-06	1.2E+00	2.6E-03	7.3E-01	8.0E-01	6.9E-06	2.1E-03	2.1E-03	9.73%
Benzo(k)fluoranthene	0.19	3.8E-06	1.1E+00	9.8E-04	7.3E-02	8.0E-02	2.8E-07	7.9E-05	7.9E-05	0.36%
Bis(2-Chloroethyl)ether	0.69	1.4E-05	2.1E-03	6.8E-06	1.0E+00	1.0E+00	1.4E-05	6.8E-06	2.1E-05	0.10%
Bis(2-ethylhexyl)phthalate	0.34	6.8E-06	3.3E-02	5.2E-05	1.4E-02	1.4E-02	9.6E-08	7.3E-07	8.3E-07	0.00%
Chrysene	0.33	6.6E-06	8.1E-01	1.2E-03	7.3E-03	8.0E-03	4.8E-08	1.0E-05	1.0E-05	0.05%
Dibenzo(a,h)Anthracene	0.019	3.8E-07	2.7E+00	2.4E-04	7.3E+00	8.0E+00	2.8E-06	1.9E-03	1.9E-03	8.83%
Indeno(1,2,3-c,d)Pyrene	0.069	1.4E-06	1.9E+00	6.1E-04	7.3E-01	8.0E-01	1.0E-06	4.9E-04	4.9E-04	2.26%
Heptachlor Epoxide	0.015	3.0E-07	7.0E-04	4.9E-08	9.1E+00	1.4E+01	2.7E-06	6.9E-07	3.4E-06	0.02%
beta-BHC	0.3	6.0E-06	2.0E-02	2.8E-05	1.8E+00	1.8E+00	1.1E-05	5.0E-05	6.1E-05	0.28%
gamma-BHC (Lindane)	0.042	8.5E-07	1.4E-02	2.7E-06	1.3E+00	1.3E+00	1.1E-06	3.6E-06	4.7E-06	0.02%
Arsenic	0.92	1.9E-05	1.0E-03	4.3E-06	1.75E+00	1.8E+00	3.2E-05	7.7E-06	4.0E-05	0.18%
Beryllium	0.029	5.8E-07	1.0E-03	1.4E-07	4.3E+00	4.3E+02	2.5E-06	5.8E-05	6.1E-05	0.28%
						SUMMARY CANCER RISK	**2E-04**	**2E-02**	**2E-02**	

TABLE C.3-21, continued

OGWCW-M | 31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER -- MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER -- SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	2.4	6.9E-03	6.1E-02	9.8E-02	9.0E-02	9.0E-02	7.67E-02	1.09E+00	1.16E+00	0.11%
1,2-Dichloroethane	0.093	2.7E-04	5.3E-03	3.3E-04	ND	ND				
1,4-Dichlorobenzene	0.077	2.2E-04	6.2E-02	3.2E-03	ND	ND				
Benzene	0.062	1.8E-04	2.1E-02	8.7E-04	ND	ND				
Bromoform	0.54	1.6E-03	2.6E-03	9.4E-04	2.0E-01	2.0E-01	7.76E-03	4.68E-03	1.24E-02	0.00%
Carbon tetrachloride	17	4.9E-02	2.2E-02	2.5E-01	7.0E-04	5.6E-04	6.98E+01	4.46E+02	5.15E+02	47.90%
Chlorobenzene	2.5	7.2E-03	4.1E-02	6.8E-02	2.0E-02	2.0E-02	3.59E-01	3.42E+00	3.78E+00	0.35%
Chloroform	50	1.4E-01	8.9E-03	3.0E-01	1.0E-02	1.0E-02	1.44E+01	2.97E+01	4.41E+01	4.10%
Methylene chloride	35	1.0E-01	4.5E-03	1.1E-01	6.0E-02	6.0E-02	1.68E+00	1.75E+00	3.43E+00	0.32%
Tetrachloroethene	2	5.8E-03	4.8E-02	6.4E-02	1.0E-01	7.0E-02	5.75E-02	9.15E-01	9.72E-01	0.09%
Toluene	4.6	1.3E-02	4.5E-02	1.4E-01	2.0E+00	2.0E+00	6.61E-03	6.90E-02	7.57E-02	0.01%
Trichloroethene	0.39	1.1E-03	1.6E-02	4.2E-03	ND	ND				
Vinyl chloride	0.012	3.5E-05	7.3E-03	5.8E-05	ND	ND				
1,2,4-Trichlorobenzene	1.4	4.0E-03	1.0E-01	9.3E-02	1.0E-02	1.0E-02	4.03E-01	9.34E+00	9.74E+00	0.91%
2,6-Dichloropyridine	44	1.3E-01	2.0E-03	5.9E-02	1.0E-02	1.0E-02	1.27E+01	5.87E+00	1.85E+01	1.72%
2-Chloropyridine	400	1.2E+00	2.0E-03	5.3E-01	1.0E-02	1.0E-02	1.15E+02	5.34E+01	1.68E+02	15.65%
2-Methylnaphthalene	0.046	1.3E-04	ND		3.0E-01	2.7E-01	4.41E-04		4.41E-04	0.00%
3-Chloropyridine	18	5.2E-02	2.0E-03	2.4E-02	1.0E-02	1.0E-02	5.18E+00	2.40E+00	7.58E+00	0.70%
4-Chloropyridine	1.3	3.7E-03	2.0E-03	1.7E-03	1.0E-02	1.0E-02	3.74E-01	1.73E-01	5.47E-01	0.05%
Acenaphthene	0.042	1.2E-04	1.3E-01	3.6E-03	6.0E-01	5.5E-01	2.01E-04	6.62E-03	6.82E-03	0.00%
Anthracene	0.16	4.6E-04	2.6E-01	2.8E-02	3.0E+00	2.7E+00	1.53E-04	1.03E-02	1.04E-02	0.00%
Benzo(a)anthracene	0.41	1.2E-03	8.1E-01	2.2E-01	3.0E-01	2.7E-01	3.93E-03	8.21E-01	8.24E-01	0.08%
Benzo(a)pyrene	0.34	9.8E-04	1.2E+00	2.7E-01	3.0E-01	2.7E-01	3.26E-03	1.01E+00	1.01E+00	0.09%
Benzo(b)fluoranthene	0.47	1.4E-03	1.2E+00	3.8E-01	3.0E-01	2.7E-01	4.50E-03	1.39E+00	1.40E+00	0.13%
Benzo(g,h,i)perylene	0.045	1.3E-04	1.6E+00	5.0E-02	3.0E-01	2.7E-01	4.31E-04	1.83E-01	1.84E-01	0.02%
Benzo(k)fluoranthene	0.19	5.5E-04	1.1E+00	1.4E-01	3.0E-01	2.7E-01	1.82E-03	5.21E-01	5.23E-01	0.05%
Bis(2-Chloroethyl)ether	0.69	2.0E-03	2.1E-03	9.7E-04	ND	ND				
Bis(2-ethylhexyl)phthalate	0.34	9.8E-04	3.3E-02	7.5E-03	2.0E-02	2.0E-02	4.89E-02	3.74E-01	4.23E-01	0.04%
Chrysene	0.33	9.5E-04	8.1E-01	1.8E-01	3.0E-01	2.7E-01	3.16E-03	6.60E-01	6.64E-01	0.06%
Dibenzo(a,h)Anthracene	0.019	5.5E-05	2.7E+00	3.4E-02	3.0E-01	2.7E-01	1.82E-04	1.27E-01	1.27E-01	0.01%
Fluoranthene	0.99	2.8E-03	3.6E-01	2.4E-01	4.0E-01	3.6E-01	7.12E-03	6.60E-01	6.68E-01	0.06%
Fluorene	0.061	1.8E-04	1.7E-01	6.9E-03	4.0E-01	3.6E-01	4.39E-04	1.92E-02	1.97E-02	0.00%
Indeno(1,2,3-c,d)Pyrene	0.069	2.0E-04	1.9E+00	8.7E-02	3.0E-01	2.7E-01	6.61E-04	3.24E-01	3.25E-01	0.03%
Naphthalene	0.006	1.7E-05	6.9E-02	2.8E-04	3.0E-01	2.7E-01	5.75E-05	1.02E-03	1.08E-03	0.00%
Phenanthrene	0.3	8.6E-04	2.3E-01	4.6E-02	3.0E-01	2.7E-01	2.88E-03	1.70E-01	1.73E-01	0.02%
Pyrene	0.66	1.9E-03	5.3E-01	2.3E-01	3.0E-01	2.7E-01	6.33E-03	8.64E-01	8.71E-01	0.08%
Pyridine	98	2.8E-01	2.0E-03	1.3E-01	1.0E-02	1.0E-02	2.82E+01	1.31E+01	4.13E+01	3.83%
Heptachlor Epoxide	0.015	4.3E-05	7.0E-04	7.0E-06	1.3E-05	8.6E-06	3.32E+00	8.15E-01	4.13E+00	0.38%
beta-BHC	0.3	8.6E-04	2.0E-02	4.0E-03	ND	ND				
gamma-BHC (Lindane)	0.042	1.2E-04	1.4E-02	3.9E-04	3.0E-03	3.0E-03	4.03E-02	1.31E-01	1.71E-01	0.02%
Antimony	0.009	2.6E-05	1.0E-03	6.0E-06	4.0E-04	4.0E-05	6.47E-02	1.50E-01	2.15E-01	0.02%
Arsenic	0.92	2.6E-03	1.0E-03	6.1E-04	3.0E-04	2.9E-04	8.82E+00	2.12E+00	1.09E+01	1.02%
Barium	8.6	2.5E-02	1.0E-03	5.7E-03	7.0E-02	4.9E-03	3.53E-01	1.17E+00	1.52E+00	0.14%
Beryllium	0.029	8.3E-05	1.0E-03	1.9E-05	5.0E-03	5.0E-05	1.67E-02	3.87E-01	4.04E-01	0.04%
Cadmium	0.11	3.2E-04	1.0E-03	7.3E-05	ND	ND				
Chromium	2.3	6.6E-03	1.0E-03	1.5E-03	2.0E-02	2.2E-03	3.31E-01	6.97E-01	1.03E+00	0.10%
Copper	3.6	1.0E-02	1.0E-03	2.4E-03	3.7E-02	1.8E-02	2.80E-01	1.33E-01	4.13E-01	0.04%
Manganese	56	1.6E-01	1.0E-03	3.7E-02	5.0E-03	2.0E-04	3.22E+01	1.87E+02	2.19E+02	20.35%
Mercury	0.63	1.8E-03	1.0E-03	4.2E-04	3.0E-04	4.5E-05	6.04E+00	9.34E+00	1.54E+01	1.43%
Nickel	1.8	5.2E-03	1.0E-04	1.2E-04	2.0E-02	1.0E-03	2.59E-01	1.20E-01	3.79E-01	0.04%
Zinc	22	6.3E-02	6.0E-04	8.8E-03	3.0E-01	1.0E-01	2.11E-01	8.81E-02	2.99E-01	0.03%
						SUMMARY HAZARD INDEX	300	776	1076	

TABLE C.5-22
INHALATION EXPOSURE TO VOLATILES IN ONSITE, OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - 6 MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CAv x IhR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

TABLE 22, continued
INHALATION EXPOSURE TO VOLATILES IN ONSITE, OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - 6 MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.093	0.0000081	1.6E-08	9.1E-02	1.5E-09	0.17%
1,4-Dichlorobenzene	0.077	0.00001	2.0E-08	ND		
Benzene	0.062	0.0000054	1.1E-08	2.9E-02	3.2E-10	0.04%
Bromoform	0.54	0.000047	9.5E-08	3.9E-03	3.7E-10	0.04%
Carbon tetrachloride	17	0.0015	3.0E-06	5.3E-02	1.6E-07	18.52%
Chloroform	50	0.0043	8.7E-06	8.1E-02	7.0E-07	81.12%
Methylene chloride	35	0.003	6.0E-06	ND		
Tetrachloroethene	2	0.00017	3.4E-07	ND		
Trichloroethene	0.39	0.000034	6.8E-08	6.0E-03	4.1E-10	0.05%
Vinyl chloride	0.012	0.000001	2.0E-09	3.0E-01	6.0E-10	0.07%
				SUMMARY CANCER RISK	9E-07	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	2.4	0.00021	6.0E-05	5.7E-01	1.1E-04	9.52%
1,2-Dichloroethane	0.093	0.0000081	2.3E-06	ND		
1,4-Dichlorobenzene	0.077	0.00001	2.9E-06	7.1E-01	4.0E-06	0.36%
Benzene	0.062	0.0000054	1.5E-06	ND		
Bromoform	0.54	0.000047	1.3E-05	ND		
Carbon tetrachloride	17	0.0015	4.3E-04	ND		
Chlorobenzene	2.5	0.00022	6.3E-05	ND		
Chloroform	50	0.0043	1.2E-03	ND		
Methylene chloride	35	0.003	8.6E-04	8.6E-01	1.0E-03	90.12%
Tetrachloroethene	2	0.00017	4.9E-05	ND		
Toluene	4.6	0.0004	1.1E-04	ND		
Trichloroethene	0.39	0.000034	9.7E-06	ND		
Vinyl chloride	0.012	0.000001	2.9E-07	ND		
				SUMMARY HAZARD INDEX	0.001	

TABLE C.5-23
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.3-23, continued

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0086	1.7E-07	5.3E-03	2.1E-07	9.1E-02	9.6E-02	1.6E-08	2.0E-08	3.6E-08	0.00%
1,4-Dichlorobenzene	0.0068	1.4E-07	6.2E-02	2.0E-06	2.4E-02	2.4E-02	3.3E-09	4.7E-08	5.1E-08	0.01%
Benzene	0.0117	2.4E-07	2.1E-02	1.1E-06	2.9E-02	2.9E-02	6.8E-09	3.3E-08	4.0E-08	0.00%
Bromoform	0.0267	5.4E-07	2.6E-03	3.2E-07	7.9E-03	7.9E-03	4.2E-09	2.6E-09	6.8E-09	0.00%
Carbon tetrachloride	0.7747	1.6E-05	2.2E-02	8.0E-05	1.3E-01	1.6E-01	2.0E-06	1.3E-05	1.5E-05	1.77%
Chloroform	2.1966	4.4E-05	8.9E-03	9.1E-05	6.1E-03	6.1E-03	2.7E-07	5.6E-07	8.3E-07	0.10%
Methylene chloride	1.0144	2.0E-05	4.5E-03	2.1E-05	7.5E-03	7.5E-03	1.5E-07	1.6E-07	3.1E-07	0.04%
Tetrachloroethene	0.1018	2.0E-06	4.8E-02	2.3E-05	5.2E-02	7.4E-02	1.1E-07	1.7E-06	1.8E-06	0.22%
Trichloroethene	0.0137	2.8E-07	1.6E-02	1.0E-06	1.1E-02	1.1E-02	3.0E-09	1.1E-08	1.4E-08	0.00%
Vinyl chloride	0.0057	1.2E-07	7.3E-03	2.0E-07	1.9E+00	1.9E+00	2.2E-07	3.7E-07	5.9E-07	0.07%
Benzo(a)anthracene	0.0130	2.6E-07	8.1E-01	4.9E-05	7.3E-01	8.0E-01	1.9E-07	3.9E-05	4.0E-05	4.75%
Benzo(a)pyrene	0.0102	2.1E-07	1.2E+00	5.7E-05	7.3E+00	8.0E+00	1.5E-06	4.6E-04	4.6E-04	55.13%
Benzo(b)fluoranthene	0.0149	3.0E-07	1.2E+00	8.3E-05	7.3E-01	8.0E-01	2.2E-07	6.7E-05	6.7E-05	8.05%
Benzo(k)fluoranthene	0.0078	1.6E-07	1.1E+00	4.0E-05	7.3E-02	8.0E-02	1.1E-08	3.2E-06	3.2E-06	0.39%
Bis(2-Chloroethyl)ether	0.0627	1.3E-06	2.1E-03	6.1E-07	1.0E+00	1.0E+00	1.3E-06	6.1E-07	1.9E-06	0.23%
Bis(2-ethylhexyl)phthalate	0.0153	3.1E-07	3.3E-02	2.4E-06	1.4E-02	1.4E-02	4.3E-09	3.3E-08	3.7E-08	0.00%
Chrysene	0.0100	2.0E-07	8.1E-01	3.8E-05	7.3E-03	8.0E-03	1.5E-09	3.0E-07	3.0E-07	0.04%
Dibenzo(a,h)Anthracene	0.0019	3.8E-08	2.7E+00	2.4E-05	7.3E+00	8.0E+00	2.8E-07	1.9E-04	1.9E-04	23.06%
Indeno(1,2,3-c,d)Pyrene	0.0031	6.3E-08	1.9E+00	2.8E-05	7.3E-01	8.0E-01	4.6E-08	2.2E-05	2.2E-05	2.69%
Heptachlor Epoxide	0.0050	1.0E-07	7.0E-04	1.6E-08	9.1E+00	1.4E+01	9.2E-07	2.3E-07	1.2E-06	0.14%
beta-BHC	0.0671	1.4E-06	2.0E-02	6.3E-06	1.8E+00	1.8E+00	2.4E-06	1.1E-05	1.4E-05	1.65%
gamma-BHC (Lindane)	0.0152	3.1E-07	1.4E-02	9.9E-07	1.3E+00	1.3E+00	4.0E-07	1.3E-06	1.7E-06	0.20%
Arsenic	0.1167	2.3E-06	1.0E-03	5.5E-07	1.75E+00	1.8E+00	4.1E-06	9.8E-07	5.1E-06	0.61%
Beryllium	0.0033	6.7E-08	1.0E-03	1.6E-08	4.3E+00	4.3E+02	2.9E-07	6.7E-06	7.0E-06	0.84%
					SUMMARY CANCER RISK		**1E-05**	**8E-04**	**8E-04**	

TABLE C.5-23, continued

OGWCW-A | 31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH ONSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	0.0870	2.5E-04	6.1E-02	3.5E-03	9.0E-02	9.0E-02	2.78E-03	3.93E-02	4.21E-02	0.05%
1,2-Dichloroethane	0.0086	2.5E-05	5.3E-03	3.0E-05	ND	ND				
1,4-Dichlorobenzene	0.0068	2.0E-05	6.2E-02	2.8E-04	ND	ND				
Benzene	0.0117	3.4E-05	2.1E-02	1.6E-04	ND	ND				
Bromoform	0.0267	7.7E-05	2.6E-03	4.6E-05	2.0E-01	2.0E-01	3.84E-04	2.32E-04	6.15E-04	0.00%
Carbon tetrachloride	0.7747	2.2E-03	2.2E-02	1.1E-02	7.0E-04	5.6E-04	3.18E+00	2.03E+01	2.35E+01	29.73%
Chlorobenzene	0.1422	4.1E-04	4.1E-02	3.9E-03	2.0E-02	2.0E-02	2.04E-02	1.94E-01	2.15E-01	0.27%
Chloroform	2.1966	6.3E-03	8.9E-03	1.3E-02	1.0E-02	1.0E-02	6.32E-01	1.30E+00	1.94E+00	2.45%
Methylene chloride	1.0144	2.9E-03	4.5E-03	3.0E-03	6.0E-02	6.0E-02	4.86E-02	5.08E-02	9.94E-02	0.13%
Tetrachloroethene	0.1018	2.9E-04	4.8E-02	3.3E-03	1.0E-01	7.0E-02	2.93E-03	4.66E-02	4.95E-02	0.06%
Toluene	0.1763	5.1E-04	4.5E-02	5.3E-03	2.0E+00	2.0E+00	2.53E-04	2.65E-03	2.90E-03	0.00%
Trichloroethene	0.0137	3.9E-05	1.6E-02	1.5E-04	ND	ND				
Vinyl chloride	0.0057	1.6E-05	7.3E-03	2.8E-05	ND	ND				
1,2,4-Trichlorobenzene	0.0692	2.0E-04	1.0E-01	4.6E-03	1.0E-02	1.0E-02	1.99E-02	4.62E-01	4.82E-01	0.61%
2,6-Dichloropyridine	2.6813	7.7E-03	2.0E-03	3.6E-03	1.0E-02	1.0E-02	7.71E-01	3.58E-01	1.13E+00	1.43%
2-Chloropyridine	33.2327	9.6E-02	2.0E-03	4.4E-02	1.0E-02	1.0E-02	9.56E+00	4.43E+00	1.40E+01	17.71%
2-Methylnaphthalene	0.0032	9.2E-06	ND		3.0E-01	2.7E-01	3.07E-05		3.07E-05	0.00%
3-Chloropyridine	1.1521	3.3E-03	2.0E-03	1.5E-03	1.0E-02	1.0E-02	3.31E-01	1.54E-01	4.85E-01	0.61%
4-Chloropyridine	0.0556	1.6E-04	2.0E-03	7.4E-05	1.0E-02	1.0E-02	1.60E-02	7.42E-03	2.34E-02	0.03%
Acenaphthene	0.0032	9.3E-06	1.3E-01	2.8E-04	6.0E-01	5.5E-01	1.55E-05	5.09E-04	5.25E-04	0.00%
Anthracene	0.0059	1.7E-05	2.6E-01	1.0E-03	3.0E+00	2.7E+00	5.66E-06	3.79E-04	3.85E-04	0.00%
Benzo(a)anthracene	0.0130	3.7E-05	8.1E-01	7.0E-03	3.0E-01	2.7E-01	1.25E-04	2.60E-02	2.61E-02	0.03%
Benzo(a)pyrene	0.0102	2.9E-05	1.2E+00	8.2E-03	3.0E-01	2.7E-01	9.78E-05	3.02E-02	3.03E-02	0.04%
Benzo(b)fluoranthene	0.0149	4.3E-05	1.2E+00	1.2E-02	3.0E-01	2.7E-01	1.43E-04	4.42E-02	4.43E-02	0.06%
Benzo(g,h,i)perylene	0.0029	8.4E-06	1.6E+00	3.2E-03	3.0E-01	2.7E-01	2.81E-05	1.20E-02	1.20E-02	0.02%
Benzo(k)fluoranthene	0.0078	2.2E-05	1.1E+00	5.8E-03	3.0E-01	2.7E-01	7.48E-05	2.14E-02	2.15E-02	0.03%
Bis(2-Chloroethyl)ether	0.0627	1.8E-04	2.1E-03	8.8E-05	ND	ND				
Bis(2-ethylhexyl)phthalate	0.0153	4.4E-05	3.3E-02	3.4E-04	2.0E-02	2.0E-02	2.20E-03	1.68E-02	1.90E-02	0.02%
Chrysene	0.0100	2.9E-05	8.1E-01	5.4E-03	3.0E-01	2.7E-01	9.59E-05	2.00E-02	2.01E-02	0.03%
Dibenzo(a,h)Anthracene	0.0019	5.5E-06	2.7E+00	3.4E-03	3.0E-01	2.7E-01	1.82E-05	1.27E-02	1.27E-02	0.02%
Fluoranthene	0.0277	8.0E-05	3.6E-01	6.7E-03	4.0E-01	3.6E-01	1.99E-04	1.85E-02	1.87E-02	0.02%
Fluorene	0.0035	1.0E-05	1.7E-01	4.0E-04	4.0E-01	3.6E-01	2.52E-05	1.10E-03	1.13E-03	0.00%
Indeno(1,2,3-c,d)Pyrene	0.0031	9.1E-06	1.9E+00	4.0E-03	3.0E-01	2.7E-01	3.02E-05	1.48E-02	1.48E-02	0.02%
Naphthalene	0.0020	5.8E-06	6.9E-02	9.2E-05	3.0E-01	2.7E-01	1.92E-05	3.41E-04	3.60E-04	0.00%
Phenanthrene	0.0099	2.8E-05	2.3E-01	1.5E-03	3.0E-01	2.7E-01	9.49E-05	5.63E-03	5.72E-03	0.01%
Pyrene	0.0195	5.6E-05	5.3E-01	6.9E-03	3.0E-01	2.7E-01	1.87E-04	2.55E-02	2.57E-02	0.03%
Pyridine	4.0611	1.2E-02	2.0E-03	5.4E-03	1.0E-02	1.0E-02	1.17E+00	5.42E-01	1.71E+00	2.16%
Heptachlor Epoxide	0.0050	1.4E-05	7.0E-04	2.3E-06	1.3E-05	8.6E-06	1.11E+00	2.73E-01	1.38E+00	1.75%
beta-BHC	0.0671	1.9E-04	2.0E-02	9.0E-04	ND	ND				
gamma-BHC (Lindane)	0.0152	4.4E-05	1.4E-02	1.4E-04	3.0E-03	3.0E-03	1.45E-02	4.72E-02	6.17E-02	0.08%
Antimony	0.0026	7.5E-06	1.0E-03	1.7E-06	4.0E-04	4.0E-05	1.87E-02	4.34E-02	6.21E-02	0.08%
Arsenic	0.1167	3.4E-04	1.0E-03	7.8E-05	3.0E-04	2.9E-04	1.12E+00	2.69E-01	1.39E+00	1.76%
Barium	1.072	3.1E-03	1.0E-03	7.2E-04	7.0E-02	4.9E-03	4.40E-02	1.46E-01	1.90E-01	0.24%
Beryllium	0.0033	9.6E-06	1.0E-03	2.2E-06	5.0E-03	5.0E-05	1.92E-03	4.46E-02	4.66E-02	0.06%
Cadmium	0.0127	3.7E-05	1.0E-03	8.5E-06	ND	ND				
Chromium	0.1407	4.0E-04	1.0E-03	9.4E-05	2.0E-02	2.2E-03	2.02E-02	4.27E-02	6.29E-02	0.08%
Copper	0.3015	8.7E-04	1.0E-03	2.0E-04	3.7E-02	1.8E-02	2.34E-02	1.12E-02	3.46E-02	0.04%
Manganese	8.0019	2.3E-02	1.0E-03	5.3E-03	5.0E-03	2.0E-04	4.60E+00	2.67E+01	3.13E+01	39.62%
Mercury	0.0208	6.0E-05	1.0E-03	1.4E-05	3.0E-04	4.5E-05	2.00E-01	3.09E-01	5.09E-01	0.64%
Nickel	0.1763	5.1E-04	1.0E-04	1.2E-05	2.0E-02	1.0E-03	2.53E-02	1.18E-02	3.71E-02	0.05%
Zinc	1.5371	4.4E-03	6.0E-04	6.2E-04	3.0E-01	1.0E-01	1.47E-02	6.15E-03	2.09E-02	0.03%
						SUMMARY HAZARD INDEX	23	56	79	

TA -24

INHA ION EXPOSURE TO VOLATILES IN ONSITE OVERBURDEN GROUNDWATER – AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER – SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg–day) x CANCER SLOPE FACTOR (mg/kg–day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg–day) / REFERENCE CONCENTRATION (mg/kg–day)

$$\text{INTAKE} = \frac{\text{CAv x IhR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

TABLE C.5-24, continued
INHALATION EXPOSURE TO VOLATILES IN ONSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0086	7.5E-07	1.5E-09	9.1E-02	1.4E-10	0.36%
1,4-Dichlorobenzene	0.0068	5.9E-07	1.2E-09	ND		
Benzene	0.0117	1.0E-06	2.0E-09	2.9E-02	5.8E-11	0.15%
Bromoform	0.0267	2.3E-06	4.6E-09	3.9E-03	1.8E-11	0.05%
Carbon tetrachloride	0.7747	6.7E-05	1.3E-07	5.3E-02	7.1E-09	18.49%
Chloroform	2.1966	1.9E-04	3.8E-07	8.1E-02	3.1E-08	80.14%
Methylene chloride	1.0144	8.8E-05	1.8E-07	ND		
Tetrachloroethene	0.1018	8.8E-06	1.8E-08	ND		
Trichloroethene	0.0137	1.2E-06	2.4E-09	6.0E-03	1.4E-11	0.04%
Vinyl chloride	0.0057	5.0E-07	1.0E-09	3.0E-01	3.0E-10	0.78%
				SUMMARY CANCER RISK	4E-08	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichlorobenzene	0.087	7.5E-06	2.1E-06	5.7E-01	3.8E-06	11.31%
1,2-Dichloroethane	0.0086	7.5E-07	2.1E-07	ND		
1,4-Dichlorobenzene	0.0068	5.9E-07	1.7E-07	7.1E-01	2.4E-07	0.71%
Benzene	0.0117	1.0E-06	2.9E-07	ND		
Bromoform	0.0267	2.3E-06	6.6E-07	ND		
Carbon tetrachloride	0.7747	6.7E-05	1.9E-05	ND		
Chlorobenzene	0.1422	1.2E-05	3.4E-06	ND		
Chloroform	2.1966	1.9E-04	5.4E-05	ND		
Methylene chloride	1.0144	8.8E-05	2.5E-05	8.6E-01	2.9E-05	87.97%
Tetrachloroethene	0.1018	8.8E-06	2.5E-06	ND		
Toluene	0.1763	1.5E-05	4.3E-06	ND		
Trichloroethene	0.0137	1.2E-06	3.4E-07	ND		
Vinyl chloride	0.0057	5.0E-07	1.4E-07	ND		
				SUMMARY HAZARD INDEX	0.00003	

TABLE C.3-23

OFGWC1-M

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-25, continued

OFGWC1-M	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.17	5.7E-07	5.3E-03	7.0E-07	9.1E-02	9.6E-02	5.2E-08	6.7E-08	1.2E-07	3.20%
Benzene	0.21	7.0E-07	2.1E-02	3.4E-06	2.9E-02	2.9E-02	2.0E-08	1.0E-07	1.2E-07	3.22%
Chloroform	1.5	5.0E-06	8.9E-03	1.0E-05	6.1E-03	6.1E-03	3.1E-08	6.3E-08	9.4E-08	2.52%
Methylene chloride	2.5	8.4E-06	4.5E-03	8.8E-06	7.5E-03	7.5E-03	6.3E-08	6.6E-08	1.3E-07	3.45%
Tetrachloroethene	0.34	1.1E-06	4.8E-02	1.3E-05	5.2E-02	7.4E-02	5.9E-08	9.4E-07	1.0E-06	26.78%
Trichloroethene	0.3	1.0E-06	1.6E-02	3.7E-06	1.1E-02	1.1E-02	1.1E-08	4.1E-08	5.2E-08	1.40%
Vinyl chloride	0.018	6.0E-08	7.3E-03	1.0E-07	1.9E+00	1.9E+00	1.1E-07	1.9E-07	3.1E-07	8.28%
Bis(2-Chloroethyl)ether	0.13	4.4E-07	2.1E-03	2.1E-07	1.0E+00	1.0E+00	4.4E-07	2.1E-07	6.5E-07	17.38%
Bis(2-ethylhexyl)phthalate	0.026	8.7E-08	3.3E-02	6.7E-07	1.4E-02	1.4E-02	1.2E-09	9.3E-09	1.1E-08	0.28%
Arsenic	0.15	5.0E-07	1.0E-03	1.2E-07	1.8E+00	1.8E+00	8.8E-07	2.1E-07	1.1E-06	29.23%
Beryllium	0.011	3.7E-08	1.0E-03	8.6E-09	4.3E+00	4.3E-02	1.6E-07	3.7E-10	1.6E-07	4.26%
						SUMMARY CANCER RISK	2E-06	2E-06	4E-06	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.17	5.0E-04	5.3E-03	6.1E-04	ND	ND				
Benzene	0.21	6.2E-04	2.1E-02	3.0E-03	ND	ND				
Chlorobenzene	0.62	1.8E-03	4.1E-02	1.7E-02	2.0E-02	2.0E-02	9.10E-02	8.66E-01	9.57E-01	0.34%
Chloroform	1.5	4.4E-03	8.9E-03	9.1E-03	1.0E-02	1.0E-02	4.40E-01	9.09E-01	1.35E+00	0.48%
Methylene chloride	2.5	7.3E-03	4.5E-03	7.7E-03	6.0E-02	6.0E-02	1.22E-01	1.28E-01	2.50E-01	0.09%
Tetrachloroethene	0.34	1.0E-03	4.8E-02	1.1E-02	1.0E-01	7.0E-02	9.98E-03	1.59E-01	1.69E-01	0.06%
Trichloroethene	0.3	8.8E-04	1.6E-02	3.3E-03	ND	ND				
Vinyl chloride	0.018	5.3E-05	7.3E-03	8.9E-05	ND	ND				
2,6-Dichloropyridine	6	1.8E-02	2.0E-02	8.2E-02	1.0E-02	1.0E-02	1.76E+00	8.17E+00	9.93E+00	3.53%
2-Chloropyridine	60	1.8E-01	2.0E-02	8.2E-01	1.0E-02	1.0E-02	1.76E+01	8.17E+01	9.93E+01	35.33%
3-Chloropyridine	4.5	1.3E-02	2.0E-02	6.1E-02	1.0E-02	1.0E-02	1.32E+00	6.13E+00	7.45E+00	2.65%
Bis(2-Chloroethyl)ether	0.13	3.8E-04	2.1E-03	1.9E-04	ND	ND				
Bis(2-ethylhexyl)phthalate	0.026	7.6E-05	3.3E-02	5.8E-04	2.0E-02	2.0E-02	3.82E-03	2.92E-02	3.30E-02	0.01%
Pyridine	6.5	1.9E-02	2.0E-02	8.9E-02	1.0E-02	1.0E-02	1.91E+00	8.85E+00	1.08E+01	3.83%
Arsenic	0.15	4.4E-04	1.0E-03	1.0E-04	3.0E-04	2.9E-04	1.47E+00	3.52E-01	1.82E+00	0.65%
Barium	3.1	9.1E-03	1.0E-03	2.1E-03	7.0E-02	4.9E-03	1.30E-01	4.31E-01	5.61E-01	0.20%
Beryllium	0.011	3.2E-05	1.0E-03	7.5E-06	5.0E-03	5.0E-05	6.46E-03	1.50E-01	1.56E-01	0.06%
Cadmium	0.03	8.8E-05	1.0E-03	2.0E-05	ND	ND				
Chromium	0.52	1.5E-03	1.0E-03	3.5E-04	2.0E-02	2.2E-03	7.63E-02	1.61E-01	2.37E-01	0.08%
Manganese	37	1.1E-01	1.0E-03	2.5E-02	5.0E-03	2.0E-04	2.17E+01	1.26E+02	1.48E+02	52.53%
Mercury	0.013	3.8E-05	1.0E-03	8.9E-06	3.0E-04	4.5E-05	1.27E-01	1.97E-01	3.24E-01	0.12%
Nickel	0.61	1.8E-03	1.0E-04	4.2E-05	2.0E-02	1.0E-03	8.95E-02	4.15E-02	1.31E-01	0.05%
						SUMMARY HAZARD INDEX	47	234	281	

INHALATION EXPOSURE TO VOLATILES IN OFFSITE OVERBURDEN GROUNDWATER – MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER – ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg–day) x CANCER SLOPE FACTOR $(mg/kg–day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg–day) / REFERENCE CONCENTRATION (mg/kg–day)

$$\text{INTAKE} = \frac{CAv \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg–day)	CANCER SLOPE FACTOR $(mg/kg–day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2–Dichloroethane	0.17	0.000015	5.0E–09	9.1E–01	4.6E–09	53.87%
Benzene	0.21	0.000018	6.0E–09	2.9E–02	1.8E–10	2.06%
Chloroform	1.5	0.00013	4.4E–08	8.1E–02	3.5E–09	41.56%
Methylene chloride	2.5	0.00022	7.4E–08	ND		
Tetrachloroethene	0.34	0.000029	9.7E–09	ND		
Trichloroethene	0.3	0.000026	8.7E–09	6.0E–03	5.2E–11	0.62%
Vinyl chloride	0.018	0.0000016	5.4E–10	3.0E–01	1.6E–10	1.89%
				SUMMARY CANCER RISK	**9E–09**	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg–day)	REFERENCE CONCENTRATION (mg/kg–day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2–Dichloroethane	0.17	0.000015	4.4E–06	ND		
Benzene	0.21	0.000018	5.3E–06	ND		
Chlorobenzene	0.62	0.000054	1.6E–05	ND		
Chloroform	1.5	0.00013	3.8E–05	ND		
Methylene chloride	2.5	0.00022	6.5E–05	8.6E–01	7.5E–05	100.00%
Tetrachloroethene	0.34	0.000029	8.5E–06	ND		
Trichloroethene	0.3	0.000026	7.6E–06	ND		
Vinyl chloride	0.018	0.0000016	4.7E–07	ND		
				SUMMARY HAZARD INDEX	**0.00008**	

TABLE C.5-27

OFGWC1-A

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-2., continued

OPGWC1-A	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	2.3E-08	5.3E-03	2.8E-08	9.1E-02	9.6E-02	2.1E-09	2.7E-09	4.8E-09	0.93%
Benzene	0.0207	6.9E-08	2.1E-02	3.4E-07	2.9E-02	2.9E-02	2.0E-09	9.8E-09	1.2E-08	2.31%
Chloroform	0.0845	2.8E-07	8.9E-03	5.8E-07	6.1E-03	6.1E-03	1.7E-09	3.6E-09	5.3E-09	1.04%
Methylene chloride	0.0877	2.9E-07	4.5E-03	3.1E-07	7.5E-03	7.5E-03	2.2E-09	2.3E-09	4.5E-09	0.88%
Tetrachloroethene	0.0161	5.4E-08	4.8E-02	6.0E-07	5.2E-02	7.4E-02	2.8E-09	4.5E-08	4.7E-08	9.28%
Trichloroethene	0.0200	6.7E-08	1.6E-02	2.5E-07	1.1E-02	1.1E-02	7.4E-10	2.7E-09	3.5E-09	0.68%
Vinyl chloride	0.0022	7.4E-09	7.3E-03	1.3E-08	1.9E+00	1.9E+00	1.4E-08	2.4E-08	3.8E-08	7.44%
Bis(2-Chloroethyl)ether	0.0110	3.7E-08	2.1E-03	1.8E-08	1.0E+00	1.0E+00	3.7E-08	1.8E-08	5.5E-08	10.71%
Bis(2-ethylhexyl)phthalate	0.0029	9.6E-09	3.3E-02	7.4E-08	1.4E-02	1.4E-02	1.3E-10	1.0E-09	1.2E-09	0.23%
Arsenic	0.0413	1.4E-07	1.0E-03	3.2E-08	1.8E+00	1.8E+00	2.4E-07	5.8E-08	3.0E-07	58.83%
Beryllium	0.0027	9.1E-09	1.0E-03	2.1E-09	4.3E+00	4.3E-02	3.9E-08	9.0E-11	3.9E-08	7.65%
						SUMMARY CANCER RISK	3E-07	2E-07	5E-07	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	2.0E-05	5.3E-03	2.5E-05	ND	ND				
Benzene	0.0207	6.1E-05	2.1E-02	3.0E-04	ND	ND				
Chlorobenzene	0.0441	1.3E-04	4.1E-02	1.2E-03	2.0E-02	2.0E-02	6.47E-03	6.16E-02	6.81E-02	0.18%
Chloroform	0.0845	2.5E-04	8.9E-03	5.1E-04	1.0E-02	1.0E-02	2.48E-02	5.12E-02	7.60E-02	0.20%
Methylene chloride	0.0877	2.6E-04	4.5E-03	2.7E-04	6.0E-02	6.0E-02	4.29E-03	4.48E-03	8.77E-03	0.02%
Tetrachloroethene	0.0161	4.7E-05	4.8E-02	5.3E-04	1.0E-01	7.0E-02	4.73E-04	7.52E-03	8.00E-03	0.02%
Trichloroethene	0.0200	5.9E-05	1.6E-02	2.2E-04	ND	ND				
Vinyl chloride	0.0022	6.5E-06	7.3E-03	1.1E-05	ND	ND				
2,6-Dichloropyridine	0.5154	1.5E-03	2.0E-02	7.0E-03	1.0E-02	1.0E-02	1.51E-01	7.02E-01	8.53E-01	2.21%
2-Chloropyridine	5.6132	1.6E-02	2.0E-02	7.6E-02	1.0E-02	1.0E-02	1.65E+00	7.65E+00	9.29E+00	24.04%
3-Chloropyridine	0.2698	7.9E-04	2.0E-02	3.7E-03	1.0E-02	1.0E-02	7.92E-02	3.68E-01	4.47E-01	1.16%
Bis(2-Chloroethyl)ether	0.0110	3.2E-05	2.1E-03	1.6E-05	ND	ND				
Bis(2-ethylhexyl)phthalate	0.0029	8.4E-06	3.3E-02	6.4E-05	2.0E-02	2.0E-02	4.21E-04	3.22E-03	3.64E-03	0.01%
Pyridine	0.3001	8.8E-04	2.0E-02	4.1E-03	1.0E-02	1.0E-02	8.81E-02	4.09E-01	4.97E-01	1.29%
Arsenic	0.0413	1.2E-04	1.0E-03	2.8E-05	3.0E-04	2.9E-04	4.04E-01	9.69E-02	5.01E-01	1.30%
Barium	0.6972	2.0E-03	1.0E-03	4.7E-04	7.0E-02	4.9E-03	2.92E-02	9.69E-02	1.26E-01	0.33%
Beryllium	0.0027	7.9E-06	1.0E-03	1.8E-06	5.0E-03	5.0E-05	1.59E-03	3.68E-02	3.84E-02	0.10%
Cadmium	0.0044	1.3E-05	1.0E-03	3.0E-06	ND	ND				
Chromium	0.0869	2.6E-04	1.0E-03	5.9E-05	2.0E-02	2.2E-03	1.28E-02	2.69E-02	3.97E-02	0.10%
Manganese	6.672	2.0E-02	1.0E-03	4.5E-03	5.0E-03	2.0E-04	3.92E+00	2.27E+01	2.66E+01	68.91%
Mercury	0.0011	3.3E-06	1.0E-03	7.8E-07	3.0E-04	4.5E-05	1.12E-02	1.73E-02	2.84E-02	0.07%
Nickel	0.1299	3.8E-04	1.0E-04	8.8E-06	2.0E-02	1.0E-03	1.91E-02	8.84E-03	2.79E-02	0.07%
						SUMMARY HAZARD INDEX	6	32	39	

TABLE C.5-28
INHALATION EXPOSURE TO VOLATILES IN OFFSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CAv x IhR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	5.9E-07	2.0E-10	9.1E-01	1.8E-10	42.91%
Benzene	0.0207	1.8E-06	6.0E-10	2.9E-02	1.7E-11	4.16%
Chloroform	0.0845	7.3E-06	2.5E-09	8.1E-02	2.0E-10	47.50%
Methylene chloride	0.0877	7.6E-06	2.6E-09	ND		
Tetrachloroethene	0.0161	1.4E-06	4.7E-10	ND		
Trichloroethene	0.0200	1.7E-06	5.8E-10	6.0E-03	3.5E-12	0.83%
Vinyl chloride	0.0022	1.9E-07	6.4E-11	3.0E-01	1.9E-11	4.60%
				SUMMARY CANCER RISK	**4E-10**	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	5.9E-07	1.7E-07	ND		
Benzene	0.0207	1.8E-06	5.3E-07	ND		
Chlorobenzene	0.0441	3.8E-06	1.1E-06	ND		
Chloroform	0.0845	7.3E-06	2.1E-06	ND		
Methylene chloride	0.0877	7.6E-06	2.2E-06	8.6E-01	2.6E-06	100.00%
Tetrachloroethene	0.0161	1.4E-06	4.1E-07	ND		
Trichloroethene	0.0200	1.7E-06	5.1E-07	ND		
Vinyl chloride	0.0022	1.9E-07	5.6E-08	ND		
				SUMMARY HAZARD INDEX	**0.000003**	

TABLE C.5-29

OFGWCW-M

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-29, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.17	3.4E-06	5.3E-03	4.2E-06	9.1E-02	9.6E-02	3.1E-07	4.0E-07	7.2E-07	3.20%
Benzene	0.21	4.2E-06	2.1E-02	2.1E-05	2.9E-02	2.9E-02	1.2E-07	6.0E-07	7.2E-07	3.22%
Chloroform	1.5	3.0E-05	8.9E-03	6.2E-05	6.1E-03	6.1E-03	1.8E-07	3.8E-07	5.6E-07	2.52%
Methylene chloride	2.5	5.0E-05	4.5E-03	5.3E-05	7.5E-03	7.5E-03	3.8E-07	3.9E-07	7.7E-07	3.45%
Tetrachloroethene	0.34	6.8E-06	4.8E-02	7.6E-05	5.2E-02	7.4E-02	3.6E-07	5.6E-06	6.0E-06	26.78%
Trichloroethene	0.3	6.0E-06	1.6E-02	2.2E-05	1.1E-02	1.1E-02	6.6E-08	2.5E-07	3.1E-07	1.40%
Vinyl chloride	0.018	3.6E-07	7.3E-03	6.1E-07	1.9E+00	1.9E+00	6.9E-07	1.2E-06	1.9E-06	8.28%
Bis(2-Chloroethyl)ether	0.13	2.6E-06	2.1E-03	1.3E-06	1.0E+00	1.0E+00	2.6E-06	1.3E-06	3.9E-06	17.38%
Bis(2-ethylhexyl)phthalate	0.026	5.2E-07	3.3E-02	4.0E-06	1.4E-02	1.4E-02	7.3E-09	5.6E-08	6.3E-08	0.28%
Arsenic	0.15	3.0E-06	1.0E-03	7.0E-07	1.8E+00	1.8E+00	5.3E-06	1.3E-06	6.5E-06	29.23%
Beryllium	0.011	2.2E-07	1.0E-03	5.1E-08	4.3E+00	4.3E-02	9.5E-07	2.2E-09	9.5E-07	4.26%
						SUMMARY CANCER RISK	1E-05	1E-05	2E-05	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.17	4.9E-04	5.3E-03	6.0E-04	ND	ND				
Benzene	0.21	6.0E-04	2.1E-02	2.9E-03	ND	ND				
Chlorobenzene	0.62	1.8E-03	4.1E-02	1.7E-02	2.0E-02	2.0E-02	8.91E-02	8.48E-01	9.37E-01	0.34%
Chloroform	1.5	4.3E-03	8.9E-03	8.9E-03	1.0E-02	1.0E-02	4.31E-01	8.91E-01	1.32E+00	0.48%
Methylene chloride	2.5	7.2E-03	4.5E-03	7.5E-03	6.0E-02	6.0E-02	1.20E-01	1.25E-01	2.45E-01	0.09%
Tetrachloroethene	0.34	9.8E-04	4.8E-02	1.1E-02	1.0E-01	7.0E-02	9.78E-03	1.56E-01	1.65E-01	0.06%
Trichloroethene	0.3	8.6E-04	1.6E-02	3.2E-03	ND	ND				
Vinyl chloride	0.018	5.2E-05	7.3E-03	8.8E-05	ND	ND				
2,6-Dichloropyridine	6	1.7E-02	2.0E-02	8.0E-02	1.0E-02	1.0E-02	1.73E+00	8.01E+00	9.73E+00	3.53%
2-Chloropyridine	60	1.7E-01	2.0E-02	8.0E-01	1.0E-02	1.0E-02	1.73E+01	8.01E+01	9.73E+01	35.33%
3-Chloropyridine	4.5	1.3E-02	2.0E-02	6.0E-02	1.0E-02	1.0E-02	1.29E+00	6.00E+00	7.30E+00	2.65%
Bis(2-Chloroethyl)ether	0.13	3.7E-04	2.1E-03	1.8E-04	ND	ND				
Bis(2-ethylhexyl)phthalate	0.026	7.5E-05	3.3E-02	5.7E-04	2.0E-02	2.0E-02	3.74E-03	2.86E-02	3.24E-02	0.01%
Pyridine	6.5	1.9E-02	2.0E-02	8.7E-02	1.0E-02	1.0E-02	1.87E+00	8.67E+00	1.05E+01	3.83%
Arsenic	0.15	4.3E-04	1.0E-03	1.0E-04	3.0E-04	2.9E-04	1.44E+00	3.45E-01	1.78E+00	0.65%
Barium	3.1	8.9E-03	1.0E-03	2.1E-03	7.0E-02	4.9E-03	1.27E-01	4.22E-01	5.49E-01	0.20%
Beryllium	0.011	3.2E-05	1.0E-03	7.3E-06	5.0E-03	5.0E-05	6.33E-03	1.47E-01	1.53E-01	0.06%
Cadmium	0.03	8.6E-05	1.0E-03	2.0E-05	ND	ND				
Chromium	0.52	1.5E-03	1.0E-03	3.5E-04	2.0E-02	2.2E-03	7.48E-02	1.58E-01	2.32E-01	0.08%
Manganese	37	1.1E-01	1.0E-03	2.5E-02	5.0E-03	2.0E-04	2.13E+01	1.23E+02	1.45E+02	52.53%
Mercury	0.013	3.7E-05	1.0E-03	8.7E-06	3.0E-04	4.5E-05	1.25E-01	1.93E-01	3.17E-01	0.12%
Nickel	0.61	1.8E-03	1.0E-04	4.1E-05	2.0E-02	1.0E-03	8.77E-02	4.07E-02	1.28E-01	0.05%
						SUMMARY HAZARD INDEX	46	230	275	

TA -30

INHA ION EXPOSURE TO VOLATILES IN OFFSITE OVERBURDEN GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{CAv \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.17	0.000015	3.0E-08	9.1E-01	2.7E-08	53.87%
Benzene	0.21	0.000018	3.6E-08	2.9E-02	1.1E-09	2.06%
Chloroform	1.5	0.00013	2.6E-07	8.1E-02	2.1E-08	41.56%
Methylene chloride	2.5	0.00022	4.4E-07	ND		
Tetrachloroethene	0.34	0.000029	5.8E-08	ND		
Trichloroethene	0.3	0.000026	5.2E-08	6.0E-03	3.1E-10	0.62%
Vinyl chloride	0.018	0.0000016	3.2E-09	3.0E-01	9.7E-10	1.89%
				SUMMARY CANCER RISK	5E-08	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.17	0.000015	4.3E-06	ND		
Benzene	0.21	0.000018	5.1E-06	ND		
Chlorobenzene	0.62	0.000054	1.5E-05	ND		
Chloroform	1.5	0.00013	3.7E-05	ND		
Methylene chloride	2.5	0.00022	6.3E-05	8.6E-01	7.3E-05	100.00%
Tetrachloroethene	0.34	0.000029	8.3E-06	ND		
Trichloroethene	0.3	0.000026	7.4E-06	ND		
Vinyl chloride	0.018	0.0000016	4.6E-07	ND		
				SUMMARY HAZARD INDEX	0.00007	

TABLE C.5-31

OFGWCW-A

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-31, continued

OPGWCW-A	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH OFFSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	1.4E-07	5.3E-03	1.7E-07	9.1E-02	9.6E-02	1.2E-08	1.6E-08	2.9E-08	0.93%
Benzene	0.0207	4.2E-07	2.1E-02	2.0E-06	2.9E-02	2.9E-02	1.2E-08	5.9E-08	7.1E-08	2.31%
Chloroform	0.0845	1.7E-06	8.9E-03	3.5E-06	6.1E-03	6.1E-03	1.0E-08	2.1E-08	3.2E-08	1.04%
Methylene chloride	0.0877	1.8E-06	4.5E-03	1.8E-06	7.5E-03	7.5E-03	1.3E-08	1.4E-08	2.7E-08	0.88%
Tetrachloroethene	0.0161	3.2E-07	4.8E-02	3.6E-06	5.2E-02	7.4E-02	1.7E-08	2.7E-07	2.8E-07	9.28%
Trichloroethene	0.0200	4.0E-07	1.6E-02	1.5E-06	1.1E-02	1.1E-02	4.4E-09	1.6E-08	2.1E-08	0.68%
Vinyl chloride	0.0022	4.4E-08	7.3E-03	7.5E-08	1.9E+00	1.9E+00	8.5E-08	1.4E-07	2.3E-07	7.44%
Bis(2-Chloroethyl)ether	0.0110	2.2E-07	2.1E-03	1.1E-07	1.0E+00	1.0E+00	2.2E-07	1.1E-07	3.3E-07	10.71%
Bis(2-ethylhexyl)phthalate	0.0029	5.8E-08	3.3E-02	4.4E-07	1.4E-02	1.4E-02	8.1E-10	6.2E-09	7.0E-09	0.23%
Arsenic	0.0413	8.3E-07	1.0E-03	1.9E-07	1.8E+00	1.8E+00	1.5E-06	3.5E-07	1.8E-06	58.83%
Beryllium	0.0027	5.4E-08	1.0E-03	1.3E-08	4.3E+00	4.3E-02	2.3E-07	5.4E-10	2.3E-07	7.65%
						SUMMARY CANCER RISK	2E-06	1E-06	3E-06	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	2.0E-05	5.3E-03	2.4E-05	ND	ND				
Benzene	0.0207	5.9E-05	2.1E-02	2.9E-04	ND	ND				
Chlorobenzene	0.0441	1.3E-04	4.1E-02	1.2E-03	2.0E-02	2.0E-02	6.34E-03	6.03E-02	6.67E-02	0.18%
Chloroform	0.0845	2.4E-04	8.9E-03	5.0E-04	1.0E-02	1.0E-02	2.43E-02	5.01E-02	7.44E-02	0.20%
Methylene chloride	0.0877	2.5E-04	4.5E-03	2.6E-04	6.0E-02	6.0E-02	4.20E-03	4.39E-03	8.59E-03	0.02%
Tetrachloroethene	0.0161	4.6E-05	4.8E-02	5.2E-04	1.0E-01	7.0E-02	4.63E-04	7.37E-03	7.83E-03	0.02%
Trichloroethene	0.0200	5.8E-05	1.6E-02	2.1E-04	ND	ND				
Vinyl chloride	0.0022	6.4E-06	7.3E-03	1.1E-05	ND	ND				
2,6-Dichloropyridine	0.5154	1.5E-03	2.0E-02	6.9E-03	1.0E-02	1.0E-02	1.48E-01	6.88E-01	8.36E-01	2.21%
2-Chloropyridine	5.6132	1.6E-02	2.0E-02	7.5E-02	1.0E-02	1.0E-02	1.61E+00	7.49E+00	9.10E+00	24.04%
3-Chloropyridine	0.2698	7.8E-04	2.0E-02	3.6E-03	1.0E-02	1.0E-02	7.76E-02	3.60E-01	4.38E-01	1.16%
Bis(2-Chloroethyl)ether	0.0110	3.1E-05	2.1E-03	1.5E-05	ND	ND				
Bis(2-ethylhexyl)phthalate	0.0029	8.2E-06	3.3E-02	6.3E-05	2.0E-02	2.0E-02	4.12E-04	3.15E-03	3.57E-03	0.01%
Pyridine	0.3001	8.6E-04	2.0E-02	4.0E-03	1.0E-02	1.0E-02	8.63E-02	4.00E-01	4.87E-01	1.29%
Arsenic	0.0413	1.2E-04	1.0E-03	2.8E-05	3.0E-04	2.9E-04	3.96E-01	9.49E-02	4.90E-01	1.30%
Barium	0.6972	2.0E-03	1.0E-03	4.7E-04	7.0E-02	4.9E-03	2.86E-02	9.49E-02	1.24E-01	0.33%
Beryllium	0.0027	7.8E-06	1.0E-03	1.8E-06	5.0E-03	5.0E-05	1.55E-03	3.60E-02	3.76E-02	0.10%
Cadmium	0.0044	1.3E-05	1.0E-03	3.0E-06	ND	ND				
Chromium	0.0869	2.5E-04	1.0E-03	5.8E-05	2.0E-02	2.2E-03	1.25E-02	2.64E-02	3.89E-02	0.10%
Manganese	6.672	1.9E-02	1.0E-03	4.5E-03	5.0E-03	2.0E-04	3.84E+00	2.23E+01	2.61E+01	68.91%
Mercury	0.0011	3.3E-06	1.0E-03	7.6E-07	3.0E-04	4.5E-05	1.09E-02	1.69E-02	2.78E-02	0.07%
Nickel	0.1299	3.7E-04	1.0E-04	8.7E-06	2.0E-02	1.0E-03	1.87E-02	8.66E-03	2.73E-02	0.07%
						SUMMARY HAZARD INDEX	6	32	38	

TABLE C.5-32
INHALATION EXPOSURE TO VOLATILES IN OFFSITE OVERBURDEN GROUNDWATER - AVERAGE CONCENTRATION
FUTURE CONSTRUCTION WORKER - 6 MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Average	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{CAv \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	5.9E-07	1.2E-09	9.1E-01	1.1E-09	42.91%
Benzene	0.0207	1.8E-06	3.6E-09	2.9E-02	1.0E-10	4.16%
Chloroform	0.0845	7.3E-06	1.5E-08	8.1E-02	1.2E-09	47.50%
Methylene chloride	0.0877	7.6E-06	1.5E-08	ND		
Tetrachloroethene	0.0161	1.4E-06	2.8E-09	ND		
Trichloroethene	0.0200	1.7E-06	3.5E-09	6.0E-03	2.1E-11	0.83%
Vinyl chloride	0.0022	1.9E-07	3.9E-10	3.0E-01	1.2E-10	4.60%
				SUMMARY CANCER RISK	**3E-09**	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m³)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.0068	5.9E-07	1.7E-07	ND		
Benzene	0.0207	1.8E-06	5.1E-07	ND		
Chlorobenzene	0.0441	3.8E-06	1.1E-06	ND		
Chloroform	0.0845	7.3E-06	2.1E-06	ND		
Methylene chloride	0.0877	7.6E-06	2.2E-06	8.6E-01	2.5E-06	100.00%
Tetrachloroethene	0.0161	1.4E-06	4.0E-07	ND		
Trichloroethene	0.0200	1.7E-06	5.0E-07	ND		
Vinyl chloride	0.0022	1.9E-07	5.5E-08	ND		
				SUMMARY HAZARD INDEX	**0.000003**	

TABLE C.3-33

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-33, continued

KGWCW-M1	31-Aug-94

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	5.0E-08	5.3E-03	6.2E-08	9.1E-02	9.6E-02	4.6E-09	5.9E-09	1.1E-08	0.28%
Benzene	0.14	4.7E-07	2.1E-02	2.3E-06	2.9E-02	2.9E-02	1.4E-08	6.6E-08	8.0E-08	2.16%
Chloroform	3.4	1.1E-05	8.9E-03	2.4E-05	6.1E-03	6.1E-03	7.0E-08	1.4E-07	2.1E-07	5.77%
Methylene Chloride	5.6	1.9E-05	4.5E-03	2.0E-05	7.5E-03	7.5E-03	1.4E-07	1.5E-07	2.9E-07	7.79%
Tetrachloroethene	0.32	1.1E-06	4.8E-02	1.2E-05	5.2E-02	7.4E-02	5.6E-08	8.8E-07	9.4E-07	25.43%
Trichloroethylene	0.37	1.2E-06	1.6E-02	4.6E-06	1.1E-02	1.1E-02	1.4E-08	5.1E-08	6.4E-08	1.74%
Vinyl Chloride	0.085	2.9E-07	7.3E-03	4.8E-07	1.9E+00	1.9E+00	5.4E-07	9.2E-07	1.5E-06	39.47%
bis(2-Chloroethyl)ether	0.08	2.7E-07	2.1E-03	1.3E-07	1.0E+00	1.0E+00	2.7E-07	1.3E-07	4.0E-07	10.79%
bis(2-Ethylhexyl)phthalate	0.007	2.3E-08	3.3E-02	1.8E-07	1.4E-02	1.4E-02	3.3E-10	2.5E-09	2.8E-09	0.08%
Arsenic	0.033	1.1E-07	1.0E-03	2.6E-08	1.75E+00	1.8E+00	1.9E-07	4.6E-08	2.4E-07	6.49%
						SUMMARY CANCER RISK	1E-06	2E-06	4E-06	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	4.4E-05	5.3E-03	5.4E-05	ND	1.0E-02		5.41E-03	5.41E-03	0.00%
Benzene	0.14	4.1E-04	2.0E-03	1.9E-04	ND	1.0E-02		1.91E-02	1.91E-02	0.01%
Chlorobenzene	0.22	6.5E-04	6.0E-03	9.0E-04	2.0E-02	1.0E-02	3.23E-02	8.99E-02	1.22E-01	0.08%
Chloroform	3.4	1.0E-02	8.9E-03	2.1E-02	1.0E-02	1.0E-02	9.98E-01	2.06E+00	3.06E+00	2.01%
Methylene Chloride	5.6	1.6E-02	4.5E-03	1.7E-02	6.0E-02	6.0E-02	2.74E-01	2.86E-01	5.60E-01	0.37%
Tetrachloroethene	0.32	9.4E-04	4.8E-02	1.0E-02	1.0E-01	7.0E-02	9.39E-03	1.49E-01	1.59E-01	0.10%
Toluene	1.8	5.3E-03	4.5E-02	5.5E-02	2.0E+00	2.0E+00	2.64E-03	2.76E-02	3.02E-02	0.02%
Trichloroethylene	0.37	1.1E-03	1.6E-02	4.0E-03	ND	ND				
Vinyl Chloride	0.085	2.5E-04	7.3E-03	4.2E-04	ND	ND				
2,6-Dichloropyridine	8.6	2.5E-02	2.0E-03	1.2E-02	1.0E-02	1.0E-02	2.52E+00	1.17E+00	3.70E+00	2.43%
2-Chloropyridine	150	4.4E-01	2.0E-03	2.0E-01	1.0E-02	1.0E-02	4.40E+01	2.04E+01	6.45E+01	42.30%
3-Chloropyridine	7.9	2.3E-02	2.0E-03	1.1E-02	1.0E-02	1.0E-02	2.32E+00	1.08E+00	3.39E+00	2.23%
4-Chloropyridine	0.0003	8.8E-07	2.0E-03	4.1E-07	1.0E-02	1.0E-02	8.81E-05	4.09E-05	1.29E-04	0.00%
Pyridine	20	5.9E-02	2.0E-03	2.7E-02	1.0E-02	1.0E-02	5.87E+00	2.72E+00	8.59E+00	5.64%
bis(2-Chloroethyl)ether	0.08	2.3E-04	2.1E-03	1.1E-04	ND	ND				
bis(2-Ethylhexyl)phthalate	0.007	2.1E-05	3.3E-03	1.6E-05	2.0E-02	2.0E-02	1.03E-03	7.87E-04	1.81E-03	0.00%
Arsenic	0.033	9.7E-05	1.0E-03	2.2E-05	3.0E-04	2.9E-04	3.23E-01	7.75E-02	4.00E-01	0.26%
Manganese	17	5.0E-02	1.0E-03	1.2E-02	5.0E-03	2.0E-04	9.98E+00	5.79E+01	6.79E+01	44.53%
Nickel	0.127	3.7E-04	0.0001	8.6E-06	2.0E-02	1.0E-03	1.86E-02	8.65E-03	2.73E-02	0.02%
						SUMMARY HAZARD INDEX	66	86	152	

TABLE 34
INHALATION EXPOSURE TO VOLATILES IN KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³
INHALATION RATE	IhR	2.5	m³/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	30	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.08	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CAv x IhR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

TABLE C.5-34, continued

INHALATION EXPOSURE TO VOLATILES IN KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - ONE MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	1.3E-06	4.4E-10	9.1E-02	4.0E-11	0.45%
Benzene	0.14	1.2E-05	4.0E-09	2.9E-02	1.2E-10	1.32%
Chloroform	3.4	2.9E-04	9.7E-08	8.1E-02	7.9E-09	89.08%
Methylene Chloride	5.6	4.9E-04	1.6E-07	ND		
Tetrachloroethene	0.32	2.8E-05	9.4E-09	ND		
Trichloroethene	0.37	3.2E-05	1.1E-08	6.0E-03	6.4E-11	0.73%
Vinyl Chloride	0.085	7.4E-06	2.5E-09	3.0E-01	7.4E-10	8.42%
				SUMMARY CANCER RISK	9E-09	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	1.3E-06	3.8E-07	ND		
Benzene	0.14	1.2E-05	3.6E-06	ND		
Chlorobenzene	0.22	1.9E-05	5.6E-06	ND		
Chloroform	3.4	2.9E-04	8.7E-05	ND		
Methylene Chloride	5.6	4.9E-04	1.4E-04	8.6E-01	1.7E-04	100.00%
Tetrachloroethene	0.32	2.8E-05	8.1E-06	ND		
Toluene	1.8	1.6E-04	4.6E-05	ND		
Trichloroethene	0.37	3.2E-05	9.4E-06	ND		
Vinyl Chloride	0.085	7.4E-06	2.2E-06	ND		
				SUMMARY HAZARD INDEX	0.0002	

KGWCW-M	31-Aug-94

TABLE C.5-35
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
INGESTION RATE	IR	0.2	L/day
FRACTION INGESTED	FI	100%	
SURFACE AREA EXPOSED	SA	5,800	cm^2/day
CONVERSION FACTOR	CF	0.001	L/cm^3
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years
PERMEABILITY COEFFICIENT	Kp	Chemical-specific	cm/hour

Note:
For noncarcinogenic effects: AT = EP/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CW \times IR \times FI \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{CW \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-35, continued
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - SIX MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	CANCER SLOPE FACTOR-ORAL $(mg/kg-day)^{-1}$	CANCER SLOPE FACTOR-DERMAL $(mg/kg-day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	3.0E-07	5.3E-03	3.7E-07	9.1E-02	9.6E-02	2.7E-08	3.6E-08	6.3E-08	0.28%
Benzene	0.14	2.8E-06	2.1E-02	1.4E-05	2.9E-02	2.9E-02	8.2E-08	4.0E-07	4.8E-07	2.16%
Chloroform	3.4	6.8E-05	8.9E-03	1.4E-04	6.1E-03	6.1E-03	4.2E-07	8.6E-07	1.3E-06	5.77%
Methylene Chloride	5.6	1.1E-04	4.5E-03	1.2E-04	7.5E-03	7.5E-03	8.5E-07	8.8E-07	1.7E-06	7.79%
Tetrachloroethene	0.32	6.4E-06	4.8E-02	7.2E-05	5.2E-02	7.4E-02	3.3E-07	5.3E-06	5.6E-06	25.43%
Trichloroethylene	0.37	7.4E-06	1.6E-02	2.8E-05	1.1E-02	1.1E-02	8.2E-08	3.0E-07	3.9E-07	1.74%
Vinyl Chloride	0.085	1.7E-06	7.3E-03	2.9E-06	1.9E+00	1.9E+00	3.3E-06	5.5E-06	8.8E-06	39.47%
bis(2-Chloroethyl)ether	0.08	1.6E-06	2.1E-03	7.8E-07	1.0E+00	1.0E+00	1.6E-06	7.8E-07	2.4E-06	10.79%
bis(2-Ethylhexyl)phthalate	0.007	1.4E-07	3.3E-02	1.1E-06	1.4E-02	1.4E-02	2.0E-09	1.5E-08	1.7E-08	0.08%
Arsenic	0.033	6.6E-07	1.0E-03	1.5E-07	1.75E+00	1.8E+00	1.2E-06	2.8E-07	1.4E-06	6.49%
						SUMMARY CANCER RISK	**8E-06**	**1E-05**	**2E-05**	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	Kp (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE-ORAL (mg/kg-day)	REFERENCE DOSE-DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	4.3E-05	5.3E-03	5.3E-05	ND	1.0E-02		5.30E-03	5.30E-03	0.00%
Benzene	0.14	4.0E-04	2.0E-03	1.9E-04	ND	1.0E-02		1.87E-02	1.87E-02	0.01%
Chlorobenzene	0.22	6.3E-04	6.0E-03	8.8E-04	2.0E-02	1.0E-02	3.16E-02	8.81E-02	1.20E-01	0.08%
Chloroform	3.4	9.8E-03	8.9E-03	2.0E-02	1.0E-02	1.0E-02	9.78E-01	2.02E+00	3.00E+00	2.01%
Methylene Chloride	5.6	1.6E-02	4.5E-03	1.7E-02	6.0E-02	6.0E-02	2.68E-01	2.80E-01	5.49E-01	0.37%
Tetrachloroethene	0.32	9.2E-04	4.8E-02	1.0E-02	1.0E-01	7.0E-02	9.20E-03	1.46E-01	1.56E-01	0.10%
Toluene	1.8	5.2E-03	4.5E-02	5.4E-02	2.0E+00	2.0E+00	2.59E-03	2.70E-02	2.96E-02	0.02%
Trichloroethylene	0.37	1.1E-03	1.6E-02	3.9E-03	ND	ND				
Vinyl Chloride	0.085	2.4E-04	7.3E-03	4.1E-04	ND	ND				
2,6-Dichloropyridine	8.6	2.5E-02	2.0E-03	1.1E-02	1.0E-02	1.0E-02	2.47E+00	1.15E+00	3.62E+00	2.43%
2-Chloropyridine	150	4.3E-01	2.0E-03	2.0E-01	1.0E-02	1.0E-02	4.31E+01	2.00E+01	6.31E+01	42.30%
3-Chloropyridine	7.9	2.3E-02	2.0E-03	1.1E-02	1.0E-02	1.0E-02	2.27E+00	1.05E+00	3.33E+00	2.23%
4-Chloropyridine	0.0003	8.6E-07	2.0E-03	4.0E-07	1.0E-02	1.0E-02	8.63E-05	4.00E-05	1.26E-04	0.00%
Pyridine	20	5.8E-02	2.0E-03	2.7E-02	1.0E-02	1.0E-02	5.75E+00	2.67E+00	8.42E+00	5.64%
bis(2-Chloroethyl)ether	0.08	2.3E-04	2.1E-03	1.1E-04	ND	ND				
bis(2-Ethylhexyl)phthalate	0.007	2.0E-05	3.3E-03	1.5E-05	2.0E-02	2.0E-02	1.01E-03	7.71E-04	1.78E-03	0.00%
Arsenic	0.033	9.5E-05	1.0E-03	2.2E-05	3.0E-04	2.9E-04	3.16E-01	7.59E-02	3.92E-01	0.26%
Manganese	17	4.9E-02	1.0E-03	1.1E-02	5.0E-03	2.0E-04	9.78E+00	5.67E+01	6.65E+01	44.53%
Nickel	0.127	3.7E-04	0.0001	8.5E-06	2.0E-02	1.0E-03	1.83E-02	8.47E-03	2.67E-02	0.02%
						SUMMARY HAZARD INDEX	**65**	**84**	**149**	

TABLE 36
INHALATION EXPOSURE TO VOLATILES IN KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - 6 MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS
CONCENTRATION GROUNDWATER	CW	Maximum	mg/L
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m^3
INHALATION RATE	IhR	2.5	m^3/hour
BODY WEIGHT	BW	70	kg
EXPOSURE TIME	ET	8	hours/day
EXPOSURE FREQUENCY	EF	180	days/year
EXPOSURE DURATION	ED	1	years
AVERAGING TIME			
CANCER	AT	70	years
NONCANCER	AT	0.49	years

Note:
For noncarcinogenic effects: AT = EF/365 days per year

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)

$$\text{INTAKE} = \frac{CAv \times IhR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

TABLE C.5-36, continued
INHALATION EXPOSURE TO VOLATILES IN KODAK PROPERTY GROUNDWATER - MAXIMUM CONCENTRATION
FUTURE CONSTRUCTION WORKER - 6 MONTH EXPOSURE
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

CARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR $(mg/kg-day)^{-1}$	CANCER RISK	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	1.3E-06	2.6E-09	9.1E-02	2.4E-10	0.45%
Benzene	0.14	1.2E-05	2.4E-08	2.9E-02	7.0E-10	1.32%
Chloroform	3.4	2.9E-04	5.8E-07	8.1E-02	4.7E-08	89.08%
Methylene Chloride	5.6	4.9E-04	9.9E-07	ND		
Tetrachloroethene	0.32	2.8E-05	5.6E-08	ND		
Trichloroethene	0.37	3.2E-05	6.4E-08	6.0E-03	3.9E-10	0.73%
Vinyl Chloride	0.085	7.4E-06	1.5E-08	3.0E-01	4.5E-09	8.42%
				SUMMARY CANCER RISK	5E-08	

NONCARCINOGENIC EFFECTS

COMPOUND	GROUNDWATER CONCENTRATION (mg/L)	CAv (mg/m^3)	INTAKE (mg/kg-day)	REFERENCE CONCENTRATION (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
1,2-Dichloroethane	0.015	1.3E-06	3.7E-07	ND		
Benzene	0.14	1.2E-05	3.5E-06	ND		
Chlorobenzene	0.22	1.9E-05	5.5E-06	ND		
Chloroform	3.4	2.9E-04	8.4E-05	ND		
Methylene Chloride	5.6	4.9E-04	1.4E-04	8.6E-01	1.6E-04	100.00%
Tetrachloroethene	0.32	2.8E-05	7.9E-06	ND		
Toluene	1.8	1.6E-04	4.5E-05	ND		
Trichloroethene	0.37	3.2E-05	9.2E-06	ND		
Vinyl Chloride	0.085	7.4E-06	2.1E-06	ND		
				SUMMARY HAZARD INDEX	0.0002	

ECOLOGICAL INVENTORY

TABLE D-1
ECOLOGICAL EXPOSURE PARAMETERS FOR REPRESENTATIVE RECEPTOR SPECIES

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

American robin -- *Turdus migratorius*

Exposure parameter	Reported values	Reference	Value selected for ecological risk assessment
Home range (acres)	Territory size 0.3 to 0.75 acres; 0.11 - 0.6 acres; ave. 0.30 acres.	DeGraaf and Rudis 1986	0.30 acres
Exposure duration (unitless)	Summer resident, migrant. Mar.-Nov.	Estimate.	0.58
Diet	Fruit, earthworms, insects; diet is approximately 60% plants. Caterpillars, beetles, earthworms, true bugs, flies, sowbugs, snails, spiders, termites, millipedes, centipedes, fruits, various plants. Plant material varies from 21% of diet in spring to 81% of diet in fall. Estimated year-round average = 59%.	DeGraaf and Rudis 1986; Martin et al. 1951	Invertebrates: 40% Plants: 55% Soil: 5% [a]
Ingestion rate (kg/day)	Allometric relationship between body weight (BW) and food ingestion rate (F) for passerines: $F\ (g/day) = 0.398 \times BW(g)^{0.851}$ [c]	Nagy 1987	0.073 kg fresh weight/day
Body weight (kg)	0.0648 - 0.0842 kg	Terres 1991	0.0745 kg [b]
Daily inhalation rate (m^3/day)	Allometric relationship between body weight (BW) and inhalation rate: $IR_{air} = 0.66 * BW(kg)^{0.7579}$	USEPA 1988	0.092 m^3/day
Drinking water intake rate (l/day)	Allometric relationship between body weight (BW) and drinking water rate (L) for all birds: $L = 0.059 * BW(kg)^{0.67}$	Calder and Braun 1983	0.01 l/day

[a] 5% selected as default value.
[b] Average of reported values.
[c] Value from equation is in dry weight. This was converted to a fresh weight ingestion rate by multiplying water content of each food item in the diet by per cent composition of the food item in the diet, and summing these values (total per cent dietary water content). This value was subtracted from 100% to yield a dry food percentage of the diet. The dry-weight ingestion rate was divided by the dry food percentage to obtain a fresh weight ingestion rate. The following food item water content percentages were used (provided in Suter, 1993):

invertebrates: 80%
plants: 85%
herpetofauna: 71%
birds: 71%
small mammals: 54%

TABLE D-1
ECOLOGICAL EXPOSURE PARAMETERS FOR REPRESENTATIVE RECEPTOR SPECIES

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Meadow vole -- *Microtus pennsylvanicus*

Exposure parameter	Reported values	Reference	Value selected for ecological risk assessment
Home range (acres)	0.08 - 0.23 acres	DeGraaf and Rudis 1986	0.08 acres [a]
Exposure duration (unitless)	Active year-round	DeGraaf and Rudis 1986	1.0
Diet	Vegetable material, especially tender grasses, bulbs, cambium of roots and stems, seeds and grains. Occasionally caches food when supply is abundant and may even take a small amount of meat when made available.	DeGraaf and Rudis 1986	Plants: 93% Invertebrates: 5% Soil: 2%
Ingestion rate (kg/day)	0.024 - 0.036 kg	Baker 1983	0.030 kg fresh weight/day [b]
Body weight (kg)	0.4 - 0.06 kg 0.028 - 0.07 kg	Baker 1983 Burt and Grossenheider 1976	0.05 kg [b]
Daily inhalation rate (m^3/day)	Allometric relationship between body weight (BW) and inhalation rate: $IR_{air} = 0.66 * BW^{0.7579}$	USEPA 1988	0.068 m^3/day
Drinking water intake rate (1/day)	Allometric relationship between body weight (BW) and drinking water rate (L) for laboratory mammals: $L = 0.10 * BW^{0.7377}$	USEPA 1988	0.011 1/day

[a] Selected as conservative value. Actual range may be greater.
[b] Average of reported values.

TABLE D-2
SUMMARY OF BIOACCUMULATION DATA USED IN ECOLOGICAL ASSESSMENT

OLIN ROCHESTER PHASE I RI REPORT
ROCHESTER, N.Y.

CHEMICAL	log K_{ow} [Source] [b]	BIOACCUMULATION FACTOR (BAF) [a]	
		Invertebrate [c]	Plant [d]
VOLATILES			
Chloroform	2.0	5.0E-02	2.0E-02
SEMIVOLATILES			
1,2,4-Trichlorobenzene	4.3	5.0E-02	2.0E-02
2,6-Dichloropyridine	2.2 [1]	5.0E-02	2.0E-02
2-Chloropyridine	1.3 [1]	5.0E-02	2.0E-02
2-Methylnaphthalene	-1.9	5.0E-02	2.0E-02
3-Chloropyridine	1.4 [1]	5.0E-02	2.0E-02
Acenaphthene	3.9	5.0E-02	2.0E-02
Acenaphthylene	4.1	5.0E-02	2.0E-02
Anthracene	4.5	5.0E-02	2.0E-02
Benzo(a)anthracene	5.7	5.0E-02	3.9E-03
Benzo(a)pyrene	6.0	5.0E-02	2.6E-03
Benzo(b)fluoranthene	6.1	5.0E-02	2.3E-03
Benzo(g,h,i)perylene	6.6	5.0E-02	1.2E-03
Benzo(k)fluoranthene	6.1	5.0E-02	2.3E-03
Bis(2-ethylhexyl)phthalate	5.1	5.0E-02	8.7E-03
Carbazole	3.8 [1]	5.0E-02	2.0E-02
Chrysene	5.7	5.0E-02	3.9E-03
Di-n-butylphthalate	5.2	5.0E-02	7.6E-03
Di-n-octylphthalate	9.2	5.0E-02	3.7E-05
Dibenz(a,h)anthracene	6.5	5.0E-02	1.4E-03
Dibenzofuran	4.1	5.0E-02	2.0E-02
Fluoranthene	5.0 [2]	5.0E-02	2.0E-02
Fluorene	4.2	5.0E-02	2.0E-02
Hexachlorobenzene	6.2	5.0E-02	2.0E-03
Indeno(1,2,3-c,d)pyrene	6.6	5.0E-02	1.2E-03
Naphthalene	3.6	5.0E-02	2.0E-02
Phenanthrene	4.5	5.0E-02	2.0E-02
Pyrene	5.3	5.0E-02	6.7E-03
Pyridine	0.65	5.0E-02	2.0E-02
INORGANICS			
Aluminum	-----	7.5E-02 [e]	8.0E-04 [f]
Arsenic	-----	6.6E-03 [g]	8.0E-03 [f]
Barium	-----	7.5E-03 [e]	3.0E-02 [f]
Cadmium	-----	1.1E+01 [h]	1.1E-01 [f]
Chromium	-----	1.6E-01 [h]	1.5E-03 [f]
Cobalt	-----	1.0E+00 [e]	4.0E-03 [f]
Copper	-----	1.6E-01 [h]	8.0E-02 [f]
Lead	-----	6.2E-02 [i]	9.0E-03 [f]
Manganese	-----	2.0E-02 [e]	5.0E-02 [f]
Mercury	-----	3.4E-01 [j]	1.8E-01 [f]
Nickel	-----	2.3E-01 [k]	1.2E-02 [f]
Selenium	-----	7.6E-01 [g]	5.0E-03 [f]
Silver	-----	1.5E-01 [e]	8.0E-02 [f]
Vanadium	-----	1.3E-01 [e]	1.1E-03 [f]
Zinc	-----	1.8E+00 [h]	3.0E-01 [f]

[a] Units for bioaccumulation factors are (mg/kg fresh wt tissue over mg/kg dry wt soil) for invertebrates and plants.

[b] Source of log K_{ow}s: Superfund Chemical Data Matrix (USEPA, 1993) unless otherwise noted.

[1] Hansch and Leo (1979)

[2] USEPA (1992), Dermal Exposure Guidance.

TABLE D-2
SUMMARY OF BIOACCUMULATION DATA USED IN ECOLOGICAL ASSESSMENT

OLIN ROCHESTER PHASE 1 RI REPORT
ROCHESTER, N.Y.

CHEMICAL	log K_{ow} [Source] [b]	BIOACCUMULATION FACTOR (BAF) [a]	
		Invertebrate [c]	Plant [d]

[c] Average of earthworm BAFs (Beyer, 1990) converted from dry weight to wet weight assuming earthworm is 80% water, unless otherwise noted.

[d] Plant BAF calclulated using the following equation presented by Travis and Arms (1988) unless otherwise noted: log (Plant Uptake Factor) = 1.588 − 0.578 log Kow; if log Kow < 5, BAF assumed to be 0.02 assuming plants are 80% water. See Appendix T text for further discussion.

[e] Prey-specific value not available; value shown is small mammal BAF for this chemical.

[f] Value from Baes et al. (1984) multiplied by 0.2 to represent 80% water composition of plants.

[g] Average of values for industrial soils from Beyer and Cromartie (1987) multiplied by 0.2 to represent 80% water composition in earthworms.

[h] BCF for earthworms from Diercxsens et al. (1985).

[i] BAF from regression equation for worms derived from Corp and Morgan (1991):

$$\log Y = 1.16 + 0.916 \log(X) - 0.326 \log(Ca)$$

Where: Y = worm tissue concentration.
X = average or maximum site soil lead concentration (mg/kg).
Ca = average site soil calcium concentration (mg/kg).

Y is converted from dry weight to wet weight by multiplying Y by 0.2 (assuming worm is 80% water). This value is then divided by the lead concentration.

[j] USEPA, 1985.

[k] Value from nickel sludge document (USEPA, 1985) multiplied by 0.2 to represent 80% water composition of earthworms.

TABLE D-3
BIOCONCENTRATION FACTORS (BCFs) AND PERSISTENCE VALUES FOR GROUNDWATER CPCs

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	CAS No.	Log K_{ow} [a]	Fish BCF (L/kg) [b]	Persistence (days) [c]
ORGANICS				
Benzene	71-43-2	2.1	230	0.84
Bromodichloromethane	75-27-4	2.1	17 [d]	1.2
Dibromochloromethane	124-48-1	2.2	28 [d]	1.4
Bromoform	75-25-2	2.4	31 [e]	1.6
Carbon tetrachloride	56-23-5	2.8	30	1.2
Chlorobenzene	108-90-7	2.8	10 [f]	0.049
1,2-Dichlorobenzene	95-50-1	3.4	89	1.2
1,3-Dichlorobenzene	541-73-1	3.6	66	1.2
Ethylbenzene	100-41-4	3.2	37.2 [f]	0.98
1,1-Dichloroethane	75-34-3	1.8	10.5 [e]	0.94
1,2-Dichloroethane	107-06-2	1.5	2	0.97
1,1,1-Trichloroethane	71-55-6	2.5	9	1.1
1,1-Dichloroethylene	75-35-4	2.1	5.6 [f]	0.93
trans-1,2-Dichloroethylene	156-60-5	2.1	1.6 [f]	0.93
Trichloroethylene	79-01-6	2.4	17	1.1
Tetrachloroethylene	127-18-4	3.4	49	1.2
Chloroform	67-66-3	2	6	1
p-Fluoroaniline	371-40-4	1.15 [g]	3.2 [e]	3 - 37 [h]
Methylene chloride	75-09-2	1.3	4 [d]	0.88
Xylenes (total)	1330-20-7	3.2	267 [d]	0.98
Di-n-butylphthalate	84-74-2	5.2	6,700	24

TABLE D-3
BIOCONCENTRATION FACTORS (BCFs) AND PERSISTENCE VALUES FOR GROUNDWATER CPCs

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	CAS No.	Log K_{ow} [a]	Fish BCF (L/kg) [b]	Persistence (days) [c]
Bis(2-ethylhexyl)phthalate	117-81-7	5.1	110,000	0.8
1,2-Dichloropropane	78-87-5	2.3	26 [e]	1
cis-1,3-Dichloropropene	542-75-6	1.6	1.9 [f]	0.1
Pyridine	110-86-1	0.65	1.3 [e]	3.3
2,6-Dichloropyridine	2402-78-0	2.15 [g]	20 [e]	> 4 [i]
3-Chloropyridine	626-60-8	1.38 [g]	4.9 [e]	3 - 4 [i]
Toluene	108-88-3	2.7	83 [d]	0.91
Vinyl chloride	75-01-4	1.4	7 [d]	0.17
2-Chloropyridine	109-09-1	1.33 [g]	4.5 [e]	3 - 4 [i]
4-Chloroaniline	106-47-8	1.8	10.5 [e]	85
Benzoic acid	65-85-0	1.9	12.6 [e]	10
Bis(2-chloroethyl)ether	111-44-4	1.3	11	2.9
INORGANICS				
Aluminum	7429-90-5	--	140	NA
Antimony	7440-36-0	--	0.9	NA
Arsenic	7440-38-2	--	17	NA
Barium	7440-39-3	--	4 [d]	NA
Beryllium	7440-41-7	--	19	NA
Cadmium	7440-43-9	--	7,400	NA
Chromium	7440-47-3	--	1	NA
Cobalt	7440-48-4	--	300 [d]	NA
Copper	7440-50-8	--	23,000	NA
Cyanide	57-12-5	--	0 [2,3]	NA

TABLE D-3
BIOCONCENTRATION FACTORS (BCFs) AND PERSISTENCE VALUES FOR GROUNDWATER CPCs

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	CAS No.	Log K_{ow} [a]	Fish BCF (L/kg) [b]	Persistence (days) [c]
Iron	15438-31-0	--	100 [d]	NA
Lead	7439-92-1	--	1,700	NA
Manganese	7439-96-5	--	400 [d]	NA
Mercury	7439-97-6	--	86,000	NA
Nickel	7440-02-0	--	110	NA
Selenium	7782-49-2	--	5,700	NA
Silver	7440-22-4	--	28	NA
Thallium	7440-28-0	--	130	NA
Vanadium	7440-62-2	--	0.01 [d]	NA
Zinc	7440-66-6	--	970	NA

NOTES:

[a] K_{ow} is the n-octanol/water partition coefficient of the chemical. The source of Log K_{ow} values is the Superfund Chemical Data Matrix (USEPA, 1993), unless otherwise noted.
[b] The source of fish BCF values is the Superfund Chemical Data Matrix (USEPA, 1993), unless otherwise noted. Bioconcentration values were obtained from the "environmental fresh BCF" category.
[c] The source of persistence values is the Superfund Chemical Data Matrix (USEPA, 1993), unless otherwise noted. Persistence values were obtained from the lowest available half-lives listed in the "River" category.
[d] Barnthouse (1988).
[e] No chemical-specific data available. Calculated using the following regression equation: log BCF = 0.79 x Log K_{ow} - 0.40. (U.S. EPA, 1988).
[f] Value obtained from the Superfund Public Health Evaluation Manual (USEPA, 1986).
[g] Hansch and Leo (1979).
[h] Dean (1985).
[i] Sims and Somers (1986).
NA = Not applicable. Inorganics are generally persistent, and do not have half-lives.

TABLE D-4
SURFACE WATER BENCHMARK CONCENTRATIONS FOR AQUATIC LIFE TOXICITY

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	National Acute AWQC [a] (mg/L)	National Chronic AWQC [b] (mg/L)	NYSDEC AWQS Class B [c] (mg/L)	Chronic Surface Water Benchmark [d] (mg/L)
Benzene	5.3 [e]	0.181 [f]	NA	0.181
Bromodichloromethane	34 [e,g]	1.06 [f]	NA	1.06
Dibromochloromethane	34 [h]	1.06 [f]	NA	1.06
Bromoform	29 [h]	0.910 [f]	NA	0.910
Carbon tetrachloride	27.3 [e]	0.860 [f]	NA	0.860
Chlorobenzene	--	2.10 [i]	0.005	0.005
1,2-dichlorobenzene	1.12 [e]	0.763 [j]	0.005	0.005
1,3-dichlorobenzene	1.12 [e]	0.763 [k]	0.005	0.005
Ethylbenzene	32 [e]	1.0 [f]	NA	1.0
1,1-dichloroethane	118 [k]	20 [k]	NA	20
1,2-dichloroethane	118 [e]	20 [j]	NA	20
1,1,1-trichloroethane	18 [e]	9.4 [l]	NA	9.4
1,1-dichloroethylene	11.6 [e]	0.38 [f]	NA	0.38
trans-1,2-dichloroethylene	11.6 [e]	0.38 [f]	NA	0.38
trichloroethylene	45 [e]	21.9 [j]	NA	21.9
tetrachloroethylene	5.28 [e]	0.84 [j]	NA	0.84
chloroform	28.9 [e]	1.24 [j]	NA	1.24
p-Fluoroaniline	16.9 [h]	0.545 [f]	NA	0.545
methylene chloride	--	82.5 [i]	NA	82.5
Xylenes (total)	0.35 [i]	0.014 [f]	NA	0.014
Di-n-butylphthalate	0.94 [e]	0.003 [j]	NA	0.003
bis(2-Ethylhexyl)phthalate	0.4 [m]	0.36 [m]	0.0006	0.0006
1,2-dichloropropane	23 [n]	5.7 [n]	NA	5.7
cis-1,3-dichloropropene	6.06 [o]	0.244 [o]	NA	0.2
pyridine	3.5 [p]	0.35 [q]	NA	0.244
2,6-dichloropyridine	43 [h]	1.32 [f]	NA	1.32
3-chloropyridine	43 [r]	1.32 [f]	NA	1.32

TABLE D-4
SURFACE WATER BENCHMARK CONCENTRATIONS FOR AQUATIC LIFE TOXICITY

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	National Acute AWQC [a] (mg/L)	National Chronic AWQC [b] (mg/L)	NYSDEC AWQS Class B [c] (mg/L)	Chronic Surface Water Benchmark [d] (mg/L)
toluene	17.5 [i]	0.56 [f]	NA	0.56
vinyl chloride		14.5 [s]	NA	14.5
2-chloropyridine	43 [r]	1.32 [f]	NA	1.32
4-chloroaniline	--	0.04 [i]	NA	0.04
Benzoic Acid	--	55 [i]	NA	55
bis(2-Chloroethyl)ether	240 [h]	6.78 [f]	NA	6.78
Aluminum	0.748	0.087	0.1	0.087
Antimony	0.088 [m]	0.03 [m]	NA	0.03
Arsenic	0.36 [t]	0.19 [t]	0.19	0.19
Barium	NA	NA	NA	NA
Beryllium	0.13 [u]	0.0053 [j]	1.1	0.0053
Cadmium	0.0039 [v]	0.0011 [v]	0.0011 [v]	0.0011
Chromium	0.016 [v,w]	0.011 [v,w]	0.207 [v]	0.011
Cobalt	NA	NA	0.005	0.005
Copper	0.018 [v]	0.012 [v]	0.012 [v]	0.012
Iron	NA	1	0.3	0.3
Lead	0.083 [v]	0.0032 [v]	0.0032 [v]	0.0032
Manganese	NA	NA	NA	NA
Mercury	0.0024	0.000012	NA	0.000012
Nickel	1.4 [v]	0.16 [v]	0.096 [v]	0.096
Selenium	0.02	0.005	0.001	0.001
Silver	0.0041 [v]	0.00012	0.0001 [v]	0.00012
Thallium	1.4 [u]	0.04 [j]	0.008	0.008
Vanadium	NA	NA	0.014	0.014
Zinc	0.12 [v]	0.11 [v]	0.03	0.03
Cyanide	0.022	0.0052	0.0052	0.0052

Notes:

[a] National Acute Ambient Water Quality Criteria (AWQC) (USEPA, 1980), unless otherwise noted. The acute criteria is the 1-hour average concentration not to be exceeded more than once every three years.

[b] National Chronic Ambient Water Quality Criteria (AWQC) (USEPA, 1980), unless otherwise noted. The chronic criterion is the 4-day

TABLE D-4
SURFACE WATER BENCHMARK CONCENTRATIONS FOR AQUATIC LIFE TOXICITY

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Compound	National Acute AWQC [a] (mg/L)	National Chronic AWQC [b] (mg/L)	NYSDEC AWQS Class B [c] (mg/L)	Chronic Surface Water Benchmark [d] (mg/L)

average concentration not to be exceeded more than once every three years.

[c] Ambient Water Quality Standards (AWQS) for Water Class B, Type A (NYSDEC, 1991), unless otherwise noted. Class B, Type A is protective of fish propagation and wildlife consumption of fish.

[d] The lower of the National Chronic AWQC and NYSDEC AWQS.

[e] Insufficient data to develop criteria. Value presented is lowest LC50 (lethal concentration to 50% of test population) (USEPA, 1980).

[f] NOEC calculated from the relationship logNOEC = −1.28+0.95logLC50 (Sloof et al., 1986).

[g] Dibromochloromethane LC50 used as surrogate (USEPA, 1980).

[h] LC50 (AQUIRE 1994).

[i] Chronic LOEL (lowest observed effect level) (AQUIRE, 1994).

[j] Chronic LOEL (USEPA, 1980).

[k] 1,2−dichloroethane LOEL used as surrogate (USEPA, 1980).

[l] 1,1,2−trichloroethane LOEL used as surrogate (USEPA, 1980).

[m] Proposed criterion (USEPA).

[n] Dichloropropane LOEL used as surrogate (USEPA, 1980).

[o] Dichloropropene LOEL used as surrogate (USEPA, 1980)

[p] Acute LOEL (AQUIRE, 1994).

[q] Acute:Chronic ratio of 0.1 applied to acute LOEL.

[r] 2,6−dichloropyridine LC50 used as surrogate (AQUIRE, 1994).

[s] Suter et al., 1992.

[t] Criteria for arsenic III.

[u] Acute LOEL (USEPA, 1980).

[v] Hardness−dependent criterion. 100 ppm hardness assumed.

[w] Criteria for chromium VI.

-- Not applicable.

NA Not available.

TABLE D.5
SUMMARY OF TOXICITY DATA FOR PLANT RECEPTORS

OLIN CHEMCIALS PHASE I RI REPORT
ROCHESTER, N.Y.

Chemical	Sample Population	Reference	RTV (mg/kg)
VOLATILE ORGANICS			
Chloroform			NA
SEMIVOLATILE ORGANICS			
1,2,4-Trichlorobenzene			NA
2,6-Dichloropyridine			NA
2-Chloropyridine			NA
2-Methylnaphthalene			NA
3-Chloropyridine			NA
Acenaphthene			NA
Acenaphthylene			NA
Anthracene			NA
Benzo(a)anthracene			NA
Benzo(a)pyrene			NA
Benzo(b)fluoranthene			NA
Benzo(g,h,i)perylene			NA
Benzo(k)fluoranthene			NA
Bis(2-ethylhexyl)phthalate			200 [a]
Carbazole			NA
Chrysene			NA
Di-n-butylphthalate	n=7	Suter et al., 1993	200
Di-n-octylphthalate			200 [a]
Dibenzo(a,h)anthracene			NA
Dibenzofuran			NA
Fluoranthene			NA
Fluorene			NA
Hexachlorobenzene			NA
Indeno(1,2,3-c,d)pyrene			NA
Naphthalene			NA
Phenanthrene			NA
Pyrene			NA
Pyridine			NA
INORGANICS			
Aluminum	n=3	Suter et al., 1993	10
Arsenic	n=4	Suter et al., 1993	10
Barium	n=2	Suter et al., 1993	500
Cadmium	n=32	Suter et al., 1993	2
Chromium	n=7	Suter et al., 1993	2
Cobalt	n=1	Suter et al., 1993	25
Copper	n=5	Suter et al., 1993	40
Lead	n=14	Suter et al., 1993	50
Manganese	n=6	Suter et al., 1993	500
Mercury	n=1	Suter et al., 1993	0.3
Nickel	n=11	Suter et al., 1993	25
Selenium	n=7	Suter et al., 1993	1
Silver	n=1	Suter et al., 1993	2
Vanadium	n=3	Suter et al., 1993	2.5
Zinc	n=15	Suter et al., 1993	20

NOTES:
[a] Value for di-n-butylphthalate was used as a surrogate.
NA = Not Available

TABLE D-6
SUMMARY OF TOXICITY DATA FOR TERRESTRIAL INVERTEBRATE RECEPTORS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Chemical	Test Type	Test Duration	Test Species	Chemical Concentration (mg/kg)	Effect	RTV (mg/kg)	Reference
VOLATILE ORGANIC COMPOUNDS							
Chloroform	Soil Test	14 day	E. fetida	740	LC_{50}	150 [a]	Neuhauser et al., 1985.
SEMIVOLATILE ORGANIC COMPOUNDS							
1,2,4-Trichlorobenzene	Soil Test	14 day	E. fetida	106	LC_{50}	20 [a]	Neuhauser et al., 1985.
2,6-Dichloropyridine	Soil Test	14 day	E. fetida	38	LC_{50}	8 [b]	Neuhauser et al., 1985.
2-Chloropyridine	Soil Test	14 day	E. fetida	38	LC_{50}	8 [b]	Neuhauser et al., 1985.
2-Methylnaphthalene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
3-Chloropyridine	Soil Test	14 day	E. fetida	38	LC_{50}	8 [b]	Neuhauser et al., 1985.
Acenaphthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Acenaphthylene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Anthracene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(a)anthracene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(a)pyrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(b)fluoranthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(g,h,i)perylene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(k)fluoranthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Bis(2-ethylhexyl)phthalate	Soil Test	14 day	E. fetida	3160	LC_{50}	630 [a]	Neuhauser et al., 1985.
Carbazole	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Chrysene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Di-n-butylphthalate	Soil Test	14 day	E. fetida	3160	LC_{50}	630 [a]	Neuhauser et al., 1985.
Di-n-octylphthalate	Soil Test	14 day	E. fetida	3160	LC_{50}	630 [a]	Neuhauser et al., 1985.
Dibenzo(a,h)anthracene	Soil Test	14 day	E. fetida	3160	LC_{50}	630 [a]	Neuhauser et al., 1985.
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Fluorene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Hexachlorobenzene	Soil Test	14 day	E. fetida	106	LC_{50}	20 [a]	Neuhauser et al., 1985.
Indeno(1,2,3-c,d)pyrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Naphthalene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Phenanthrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Pyrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Pyridine	Soil Test	14 day	E. fetida	38	LC_{50}	8 [b]	Neuhauser et al., 1985.
INORGANICS							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Arsenic	Soil Test	14 day	E. fetida	100	0 % mortality	100	Bouche et al., 1987
Arsenic	Soil Test	14 day	E. fetida	200	100 % mortality		Bouche et al., 1987
Barium	NA	NA	NA	NA	NA	NA	NA
Cadmium	Soil Test	14 day	E. fetida	900	0 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	E. fetida	2700	100 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	E. fetida	1000 [c]	LC_{50}		Gestel and Dis, 1988
Cadmium	Soil Test	20 week	E. fetida	50 [d]	Decrease in co	50 [e]	Malecki et al., 1982
Cadmium	Soil Test	2 week	E. fetida	1843	LC_{50}		Neuhauser et al., 1985
Chromium (III)	Soil Test	8 week	E. fetida	250	Reproduction.	50	Monar et al., 1989
Cobalt	NA	NA	NA	NA	NA	NA	NA

TABLE D–6
SUMMARY OF TOXICITY DATA FOR TERRESTRIAL INVERTEBRATE RECEPTORS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

Chemical	Test Type	Test Duration	Test Species	Chemical Concentration (mg/kg)	Effect	RTV (mg/kg)	Reference
Copper	Soil Test	14 day	E. fetida	10	0 % mortality		Bouche et al., 1987
Copper	Soil Test	14 day	E. fetida	30	20 % mortality	30	Bouche et al., 1987
Copper	Soil Test	20 week	E. fetida	1000 [d]	Decrease in cocoon production		Malecki et al., 1982
Copper	Soil Test	2 week	E. fetida	643	LC_{50}		Neuhauser et al., 1985
Lead	Soil Test	20 week	E. fetida	5000 [d]	Decrease in cocoon production		Malecki et al., 1982
Lead	Soil Test	2 week	E. fetida	5941	LC_{50}	1190 [e]	Neuhauser et al., 1985
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	Soil Test	14 day	E. fetida	36	0 % mortality	36	Bouche et al., 1987
Mercury	Soil Test	14 day	E. fetida	216	60 % mortality		Bouche et al., 1987
Nickel	Soil Test	20 week	E. fetida	400 [d]	Decrease in co	400	Malecki et al., 1982
Nickel	Soil Test	2 week	E. fetida	757	LC_{50}		Neuhauser et al., 1985
Selenium	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	Soil Test	20 week	E. fetida	5000 [d]	Decrease in cocoon production		Malecki et al., 1982
Zinc	Soil Test	2 week	E. fetida	662	LC_{50}	130 [e]	Neuhauser et al., 1985

NOTES:
[a] Equal to the lowest LC_{50} in each chemical class, multiplied by a safety factor of 0.2, as described in text.
[b] Value for phenol used as surrogate based on structural similarities between phenol and pyridines.
[c] LC_{50} value for soil at pH = 7.0; LC_{50} = 320 ug/g – 560 ug/g for soil pH = 4.1
[d] Acetate salt
[e] Conservative factor of 0.2 applied to endpoint; resultant value should be protective of 99.9% of the exposued population from acute effects (USEPA, 1986).
NA = Not Available

TABLE D–7
SUMMARY OF INGESTION TOXICITY DATA FOR WILDLIFE RECEPTORS
OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

ANALYTE	ACUTE (mg/kgBW–day) ORAL LD_{50}	ACUTE (mg/kgBW–day) ORAL LOAEL	CHRONIC (mg/kgBW–day) LOAEL	CHRONIC (mg/kgBW–day) NOAEL	TEST SPECIES	TEST TYPE	DURATION	EFFECT	REFERENCE
VOLATILE ORGANICS									
Chloroform		129 [b]	12.9		Dog (beagle)	Oral (chronic)	7.5 years	Liver cyst formation	IRIS, 1991
			63		Rabbit	Oral (acute)	10 days	Increased abortion rate	ATSDR, 1992
SEMI–VOLATILE ORGANICS									
1,2,4–Trichlorobenzene	1000	200 [a]	20 [b]		Rat	Oral (acute)		Mortality	Verschueren, 1983.
2,6–Dichloropyridine	130 [j]	26 [a]	2.6 [b]		Mouse	Single oral dose		Mortality	Sax, 1989
2–Chloropyridine (also surrogate	130	26 [a]	2.6 [b]		Mouse	Single oral dose		Mortality	Sax, 1989
2–Methylnaphthalene	1630	330 [a]	33 [b]		Rat	Single oral dose		Mortality	NIOSH, 1985
3–Chloropyridine	130 [j]	26 [a]	2.6 [b]		Mouse	Single oral dose		Mortality	Sax, 1989
Acenaphthene		3500 [b]	350	175	Mouse	Oral (chronic)	90 days	Liver weight increase	IRIS, 1990
			2000		Rat	Oral (chronic)	32 days	Physiological changes	USEPA, 1984
Acenaphthylene		6000 [b]	600		Rat	Oral (chronic)	40 days	Physiological changes	USEPA, 1984
Anthracene			3300		Rodents	Oral (chronic)	NS	Carcinogenicity	Eisler, 1987
		10000 [b]		1000	Mouse	Oral (chronic)	90 days	Clinical and pathological effects	IRIS, 1990
Benzo(a)anthracene			10 [c]		Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
Benzo(a)pyrene (also used as surrogate		40	4 [b]		Rat	Oral (acute)	Pregnancy	Sterility in offspring	USEPA, 1984
for dibenz(a,h)anthracene)			10		Rat	Oral (chronic)	Pregnancy	Decreased gonad weight	USEPA, 1984
			50		Rat	Oral (chronic)	3.5 months	Reproductive effects	USEPA, 1984
			4.7		Mouse	Oral (chronic)	110 days	Tumor growth	Neal and Rigdon, 1967
			10		Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
			2.5		Rat	Oral (chronic)	NS	Papillomas in stomach	USEPA, 1985
Benzo(b)fluoranthene			40		Rodents	Oral (chronic)	NS	Carcinogenicity	Eisler, 1987
			10 [c]		Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
Benzo(g,h,i)perylene			99 [d]		Rodents	Oral (chronic)	NS	Carcinogenicity	Eisler, 1987
			10 [c]		Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
Bis(2–ethylhexyl)phthalate			19	3.8	Guinea pig	Oral (chronic)	1 year	Increased liver weight	IRIS, 1992
	8600	1720 [a]			Rat	Single oral dose		Mortality	NIOSH, 1985
	26000				Rat	Single oral dose		Mortality	ATSDR, 1988
Carbazole	500	100 [a]	10 [b]		Rat	Single oral dose		Mortality	USEPA, 1986
Chrysene			99		Rodents	Oral (chronic)	NS	Carcinogenicity	Eisler, 1987
			10 [c]		Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
Dibenzofuran		500			Rodents	Single oral dose		LC20	ATSDR, 1991
			125		Rodents	Oral (chronic)	13 weeks	LC10	ATSDR, 1991
				60	Mouse	Oral (chronic)	103 weeks	Multinuclear hepatocytes	ATSDR, 1991
Di–n–butylphthalate			125		Rat	Oral (subchronic)	48 days	LOAEL for reproductive effects	ATSDR, 1989
			600	125	Rat	Oral (chronic)	1 year	Mortality	IRIS, 1991
	6513 [h]	1302 [a]			Mouse	Single oral dose		Mortality	Sax, 1984
Di–n–octylphthalate			175		Rat	Oral (chronic)	7–12 months	Increased kidney weight	USEPA, 1992
	6513	1302 [a]			Mouse	Single oral dose		Moratlity	Sax, 1984
Fluoranthene			250	125	Mouse	Oral (subchronic)	90 days	Nephropathy; clinical and pathological effects	IRIS, 1990
	2000	400 [a]			Rodents	Single oral dose		Mortality	Eisler, 1987
Fluorene			250	125	Mouse	Oral (chronic)	13 weeks	Hematological changes	IRIS, 1990
		10 [c]			Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
Hexachlorobenzene		2000			Mouse	Single oral dose		Mortality	Verschueren, 1983.
			6		Rat	Oral (chronic)	13 days	Nervousness, twitching	Verschueren, 1983.
			0.5		Quail	Oral (chronic)	90 days	Increased liver weight	Verschueren, 1983.
		5			Rat	Oral (acute)	1 generation	Mortality	ATSDR, 1989
			0.25		Rat	Oral (chronic)	12 mos.	Hepatic effects	ATSDR, 1989
			2		Rat	Oral (chronic)	130 weeks	Increased pup mortality and severe hepatic and renal lesions in F1 generation	ATSDR, 1989

TABLE D–7
SUMMARY OF INGESTION TOXICITY DATA FOR WILDLIFE RECEPTORS

OLIN CHEMICALS PHASE I RI REPORT
ROCHESTER, N.Y.

ANALYTE	ACUTE (mg/kgBW–day) ORAL LD_{50}	ACUTE (mg/kgBW–day) ORAL LOAEL	CHRONIC (mg/kgBW–day) LOAEL	CHRONIC (mg/kgBW–day) NOAEL	TEST SPECIES	TEST TYPE	DURATION	EFFECT	REFERENCE
Indeno(1,2,3–cd)pyrene			72		Rodents	Oral (chronic)	NS	Carcinogenicity	Eisler, 1987
			10 [c]		Mouse	Gavage	9 days	Decreased fertility and litter size	MacKenzie and Angevine, 1981
Naphthalene			41		Rat	Oral (chronic)	100 weeks	Ocular lesions	USEPA, 1990
			35.7		Rat	Oral (subchronic)	13 weeks	Decreased body weight gain	USEPA, 1990
	533	110 [a]			Mouse	Single oral dose		Mortality	ATSDR, 1990
Phenanthrene			120		Rat	Oral (subchronic)	6 months	Increased liver weight	ATSDR, 1989
	700	140 [a]			Rodents	Single oral dose		Mortality	Eisler, 1987
Pyrene			125	75	Mouse	Oral (chronic)	13 weeks	Renal effects	IRIS, 1990
	800	160 [a]			Mouse	Single oral dose		Mortality	NIOSH, 1985
	2700				Rat	Single oral dose		Mortality	NIOSH, 1985
Pyridine	800				Rat	Oral (acute)		Mortality	Verschueren, 1983.
	1580				Rat	Oral (acute)		Mortality	ATSDR, 1991
			10		Rat	Oral (subchronic)	90 days	Increased liver weight	ATSDR, 1991
			50		Rat	Oral (subchronic)	90 days	Hepatic inflammatory lesions	ATSDR, 1991
			100		Rat	Oral (subchronic)	90 days	Mortality	IRIS, 1994
INORGANICS									
Aluminum		4250 [b]	425		Mouse	Oral (chronic)	2–3 genrtns	Reduced body weight gain of newborns	NIOSH, 1985
		1000 [b]	100		Rat	Oral (subchronic)	15 days	Reduced growth	Bernuzzi, et al., 1989
Arsenic			7.5		Rat	Oral (chronic)	NS	Weight loss	USEPA, 1984
		14			Hamster	Single oral dose	Gestation	7–36% Fetal mortality	ATSDR, 1992
	323	64.6 [a]			Mallard	Single oral dose		Mortality	Eisler, 1988
	386				Pheasant	Single oral dose		Mortality	Eisler, 1988
Barium				0.825	Mouse	Oral (chronic)	lifetime	NOEL	IRIS, 1990
				5.1	Rat	Oral (chronic)	16 months	NOEL	IRIS, 1990
				0.25	Rat	Oral (chronic)	lifetime	NOEL	IRIS, 1990
				31.5	Rat	Oral (chronic)	13 weeks	NOEL	IRIS, 1990
			142		Rat	Oral (chronic)	68 weeks	Renal ultrastructure changes	IRIS, 1993
			91		Rat	Oral (subchronic)	13 weeks	LOAEL for renal effects	Dietz et al., 1992
		430			Rat	Oral (subchronic)	13 weeks	20% population mortality	Dietz et al., 1992
Cadmium			1.75		Mouse	Oral (chronic)	18 months	Histopathological effects	ATSDR, 1988
			0.32		Mouse	Oral (subchronic)	28 days	Alteration in blood chemistry	Eisler, 1985
				1.8	Mouse (young)	Oral (chronic)	28 days	Blood chemistry altered	Eisler, 1985
	250				Rat	Single oral dose		Mortality	Eisler, 1985
				100	Rat	Single oral dose		Testicular damage	Eisler, 1985
			14		Rat	Oral (subchronic)	12 weeks	Hepatic and renal effects	ATSDR, 1992
				12.5	Rat	Oral (subchronic)	Gest., days 6–15	NOAEL for reproductive effects	Machener & Lorke, 1981
	150	30 [a]			Guinea pig	Single oral dose		Mortality	Eisler, 1985
			7.6		Japanese quail	Oral (subchronic)	6 weeks	Bone marrow hypoplasia	Eisler, 1985
				200	Mallard	Oral (chronic)	90 days	Egg production suppressed	Eisler, 1985
				200	Mallard	Oral (chronic)	90 days	NOEL	Eisler, 1985
				20	Mallard (young)	Oral (chronic)	12 weeks	Kidney lesions	Eisler, 1985
Chromium (III)		14000 [b]	1400		Rat	Oral (subchronic)	90 days	NOAEL for histopathologic and reproductive effects	Ivankovic and Preussman, 1975
		2000 [b]	200		Black Duck	Oral (subchronic)	5 months	NOAEL for reproductive effects	Outridge and Scheuhammer, 1993
Cobalt	91	18 [a]			Rat	Single oral dose		Mortality	ATSDR, 1991
		157			Rat	Single oral dose		Hepatic/renal hyperemia	ATSDR, 1991
			4.2		Rat	Oral (subchronic)	8 weeks	Decreased body weight gain	ATSDR, 1991
			13		Rat	Oral (chronic)	98 days	Testicular degeneration	ATSDR, 1991
			20		Rat	Oral (chronic)	69 days	Testicular atrophy	ATSDR, 1991
		20			Guinea pig	Oral (subchronic)	5 week	Mortality	ATSDR, 1991

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ANALYTE	ACUTE (mg/kgBW-day) ORAL LD_{50}	ACUTE (mg/kgBW-day) ORAL LOAEL	CHRONIC (mg/kgBW-day) LOAEL	CHRONIC (mg/kgBW-day) NOAEL	TEST SPECIES	TEST TYPE	DURATION	EFFECT	REFERENCE
Copper		152			Rat	Single oral dose		TDlo for reproductive effects	NIOSH, 1985
			100		Mice	Oral (chronic)	30 days	Decreased litter sizes with teratogenic effects	Lecyk, 1980
			152		Rat	Oral (chronic)	22 weeks	Fetotoxicity; CNS abnormalities	NIOSH, 1985
		2.09			Mallard	Oral (acute)	29 days	No effect on survivorship	Demayo et al., 1982
			29		Mallard	Oral (subchronic)	NS	LOAEL	NRC, 1977
Lead			1.5		Mouse	Oral (chronic)	NS	Reduced sucess of implanted ova	Eisler, 1988
	12				Rat	Single oral dose		Mortality	Eisler, 1988
	17				Rat	Single oral dose		LDLO	Eisler, 1988
		2.5			Rat	Oral (acute)	Days 12-14 (preg)	Increased fetal resorption rate; decreased fetal BW	McClain and Becker, 1972
		1			Rat	Oral (acute)	Days 5-15 (preg)	Increased resorptions/dam	Kennedy et al., 1975
		1.5			Rat	Oral (subchronic)	3 weeks	Increased locomotor activity	Eisler, 1988
				7	Rat	Oral (chronic)	2 generations	NOAEL for developmental effects	Kimmel et al., 1988 and Grant et al., 1980
			2.16		Rat	Oral (chronic)	2 years	Decreased ALAD synthesis	ATSDR, 1988
			25		Rat	Oral (chronic)	NS	Increased locomotor activity	Eisler, 1988
	300	60 [a]			Guinea pig	Single oral dose		Mortality	Sax, 1984
			0.51		Rabbit	Oral (chronic)	NS	Mortality	USEPA, 1988
			169		Chicken	Oral (subchronic)	4 weeks	Growth rate suppressed	Eisler, 1988
			6.25		Rock dove	Oral (chronic)	NS	Kidney pathology; learning deficiences	Anders et al., 1982 and Dietz et al., 1979
		75			Rock dove	Single oral dose		Mortality	Kendall and Scanlon, 1985
	151				Mallard	Oral (subchronic)	NS	Some mortality and ALAD decrease	Eisler, 1988
			1.75		Mallard	Oral (chronic)	12 weeks	Decrease in ALAD activity	Eisler, 1988
	24.6				Japanese quail	Single oral dose		Mortality	Eisler, 1988
			2.8		Starling	Oral (acute)	11 days	Reduced food consumption	Eisler, 1988
Manganese				2300	Mouse	Oral (subchronic)	6 months	Mortality	ATSDR, 1990
			140		Mouse	Oral (subchronic)	90 days	Delayed growth of testes	ATSDR, 1990
				810	Mouse	Oral (chronic)	103 weeks	Mortality	ATSDR, 1990
	410				Rat	Single oral dose		Mortality	ATSDR, 1990
	225				Rat	Oral (acute)	20 day	Mortality	ATSDR, 1990
				12	Rat	Oral (subchronic)	10 weeks	Hepatic effects	ATSDR, 1990
		1240		620	Rat	Oral (subchronic)	20 days	Decreased litter weight during gestation	ATSDR, 1990
			930		Rat	Oral (chronic)	103 weeks	Mortality	ATSDR, 1990
	400				Guinea pig	Single oral dose		Mortality	USEPA, 1984
			25		Monkey	Oral (chronic)	18 months	Weakness, rigidity	ATSDR, 1990
			100		Rodents	Oral (subchronic)	10 days - 2 months	Decreased growth rate	Cunningham et al., 1966
		2300			Mouse	Oral (subchronic)	180 days	NOAEL for mortality	Gianutsos and Murray, 1982
Mercury	22				Mouse	Single oral dose		Mortality	NIOSH, 1985
			6.3		Mouse	Oral (subchronic)	18 days	Mortality; neurological symptoms	Suzuki, 1979
			5		Mouse	Oral (subchronic)	38 days	Mortality; neurological symptoms	Suzuki, 1979
			0.9		Mouse	Oral (subchronic)	50 days	Embryotoxicity and teratogenicity	Suzuki, 1979
			1		Mouse	Oral (subchronic)	45 days	Hypophagia, weight loss, weakness of hind legs	Suzuki, 1979
			4		Mouse	Oral (subchronic)	Day 6-17 (gest)	Stillbirths and neonatal death	Suzuki, 1979
			0.7		Mouse	Oral (subchronic)	Day 0-18 (gest)	Embryolethality and teratogenicity	Suzuki, 1979
			4		Rat	Oral (subchronic)	Day 6-14 (gest)	Retarded fetus growth and teratogenicity	Suzuki, 1979
			0.12 [e]		Rat	Oral (subchronic)	Gest. + 16 days	Behavioral changes in offspring	Suzuki, 1979
			0.5		Rat	Oral (chronic)	NS	Reduced fertility	Eisler, 1987
			0.16 [e]		Rat	Oral (chronic)	38 days	Adverse behavioral change	Eisler, 1987
	18	3.6 [a]			Rat	Single oral dose		Mortality	NIOSH, 1985
			0.5		Pig	Oral (chronic)	Pregnancy	High incidence of stillbirths	Eisler, 1987

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	12.6				House sparrow	Single oral dose		Mortality	Eisler, 1987
	22.8				Rock dove	Single oral dose		Mortality	Eisler, 1987
			3		Pigeon	Oral (subchronic)	17 days	Behavioral alterations	Eisler, 1987
			1		Pigeon	Oral (subchronic)	5 weeks	Behavioral alterations	Eisler, 1987
			0.25 [e]		Starling	Oral (chronic)	8 weeks	Kidney lesions	Eisler, 1987
	20				Chicken	Single oral dose		Mortality	Fimreite, 1979
	190				Bantam chicken	Single oral dose		Mortality	Fimreite, 1979
	11.5				Prairie chicken	Single oral dose		Mortality	Eisler, 1987
	26.9				Chukar	Single oral dose		Mortality	Eisler, 1987
	11	2 [a]			Coturnix	Single oral dose		Mortality	Eisler, 1987
			0.22 [e]		Black duck	Oral (chronic)	28 weeks	Reproduction inhibited, brain lesions	Eisler, 1987
	37.8				Fulvous whistling duck	Single oral dose		Mortality	Eisler, 1987
	23.8				Northern bobwhite	Single oral dose		Mortality	Eisler, 1987
	523				Bobwhite quail	Oral (acute	5 days	Mortality	Hill et al., 1975
	14.4				Japanese quail	Single oral dose		Mortality	Eisler, 1987
			0.81		Japanese quail	Oral (subchronic)	3 weeks	Depressed gonad weights	Eisler, 1987
			0.10		Japanese quail	Oral (subchronic)	9 weeks	Alterations in brain and plasma enzyme activities	Eisler, 1987
			5.0		Japanese quail	Oral (chronic)	NS	Reproductive effects	Fimreite, 1979
	17.6				Gray partridge	Single oral dose		Mortality	Eisler, 1987
			0.64		Gray pheasant	Oral (chronic)	30 days	Reduced reproductive ability	Eisler, 1987
	11.5				Ring-necked pheasant	Single oral dose		Mortality	Eisler, 1987
Nickel	67	13.4 [a]			Rat	Single oral dose		Mortality	ATSDR, 1987
			50		Rat	Oral (chronic)	2 years	Decreased body weight gain	ATSDR, 1987
	504 [c]	100 [a]	**10** [b]		Japanese quail	Oral (acute)	5 days	NOAEL	Hill and Camardese, 1986
Selenium			**0.2**		Rat	Oral (chronic)	2 years	Decrease in breeding	ATSDR, 1988
			0.045		Rat	Oral (chronic)	NS	Histological changes in heart and kidney	Eisler, 1985
			0.6		Japanese quail	Oral (chronic)	NS	Reduced egg hatching	Eisler, 1985
			0.72	0.36	Mallard	Oral (subchronic)	3 months	NOAEL for teratogenic effects	Eisler, 1985
		0.5			Rat	Single oral dose		Mortality	ATSDR, 1988
Silver	34	6.8 [a]			Mouse	Intraperitoneal (acute)		Mortality	NIOSH, 1985
		181			Rat	Oral (acute)	2 week	Mortality	ATSDR, 1990
			222.2		Rat	Oral (chronic)	37 week	Weight gain	ATSDR, 1990
			18.1		Mouse	Oral (chronic)	125 days	Hypoactivity	ATSDR, 1990
Vanadium			4 [d]	0.89	Rat	Oral (chronic)	2.5 years	Decreased hair cystine	IRIS, 1989
			2.87		Rat	Oral (subchronic)	3 months	Adverse renal effects	ATSDR, 1990
		25 [b]	2.5		Rat	Oral (chronic)	103 days	Decreased hair cystine, hemoglobin	IRIS, 1989
	96	20 [a]			Japanese quail	Oral (acute)	5 days	Mortality	Hill and Camardese, 1986
			15		Rat	Oral (subchronic)	2 months	Hypertension	Susic and Kentera, 1986
		16			Rat	Single oral dose		NOAEL for mortality	Llobet and Domingo, 1984
			11		Chicken	Oral (subchronic)	6 weeks	Decrease in egg-laying	USEPA, 1988
Zinc	2510				Rat	Single oral dose		Mortality	Sax, 1984
			160		Rat	Oral (subchronic)	NS	Kidney toxicity	Llobet, et al., 1988
			200		Rat	Oral	Gestation	Fetal resorptions in 4 to 20% of population	Shlicker and Cox, 1968

NOTES:

Boxed values used as reference toxicity values (RTVs).

[a] For chemicals lacking LOAEL or NOAEL data, an Acute Oral Criterion (AOC) is calculated by applying a factor of 0.2 to the acute LD50; this value is expected to protect 99.9% of the exposed population from acute effects (USEPA, 1986).

[b] Estimated by applying an acute-chronic ratio of 10.

[c] Acute value for benzo(a)pyrene chosen as a surrogate. Chemical-specific toxicity studies are lacking; this is a conservative assumption.

[d] Chrysene data used as surrogate for benzo(g,h,i)perylene.

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[e] Converted to dose per kilogram body weight by multiplying by ingestion rate and dividing by body weight.
The following ingestion rate and body weight data were used:

Species	Ingestion Rate (kg/day)	Body Weight (kg)	Reference
Rat (Male)	0.025	0.35	USEPA, 1988
Rat (Female)	0.02	0.25	USEPA, 1988
Starling	0.01	0.0437	USEPA, 1988
Black duck	--	1.25	USEPA, 1988

[f] Ingestion rate estimated from body weight using allometric equation for chickens in USEPA, 1988.
[g] Data was used from 3,4 Dimethyl phenol
[h] Data not available; value for di-n-octylphthalate used as a surrogate.
[i] LD50 based on a small number of test organisms
[j] Value for 2-chloropyridine used as a surrogate.
NS = Not Stated
BW = Body Weight
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level

APPENDIX D - REFERENCES

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BASELINE ECOLOGICAL RISK ASSESSMENT SPREADSHEETS

TABLE E-1
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

EXPOSURE CONCENTRATION DATA | **ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS**

CHEMICAL	MAXIMUM CONCENTRATION SOIL (mg/kg)	Invert BAF [a]	Tissue Level (mg/kg)	Plant BAF [a]	Tissue Level (mg/kg)
Chloroform	0.0005	5.0E-02	2.5E-05	2.0E-02	1.0E-05
1,2,4-Trichlorobenzene	0.022	5.0E-02	1.1E-03	2.0E-02	4.4E-04
2,6-Dichloropyridine	0.17	5.0E-02	8.5E-03	2.0E-02	3.4E-03
2-Chloropyridine	0.57	5.0E-02	2.9E-02	2.0E-02	1.1E-02
2-Methylnaphthalene	0.087	5.0E-02	4.4E-03	2.0E-02	1.7E-03
3-Chloropyridine	0.063	5.0E-02	3.2E-03	2.0E-02	1.3E-03
Acenaphthene	0.27	5.0E-02	1.4E-02	2.0E-02	5.4E-03
Acenaphthylene	0.17	5.0E-02	8.5E-03	2.0E-02	3.4E-03
Anthracene	0.48	5.0E-02	2.4E-02	2.0E-02	9.6E-03
Benzo(a)anthracene	1.6	5.0E-02	8.0E-02	3.9E-03	6.3E-03
Benzo(a)pyrene	1.2	5.0E-02	6.0E-02	2.6E-03	3.2E-03
Benzo(b)fluoranthene	2	5.0E-02	1.0E-01	2.3E-03	4.6E-03
Benzo(g,h,i)perylene	0.22	5.0E-02	1.1E-02	1.2E-03	2.6E-04
Benzo(k)fluoranthene	1.3	5.0E-02	6.5E-02	2.3E-03	3.0E-03
Bis(2-ethylhexyl)phthalate	9.5	5.0E-02	4.8E-01	8.7E-03	8.3E-02
Carbazole	0.33	5.0E-02	1.7E-02	2.0E-02	6.6E-03
Chrysene	1.5	5.0E-02	7.5E-02	3.9E-03	5.9E-03
Di-n-butylphthalate	0.33	5.0E-02	1.7E-02	7.6E-03	2.5E-03
Di-n-octylphthalate	0.43	5.0E-02	2.2E-02	3.7E-05	1.6E-05
Dibenzo(a,h)anthracene	0.110	5.0E-02	5.5E-03	1.4E-03	1.5E-04
Dibenzofuran	0.15	5.0E-02	7.5E-03	2.0E-02	3.0E-03
Fluoranthene	2.8	5.0E-02	1.4E-01	2.0E-02	5.6E-02
Fluorene	0.27	5.0E-02	1.4E-02	2.0E-02	5.4E-03
Hexachlorobenzene	0.039	5.0E-02	2.0E-03	2.0E-03	7.9E-05
Indeno(1,2,3-c,d)pyrene	0.4	5.0E-02	2.0E-02	1.2E-03	4.7E-04
Naphthalene	0.061	5.0E-02	3.1E-03	2.0E-02	1.2E-03
Phenanthrene	1.9	5.0E-02	9.5E-02	2.0E-02	3.8E-02
Pyrene	3	5.0E-02	1.5E-01	6.7E-03	2.0E-02
Pyridine	0.074	5.0E-02	3.7E-03	2.0E-02	1.5E-03
Aluminum	8,700	7.5E-02	6.5E+02	8.0E-04	7.0E+00

TABLE E-1
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

EXPOSURE CONCENTRATION DATA

CHEMICAL	MAXIMUM CONCENTRATION SOIL (mg/kg)
Arsenic	12
Barium	110
Cadmium	0.8
Chromium	150
Cobalt	7.1
Copper	48
Lead	140
Manganese	760
Mercury	0.4
Nickel	62
Selenium	0.8
Silver	0.7
Vanadium	20
Zinc	240

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

	Tissue		Tissue
Invert BAF [a]	Level (mg/kg)	Plant BAF [a]	Level (mg/kg)
6.6E-03	7.9E-02	8.0E-03	9.6E-02
7.5E-03	8.3E-01	3.0E-02	3.3E+00
1.1E+01	8.5E+00	1.1E-01	8.8E-02
1.6E-01	2.4E+01	1.5E-03	2.3E-01
1.0E+00	7.1E+00	4.0E-03	2.8E-02
1.6E-01	7.7E+00	8.0E-02	3.8E+00
6.2E-02	8.7E+00	9.0E-03	1.3E+00
2.0E-02	1.5E+01	5.0E-02	3.8E+01
3.4E-01	1.4E-01	1.8E-01	7.2E-02
2.3E-01	1.4E+01	1.2E-02	7.4E-01
7.6E-01	6.1E-01	5.0E-03	4.0E-03
1.5E-01	1.1E-01	8.0E-02	5.6E-02
1.3E-01	2.5E+00	1.1E-03	2.2E-02
1.8E+00	4.2E+02	3.0E-01	7.2E+01

TABLE E-1
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

TOTAL BODY DOSE (mg/kgBW-day) [b]

CHEMICAL	*Meadow vole*	*American robin*
Chloroform	2.5E-06	1.2E-06
1,2,4-Trichlorobenzene	1.1E-04	5.4E-05
2,6-Dichloropyridine	8.4E-04	4.2E-04
2-Chloropyridine	2.8E-03	1.4E-03
2-Methylnaphthalene	4.3E-04	2.1E-04
3-Chloropyridine	3.1E-04	1.6E-04
Acenaphthene	1.3E-03	6.7E-04
Acenaphthylene	8.4E-04	4.2E-04
Anthracene	2.4E-03	1.2E-03
Benzo(a)anthracene	5.0E-03	3.5E-03
Benzo(a)pyrene	3.6E-03	2.6E-03
Benzo(b)fluoranthene	5.9E-03	4.3E-03
Benzo(g,h,i)perylene	6.2E-04	4.7E-04
Benzo(k)fluoranthene	3.8E-03	2.8E-03
Bis(2-ethylhexyl)phthalate	3.5E-02	2.2E-02
Carbazole	1.6E-03	8.1E-04
Chrysene	4.7E-03	3.3E-03
Di-n-butylphthalate	1.2E-03	7.5E-04
Di-n-octylphthalate	1.2E-03	9.2E-04
Dibenzo(a,h)anthracene	3.1E-04	2.4E-04
Dibenzofuran	7.4E-04	3.7E-04
Fluoranthene	1.4E-02	6.9E-03
Fluorene	1.3E-03	6.7E-04
Hexachlorobenzene	1.1E-04	8.5E-05
Indeno(1,2,3-c,d)pyrene	1.1E-03	8.6E-04
Naphthalene	3.0E-04	1.5E-04
Phenanthrene	9.4E-03	4.7E-03
Pyrene	1.0E-02	6.7E-03
Pyridine	3.6E-04	1.8E-04
Aluminum	2.6E+01	2.1E+01
Arsenic	4.0E-02	2.1E-02

TABLE E-1
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

TOTAL BODY DOSE (mg/kgBW-day) [b]

CHEMICAL	*Meadow vole*	*American robin*
Barium	6.4E-01	2.3E-01
Cadmium	6.2E-02	1.1E-01
Chromium	5.3E-01	5.3E-01
Cobalt	6.3E-02	9.8E-02
Copper	5.9E-01	2.3E-01
Lead	5.3E-01	3.4E-01
Manganese	6.2E+00	2.0E+00
Mercury	9.8E-03	3.5E-03
Nickel	3.2E-01	2.8E-01
Selenium	6.0E-03	8.7E-03
Silver	8.6E-03	3.3E-03
Vanadium	6.5E-02	6.1E-02
Zinc	1.1E+01	6.8E+00

TABLE E-1
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

EXPOSURE PARAMETERS [c]

Indicator Species		Percent Prey in Diet						Home Range (acres)	Site Foraging Frequency [d]	Dietary Ingestion Rate (kg/day)	Body Weight (kg)	Exposure Duration
		Inverts	Plants	Small Mammals	Herpeto-fauna	Birds	Soil					
Meadow vole	(Small Mammal)	5%	93%	0%	0%	0%	2%	0.08	2.0E-01	0.030	0.05	1
American robin	(Small Bird)	40%	55%	0%	0%	0%	5%	0.3	5.3E-02	0.073	0.0745	0.583

SITE AREA:	0.016 acres

NOTES:
[a] Bioaccumulation data presented in: Appendix D
[b] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the SFF and ingestion rate, and then dividing by body weight.
[c] Documentation of exposure parameters presented in: Appendix D
[d] Site Foraging Frequency (SFF). Calculated by dividing site area by receptor home range (cannot exceed 1.0)

TABLE E-2
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

EXPOSURE CONCENTRATION DATA

CHEMICAL	AVERAGE CONCENTRATION SOIL (mg/kg)
Chloroform	0.0050
1,2,4-Trichlorobenzene	0.022
2,6-Dichloropyridine	0.065
2-Chloropyridine	0.224
2-Methylnaphthalene	0.087
3-Chloropyridine	0.063
Acenaphthene	0.103
Acenaphthylene	0.110
Anthracene	0.179
Benzo(a)anthracene	0.643
Benzo(a)pyrene	0.563
Benzo(b)fluoranthene	1.003
Benzo(g,h,i)perylene	0.147
Benzo(k)fluoranthene	0.703
Bis(2-ethylhexyl)phthalate	3.475
Carbazole	0.102
Chrysene	0.761
Di-n-butylphthalate	0.217
Di-n-octylphthalate	0.247
Dibenzo(a,h)anthracene	0.110
Dibenzofuran	0.116
Fluoranthene	1.226
Fluorene	0.175
Hexachlorobenzene	0.039
Indeno(1,2,3-c,d)pyrene	0.198
Naphthalene	0.061
Phenanthrene	0.672
Pyrene	1.178
Pyridine	0.074
Aluminum	6,533

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

Invert BAF [a]	Tissue Level (mg/kg)	Plant BAF [a]	Tissue Level (mg/kg)
5.0E-02	2.5E-04	2.0E-02	1.0E-04
5.0E-02	1.1E-03	2.0E-02	4.4E-04
5.0E-02	3.3E-03	2.0E-02	1.3E-03
5.0E-02	1.1E-02	2.0E-02	4.5E-03
5.0E-02	4.4E-03	2.0E-02	1.7E-03
5.0E-02	3.2E-03	2.0E-02	1.3E-03
5.0E-02	5.2E-03	2.0E-02	2.1E-03
5.0E-02	5.5E-03	2.0E-02	2.2E-03
5.0E-02	8.9E-03	2.0E-02	3.6E-03
5.0E-02	3.2E-02	3.9E-03	2.5E-03
5.0E-02	2.8E-02	2.6E-03	1.5E-03
5.0E-02	5.0E-02	2.3E-03	2.3E-03
5.0E-02	7.3E-03	1.2E-03	1.7E-04
5.0E-02	3.5E-02	2.3E-03	1.6E-03
5.0E-02	1.7E-01	8.7E-03	3.0E-02
5.0E-02	5.1E-03	2.0E-02	2.0E-03
5.0E-02	3.8E-02	3.9E-03	3.0E-03
5.0E-02	1.1E-02	7.6E-03	1.7E-03
5.0E-02	1.2E-02	3.7E-05	9.2E-06
5.0E-02	5.5E-03	1.4E-03	1.5E-04
5.0E-02	5.8E-03	2.0E-02	2.3E-03
5.0E-02	6.1E-02	2.0E-02	2.5E-02
5.0E-02	8.7E-03	2.0E-02	3.5E-03
5.0E-02	2.0E-03	2.0E-03	7.9E-05
5.0E-02	9.9E-03	1.2E-03	2.4E-04
5.0E-02	3.1E-03	2.0E-02	1.2E-03
5.0E-02	3.4E-02	2.0E-02	1.3E-02
5.0E-02	5.9E-02	6.7E-03	7.9E-03
5.0E-02	3.7E-03	2.0E-02	1.5E-03
7.5E-02	4.9E+02	8.0E-04	5.2E+00

TABLE E-2
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

EXPOSURE CONCENTRATION DATA

CHEMICAL	AVERAGE CONCENTRATION SOIL (mg/kg)
Arsenic	5.4
Barium	60
Cadmium	0.5
Chromium	28
Cobalt	3.9
Copper	21
Lead	74
Manganese	428
Mercury	0.20
Nickel	24
Selenium	0.4
Silver	0.4
Vanadium	17
Zinc	150

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

	Tissue		Tissue
Invert BAF [a]	Level (mg/kg)	Plant BAF [a]	Level (mg/kg)
6.6E-03	3.6E-02	8.0E-03	4.3E-02
7.5E-03	4.5E-01	3.0E-02	1.8E+00
1.1E+01	5.0E+00	1.1E-01	5.2E-02
1.6E-01	4.5E+00	1.5E-03	4.2E-02
1.0E+00	3.9E+00	4.0E-03	1.6E-02
1.6E-01	3.3E+00	8.0E-02	1.6E+00
6.2E-02	4.6E+00	9.0E-03	6.6E-01
2.0E-02	8.6E+00	5.0E-02	2.1E+01
3.4E-01	6.8E-02	1.8E-01	3.6E-02
2.3E-01	5.4E+00	1.2E-02	2.8E-01
7.6E-01	3.2E-01	5.0E-03	2.1E-03
1.5E-01	6.0E-02	8.0E-02	3.2E-02
1.3E-01	2.1E+00	1.1E-03	1.9E-02
1.8E+00	2.7E+02	3.0E-01	4.5E+01

TABLE E-2
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

TOTAL BODY DOSE (mg/kgBW-day) [b]

CHEMICAL	*Meadow vole*	*American robin*
Chloroform	2.5E-05	1.2E-05
1,2,4-Trichlorobenzene	1.1E-04	5.4E-05
2,6-Dichloropyridine	3.2E-04	1.6E-04
2-Chloropyridine	1.1E-03	5.5E-04
2-Methylnaphthalene	4.3E-04	2.1E-04
3-Chloropyridine	3.1E-04	1.6E-04
Acenaphthene	5.1E-04	2.5E-04
Acenaphthylene	5.4E-04	2.7E-04
Anthracene	8.8E-04	4.4E-04
Benzo(a)anthracene	2.0E-03	1.4E-03
Benzo(a)pyrene	1.7E-03	1.2E-03
Benzo(b)fluoranthene	3.0E-03	2.2E-03
Benzo(g,h,i)perylene	4.2E-04	3.2E-04
Benzo(k)fluoranthene	2.1E-03	1.5E-03
Bis(2-ethylhexyl)phthalate	1.3E-02	7.9E-03
Carbazole	5.0E-04	2.5E-04
Chrysene	2.4E-03	1.7E-03
Di-n-butylphthalate	7.7E-04	4.9E-04
Di-n-octylphthalate	6.7E-04	5.3E-04
Dibenzo(a,h)anthracene	3.1E-04	2.4E-04
Dibenzofuran	5.7E-04	2.9E-04
Fluoranthene	6.0E-03	3.0E-03
Fluorene	8.6E-04	4.3E-04
Hexachlorobenzene	1.1E-04	8.5E-05
Indeno(1,2,3-c,d)pyrene	5.6E-04	4.3E-04
Naphthalene	3.0E-04	1.5E-04
Phenanthrene	3.3E-03	1.7E-03
Pyrene	4.1E-03	2.6E-03
Pyridine	3.6E-04	1.8E-04
Aluminum	1.9E+01	1.6E+01
Arsenic	1.8E-02	9.4E-03

TABLE E-2
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

TOTAL BODY DOSE (mg/kgBW-day) [b]

CHEMICAL	*Meadow vole*	*American robin*
Barium	3.5E-01	1.3E-01
Cadmium	3.7E-02	6.3E-02
Chromium	9.9E-02	9.8E-02
Cobalt	3.5E-02	5.4E-02
Copper	2.5E-01	9.9E-02
Lead	2.8E-01	1.8E-01
Manganese	3.5E+00	1.1E+00
Mercury	4.9E-03	1.7E-03
Nickel	1.2E-01	1.1E-01
Selenium	3.2E-03	4.6E-03
Silver	4.9E-03	1.9E-03
Vanadium	5.5E-02	5.2E-02
Zinc	7.0E+00	4.2E+00

TABLE E-2
ESTIMATION OF CHRONIC EXPOSURES TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

EXPOSURE PARAMETERS [c]

Indicator Species		Percent Prey in Diet						Home Range (acres)	Site Foraging Frequency [d]	Dietary Ingestion Rate (kg/day)	Body Weight (kg)	Exposure Duration
		Inverts	Plants	Small Mammals	Herpeto-fauna	Birds	Soil					
Meadow vole	(Small Mammal)	5%	93%	0%	0%	0%	2%	0.08	2.0E-01	0.030	0.05	1
American robin	(Small Bird)	40%	55%	0%	0%	0%	5%	0.3	5.3E-02	0.073	0.0745	0.6

SITE AREA:	0.016 acres

NOTES:
[a] Bioaccumulation data presented in: Appendix D
[b] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the SFF and ingestion rate, and then dividing by body weight.
[c] Documentation of exposure parameters presented in: Appendix D
[d] Site Foraging Frequency (SFF). Calculated by dividing site area by receptor home range (cannot exceed 1.0)

TABLE E-3
RISK ESTIMATION OF SUBLETHAL EFFECTS TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION
BASED ON MAXIMUM CONCENTRATIONS IN SURFACE SOIL

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

CHEMICAL	Meadow vole			American robin		
	TBD	RTV	HQ	TBD	RTV	HQ
Chloroform	2.5E-06	6.3E+01	3.9E-08	1.2E-06	6.3E+01	2.0E-08
1,2,4-Trichlorobenzene	1.1E-04	2.0E+01	5.4E-06	5.4E-05	2.0E+01	2.7E-06
2,6-Dichloropyridine	8.4E-04	2.6E+00	3.2E-04	4.2E-04	2.6E+00	1.6E-04
2-Chloropyridine	2.8E-03	2.6E+00	1.1E-03	1.4E-03	2.6E+00	5.4E-04
2-Methylnaphthalene	4.3E-04	3.3E+01	1.3E-05	2.1E-04	3.3E+01	6.5E-06
3-Chloropyridine	3.1E-04	2.6E+00	1.2E-04	1.6E-04	2.6E+00	6.0E-05
Acenaphthene	1.3E-03	3.5E+02	3.8E-06	6.7E-04	3.5E+02	1.9E-06
Acenaphthylene	8.4E-04	6.0E+02	1.4E-06	4.2E-04	6.0E+02	7.0E-07
Anthracene	2.4E-03	1.0E+03	2.4E-06	1.2E-03	1.0E+03	1.2E-06
Benzo(a)anthracene	5.0E-03	1.0E+01	5.0E-04	3.5E-03	1.0E+01	3.5E-04
Benzo(a)pyrene	3.6E-03	1.0E+01	3.6E-04	2.6E-03	1.0E+01	2.6E-04
Benzo(b)fluoranthene	5.9E-03	1.0E+01	5.9E-04	4.3E-03	1.0E+01	4.3E-04
Benzo(g,h,i)perylene	6.2E-04	1.0E+01	6.2E-05	4.7E-04	1.0E+01	4.7E-05
Benzo(k)fluoranthene	3.8E-03	1.0E+01	3.8E-04	2.8E-03	1.0E+01	2.8E-04
Bis(2-ethylhexyl)phthalate	3.5E-02	1.9E+01	1.8E-03	2.2E-02	1.9E+01	1.1E-03
Carbazole	1.6E-03	1.0E+01	1.6E-04	8.1E-04	1.0E+01	8.1E-05
Chrysene	4.7E-03	1.0E+01	4.7E-04	3.3E-03	1.0E+01	3.3E-04
Di-n-butylphthalate	1.2E-03	1.3E+02	9.4E-06	7.5E-04	1.3E+02	6.0E-06
Di-n-octylphthalate	1.2E-03	1.8E+02	6.6E-06	9.2E-04	1.8E+02	5.2E-06
Dibenzo(a,h)anthracene	3.1E-04	1.0E+01	3.1E-05	2.4E-04	1.0E+01	2.4E-05
Dibenzofuran	7.4E-04	1.3E+02	5.9E-06	3.7E-04	1.3E+02	3.0E-06
Fluoranthene	1.4E-02	2.5E+02	5.5E-05	6.9E-03	2.5E+02	2.8E-05
Fluorene	1.3E-03	2.5E+02	5.3E-06	6.7E-04	2.5E+02	2.7E-06
Hexachlorobenzene	1.1E-04	2.0E+00	5.7E-05	8.5E-05	5.0E-01	1.7E-04
Indeno(1,2,3-c,d)pyrene	1.1E-03	1.0E+01	1.1E-04	8.6E-04	1.0E+01	8.6E-05
Naphthalene	3.0E-04	3.6E+01	8.4E-06	1.5E-04	3.6E+01	4.2E-06
Phenanthrene	9.4E-03	1.2E+02	7.8E-05	4.7E-03	1.2E+02	3.9E-05
Pyrene	1.0E-02	1.3E+02	8.3E-05	6.7E-03	1.3E+02	5.4E-05
Pyridine	3.6E-04	5.0E+01	7.3E-06	1.8E-04	5.0E+01	3.7E-06
Aluminum	2.6E+01	4.3E+02	6.0E-02	2.1E+01	4.3E+02	5.0E-02

TABLE E-3
RISK ESTIMATION OF SUBLETHAL EFFECTS TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION
BASED ON MAXIMUM CONCENTRATIONS IN SURFACE SOIL

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

CHEMICAL	Meadow vole			American robin		
	TBD	RTV	HQ	TBD	RTV	HQ
Arsenic	4.0E-02	7.5E+00	5.3E-03	2.1E-02	7.5E+00	2.8E-03
Barium	6.4E-01	9.1E+01	7.0E-03	2.3E-01	9.1E+01	2.6E-03
Cadmium	6.2E-02	1.3E+01	5.0E-03	1.1E-01	7.6E+00	1.4E-02
Chromium	5.3E-01	1.4E+03	3.8E-04	5.3E-01	2.0E+02	2.6E-03
Cobalt	6.3E-02	1.3E+01	4.8E-03	9.8E-02	1.3E+01	7.5E-03
Copper	5.9E-01	1.0E+02	5.9E-03	2.3E-01	1.0E+02	2.3E-03
Lead	5.3E-01	7.0E+00	7.6E-02	3.4E-01	6.2E+00	5.4E-02
Manganese	6.2E+00	1.0E+02	6.2E-02	2.0E+00	1.0E+02	2.0E-02
Mercury	9.8E-03	9.0E-01	1.1E-02	3.5E-03	2.2E-01	1.6E-02
Nickel	3.2E-01	5.0E+01	6.3E-03	2.8E-01	1.0E+01	2.8E-02
Selenium	6.0E-03	2.0E-01	3.0E-02	8.7E-03	7.2E-01	1.2E-02
Silver	8.6E-03	1.8E+01	4.7E-04	3.3E-03	1.8E+01	1.8E-04
Vanadium	6.5E-02	1.5E+01	4.4E-03	6.1E-02	1.1E+01	5.6E-03
Zinc	1.1E+01	2.0E+02	5.6E-02	6.8E+00	2.0E+02	3.4E-02
SUMMARY HAZARD INDEX			3.4E-01			2.6E-01

TBD = Total Body Dose (mg/kgBW-day) RTV = Reference Toxicity Value (mg/kgBW-day)
HQ = Hazard Quotient (calculated by dividing TBD by RTV)

TABLE E-4
RISK ESTIMATION OF SUBLETHAL EFFECTS TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION
BASED ON AVERAGE CONCENTRATIONS IN SURFACE SOIL

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

CHEMICAL	Meadow vole			American robin		
	TBD	RTV	HQ	TBD	RTV	HQ
Chloroform	2.5E-05	6.3E+01	3.9E-07	1.2E-05	6.3E+01	2.0E-07
1,2,4-Trichlorobenzene	1.1E-04	2.0E+01	5.4E-06	5.4E-05	2.0E+01	2.7E-06
2,6-Dichloropyridine	3.2E-04	2.6E+00	1.2E-04	1.6E-04	2.6E+00	6.2E-05
2-Chloropyridine	1.1E-03	2.6E+00	4.2E-04	5.5E-04	2.6E+00	2.1E-04
2-Methylnaphthalene	4.3E-04	3.3E+01	1.3E-05	2.1E-04	3.3E+01	6.5E-06
3-Chloropyridine	3.1E-04	2.6E+00	1.2E-04	1.6E-04	2.6E+00	6.0E-05
Acenaphthene	5.1E-04	3.5E+02	1.5E-06	2.5E-04	3.5E+02	7.3E-07
Acenaphthylene	5.4E-04	6.0E+02	9.0E-07	2.7E-04	6.0E+02	4.5E-07
Anthracene	8.8E-04	1.0E+03	8.8E-07	4.4E-04	1.0E+03	4.4E-07
Benzo(a)anthracene	2.0E-03	1.0E+01	2.0E-04	1.4E-03	1.0E+01	1.4E-04
Benzo(a)pyrene	1.7E-03	1.0E+01	1.7E-04	1.2E-03	1.0E+01	1.2E-04
Benzo(b)fluoranthene	3.0E-03	1.0E+01	3.0E-04	2.2E-03	1.0E+01	2.2E-04
Benzo(g,h,i)perylene	4.2E-04	1.0E+01	4.2E-05	3.2E-04	1.0E+01	3.2E-05
Benzo(k)fluoranthene	2.1E-03	1.0E+01	2.1E-04	1.5E-03	1.0E+01	1.5E-04
Bis(2-ethylhexyl)phthalate	1.3E-02	1.9E+01	6.7E-04	7.9E-03	1.9E+01	4.2E-04
Carbazole	5.0E-04	1.0E+01	5.0E-05	2.5E-04	1.0E+01	2.5E-05
Chrysene	2.4E-03	1.0E+01	2.4E-04	1.7E-03	1.0E+01	1.7E-04
Di-n-butylphthalate	7.7E-04	1.3E+02	6.2E-06	4.9E-04	1.3E+02	3.9E-06
Di-n-octylphthalate	6.7E-04	1.8E+02	3.8E-06	5.3E-04	1.8E+02	3.0E-06
Dibenzo(a,h)anthracene	3.1E-04	1.0E+01	3.1E-05	2.4E-04	1.0E+01	2.4E-05
Dibenzofuran	5.7E-04	1.3E+02	4.6E-06	2.9E-04	1.3E+02	2.3E-06
Fluoranthene	6.0E-03	2.5E+02	2.4E-05	3.0E-03	2.5E+02	1.2E-05
Fluorene	8.6E-04	2.5E+02	3.4E-06	4.3E-04	2.5E+02	1.7E-06
Hexachlorobenzene	1.1E-04	2.0E+00	5.7E-05	8.5E-05	5.0E-01	1.7E-04
Indeno(1,2,3-c,d)pyrene	5.6E-04	1.0E+01	5.6E-05	4.3E-04	1.0E+01	4.3E-05
Naphthalene	3.0E-04	3.6E+01	8.4E-06	1.5E-04	3.6E+01	4.2E-06
Phenanthrene	3.3E-03	1.2E+02	2.8E-05	1.7E-03	1.2E+02	1.4E-05
Pyrene	4.1E-03	1.3E+02	3.2E-05	2.6E-03	1.3E+02	2.1E-05
Pyridine	3.6E-04	5.0E+01	7.3E-06	1.8E-04	5.0E+01	3.7E-06
Aluminum	1.9E+01	4.3E+02	4.5E-02	1.6E+01	4.3E+02	3.8E-02

TABLE E-4
RISK ESTIMATION OF SUBLETHAL EFFECTS TO TERRESTRIAL RECEPTORS VIA FOOD AND SOIL INGESTION
BASED ON AVERAGE CONCENTRATIONS IN SURFACE SOIL

ECOLOGICAL RISK ASSESSMENT
OLIN CHEMICALS PHASE I RI REPORT, ROCHESTER, N.Y.

CHEMICAL	Meadow vole			American robin		
	TBD	RTV	HQ	TBD	RTV	HQ
Arsenic	1.8E-02	7.5E+00	2.4E-03	9.4E-03	7.5E+00	1.3E-03
Barium	3.5E-01	9.1E+01	3.8E-03	1.3E-01	9.1E+01	1.4E-03
Cadmium	3.7E-02	1.3E+01	3.0E-03	6.3E-02	7.6E+00	8.3E-03
Chromium	9.9E-02	1.4E+03	7.1E-05	9.8E-02	2.0E+02	4.9E-04
Cobalt	3.5E-02	1.3E+01	2.7E-03	5.4E-02	1.3E+01	4.2E-03
Copper	2.5E-01	1.0E+02	2.5E-03	9.9E-02	1.0E+02	9.9E-04
Lead	2.8E-01	7.0E+00	4.0E-02	1.8E-01	6.2E+00	2.9E-02
Manganese	3.5E+00	1.0E+02	3.5E-02	1.1E+00	1.0E+02	1.1E-02
Mercury	4.9E-03	9.0E-01	5.5E-03	1.7E-03	2.2E-01	7.9E-03
Nickel	1.2E-01	5.0E+01	2.4E-03	1.1E-01	1.0E+01	1.1E-02
Selenium	3.2E-03	2.0E-01	1.6E-02	4.6E-03	7.2E-01	6.4E-03
Silver	4.9E-03	1.8E+01	2.7E-04	1.9E-03	1.8E+01	1.0E-04
Vanadium	5.5E-02	1.5E+01	3.7E-03	5.2E-02	1.1E+01	4.7E-03
Zinc	7.0E+00	2.0E+02	3.5E-02	4.2E+00	2.0E+02	2.1E-02
SUMMARY HAZARD INDEX			2.0E-01			1.5E-01

TBD = Total Body Dose (mg/kgBW-day) RTV = Reference Toxicity Value (mg/kgBW-day)
HQ = Hazard Quotient (calculated by dividing TBD by RTV)