APPENDIX J

2003 Geomatrix Screening Levels

GEOMATRIX

TABLE 3-1
RI REFERENCE CONCENTRATIONS IN SOIL

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Soil	Carcinogen	Non-Carcinogen
Volatile Organic Compounds[b]	µg/kg	µg/kg	µg/kg
Acetone	NE		8,000,000
Acrolein	NE		1,600,000
Benzene	30		18,200
Bromodichloromethane	NE	16,100	1,600,000
Bromoform	NE	127,000	1,600,000
Bromomethane	NE		112,000
2-Butanone (methyl ethyl ketone)	NE		48,000,000
Carbon Disulfide	NE		8,000,000
Carbon Tetrachloride	NE	7,690	56,000
Chlorobenzene	NE		1,600,000
Chloroethane	NE		NE
2-Chloroethylvinylether	NE		NE
Chloroform	NE	164,000	800,000
Chloromethane	NE	76,900	
Cyclohexanone[c]	NE		400,000,000
Dibromochloromethane (chlorodibromomethane)	NE	11,900	1,600,000
1,1-Dichloroethane	NE		8,000,000
1,2-Dichloroethane	NE	11,000	
1,1-Dichloroethene	NE	1,670	720,000
cis-1,2-Dichloroethene	NE		800,000
trans-1,2-Dichloroethene	NE		1,600,000
1,2-Dichloropropane	NE	14,700	
cis-1,3-Dichloropropene	NE	5,560	2,400,000
trans-1,3-Dichloropropene	NE	5,560	2,400,000
Ethylbenzene	6,000		8,000,000
2-Hexanone	NE		NE
Methylene chloride	20	133,000	4,800,000
4-Methyl-2-pentanone (methyl isobutyl ketone)	NE		6,400,000
Styrene	NE	33,300	16,000,000
1,1,2,2-Tetrachloroethane	NE	5,000	
Tetrachloroethene	50	19,600	800,000
Toluene	7,000		16,000,000
1,1,1-Trichloroethane	2,000		72,000,000
1,1,2-Trichloroethane	NE	17,500	320,000
1,1,2-Trichlorotrifluoroethane	NE		NE
Trichloroethene	30	90,900	

GEOMATRIX

TABLE 3-1 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN SOIL

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
Trichlorofluoromethane	NE		24,000,000
1,1,2-Trichloro-1,2,2-trifluoroethane	NE		NE
Vinyl Acetate	NE		80,000,000
Vinyl Chloride	NE	667	240,000
m,p-xylene	9,000		160,000,000
o-xylene	9,000		160,000,000
Semivolatile Organic Compounds (SVOCs)[d]	**µg/kg**	**µg/kg**	**µg/kg**
Acenaphthene	NE		4,800,000
Acenaphthylene	NE		NE
Aniline	NE	175,000	
Anthracene	NE		24,000,000
Benzo(a)anthracene [e]	See note e	137	
Benzo(a)pyrene [e]	100 (R), 2,000 (I)	137	
Benzo(b)fluoranthene [e]	See note e	137	
Benzo(g,h,i)perylene	NE		NE
Benzo(k)fluoranthene [e]	See note e	137	
Benzoic Acid	NE		320,000,000
Benzyl Alcohol	NE		24,000,000
bis(2-Chloroethoxy) Methane	NE		NE
bis-(2-Chloroethyl) Ether	NE	909	
bis(2-Ethylhexyl)phthalate	NE	71,400	1,600,000
4-Bromophenyl-phenylether	NE		NE
Butylbenzylphthalate	NE		16,000,000
Carbazole	NE	50,000	
Chrysene[e]	See note e	137	
4-Chloroaniline	NE		320,000
4-Chloro-3-methylphenol	NE		NE
2-Chloronaphthalene	NE		6,400,000
2-Chlorophenol	NE		400,000
4-Chlorophenyl-phenylether	NE		NE
Dibenz(a,h)anthracene [e]	See note e	137	
Dibenzofuran	NE		NE
1,2-Dichlorobenzene	NE		7,200,000
1,3-Dichlorobenzene	NE		NE
1,4-Dichlorobenzene	NE	41,700	
3,3'-Dichlorobenzidine	NE	2,220	
2,4-Dichlorophenol	NE		240,000
di-n-Butylphthalate	NE		8,000,000

TABLE 3-1 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN SOIL

Parameter	MTCA 2001		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Soil	Carcinogen	Non-Carcinogen
Diethylphthalate	NE		64,000,000
2,4-Dimethylphenol	NE		1,600,000
Dimethylphthalate	NE		80,000,000
4,6-Dinitro-2-methylphenol	NE		NE
2,4-Dinitrophenol	NE		160,000
2,4-Dinitrotoluene	NE		160,000
2,6-Dinitrotoluene	NE		80,000
Di-n-Octyl phthalate	NE		1,600,000
Fluoranthene	NE		3,200,000
Fluorene	NE		3,200,000
Hexachlorobenzene	NE	625	64,000
Hexachlorobutadiene	NE	12,800	16,000
Hexachlorocyclopentadiene	NE		480,000
Hexachloroethane	NE	71,400	80,000
Indeno(1,2,3-cd)pyrene [e]	See note e	137.0	
Isophorone	NE	1,050,000	1,600,000
2-Methylnaphthalene	5,000 [f]		NE
2-Methylphenol	NE		4,000,000
4-Methylphenol	NE		4,000,000
Naphthalene	5,000 [f]		1,600,000
2-Nitroaniline	NE		NE
3-Nitroaniline	NE		NE
4-Nitroaniline	NE		NE
Nitrobenzene	NE		40,000
2-Nitrophenol	NE		NE
4-Nitrophenol	NE		NE
N-Nitroso-di-N-propylamine	NE	143	
N-Nitrosodiphenylamine	NE	204,000	
2,2'-Oxybis(1-chloropropane)	NE		NE
Pentachlorophenol	NE	8,330	240,000
Phenanthrene	NE		NE
Phenol	NE		48,000,000
Pyrene	NE		2,400,000
1,2,4-Trichlorobenzene	NE		800,000
2,4,5-Trichlorophenol	NE		8,000,000
2,4,6-Trichlorophenol	NE	90,900	

GEOMATRIX

TABLE 3-1 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN SOIL

Parameter	MTCA 2001		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Soil	Carcinogen	Non-Carcinogen
Polychlorinated Biphenyls (PCBs)[g]	µg/kg	µg/kg	µg/kg
Aroclor 1016	NE		5,600
Aroclor 1221	NE		NE
Aroclor 1232	NE		NE
Aroclor 1242	NE		NE
Aroclor 1248	NE		NE
Aroclor 1254	NE		1,600
Aroclor 1260	NE		NE
Total PCBs [h]	1,000 (R), 10,000 (I)		NE
Total Petroleum Hydrocarbons	mg/kg	mg/kg	mg/kg
Gasoline Range	100		NE
Diesel Range[i]	2,000		NE
Oil Range	2,000		NE
Purgeable Aromatic Hydrocarbons	µg/kg	µg/kg	µg/kg
Benzene	30		18,200
Ethylbenzene	6,000		8,000,000
Toluene	7,000		16,000,000
m,p-Xylene	9,000		160,000,000
o-Xylene	9,000		160,000,000
Metals (Dissolved and Total)	mg/kg	mg/kg	mg/kg
Arsenic	20	0.667	24,000
Barium	NE		5,600
Beryllium	NE		5,600
Cadmium	2		80
Cadmium	2		80
Chromium	2,000 (Cr^{+3}), 19 (Cr^{+6})		120,000 (Cr^{+3}), 240 (Cr^{+6})
Cobalt	NE		NE
Copper	NE		2,960
Cyanide	NE		1,600
Lead	250 (R), 1,000 (I)		NE
Lead	250 (R), 1,000 (I)		NE
Manganese	NE		11,200
Mercury	2		24
Molybdenum	NE		400
Nickel	NE		1,600

TABLE 3-1 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN SOIL

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Soil	Carcinogen	Non-Carcinogen
Polychlorinated Biphenyls (PCBs)[g]	µg/kg	µg/kg	µg/kg
Selenium	NE		400
Silver	NE		400
Silver	NE		400
Strontium	NE		48,000
Thallium	NE		5.6
Tin	NE		48,000
Vandium	NE		560
Zinc	NE		24,000

[a] Model Toxics Control Act Cleanup Regulation, WAC 173-340 Method A values are from Ecology Publication 94-06 amended February 12, 2001. Method B values are from Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) Version 3.0, Ecology Publication #94-145, updated August 2001.

[b] MDLs and RLs will vary based on purge volume (water) or sample weight (solids/sediments). Limits shown are for 20 mL purge (water) and 5 g sample weight (solids/sediments).

[c] A modification to the standard method is necessary for this analyte. A low-level standard (100 µg/L) is analyzed directly prior to each sample analytical batch if cyclohexanone is requested.

[d] MDLs will vary based on extraction method. Values shown are for extraction by separatory funnel (water) and microtip sonication (soil).

[e] Carcinogenic PAHs - Cleanup levels under 1996 MTCA are for total carcinogenic PAHs: groundwater 0.1 µg/L, residential soil 1,000 µg/kg, industrial soil 20,000 µg/kg. Cleanup levels for carcinogenic PAHs under 2001 MTCA are based on a total value of 0.1 µg/L for groundwater, 100 µg/kg for unrestricted land use, and 2,000 µg/kg for industrial land.

[f] Cleanup level based on total of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

[g] MDLs will vary based on extraction method. Values shown are for liquid/liquid extraction (water) and microtip sonication (soil).

[h] Cleanup level is for total PCBs.

[i] The NWTPH-Dx method will be modified to report Jet A fuel in soils, accumulated solids, surface water and groundwater where appropriate. The MDLs shown are based on diesel.

Notes:
(R) - Residential under MTCA 1996, unrestricated land use under MTCA 2001.
(I) - Industrial
MDL - method detection limit
NA - not applicable or not available
NE - not established
RL - reporting level

TABLE 3-2
RI REFERENCE CONCENTRATIONS IN GROUNDWATER

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Groundwater	Carcinogen	Non-Carcinogen
Volatile Organic Compounds[b]	µg/L	µg/L	µg/L
Acetone	NE		800
Acrolein	NE		160
Benzene	5		1.6
Bromodichloromethane	NE	0.706	160
Bromoform	NE	5.54	160
Bromomethane	NE		11.2
2-Butanone (methyl ethyl ketone)	NE		4,800
Carbon Disulfide	NE		800
Carbon Tetrachloride	NE	0.337	5.60
Chlorobenzene	NE		160
Chloroethane	NE		NE
2-Chloroethylvinylether	NE		NE
Chloroform	NE	7.17	80
Chloromethane	NE	3.37	
Cyclohexanone[c]	NE		80,000
Dibromochloromethane (chlorodibromomethane)	NE	0.521	160
1,1-Dichloroethane	NE		800
1,2-Dichloroethane	5	0.481	
1,1-Dichloroethene	NE	0.0729	72
cis-1,2-Dichloroethene	NE		80
trans-1,2-Dichloroethene	NE		160
1,2-Dichloropropane	NE	0.643	
cis-1,3-Dichloropropene	NE	0.243	240
trans-1,3-Dichloropropene	NE	0.243	240
Ethylbenzene	700		800
2-Hexanone	NE		NE
Methylene chloride	5	5.83	480.00
4-Methyl-2-pentanone (methyl isobutyl ketone)	NE		640
Styrene	NE	1.46	1,600
1,1,2,2-Tetrachloroethane	NE	0.219	
Tetrachloroethene	5	0.858	80
Toluene	1,000		1,600
1,1,1-Trichloroethane	200		7,200
1,1,2-Trichloroethane	NE	0.768	32
1,1,2-Trichlorotrifluoroethane			NE

TABLE 3-2 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN GROUNDWATER

Parameter	MTCA 2001		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Groundwater	Carcinogen	Non-Carcinogen
Trichloroethene	5	3.98	
Trichlorofluoromethane	NE		2,400
1,1,2-Trichloro-1,2,2-trifluoroethane	NE		NE
Vinyl Acetate	NE		8,000
Vinyl Chloride	0.2	0.0292	24.0000
m,p-xylene	1,000		16,000
o-xylene	1,000		16,000
Semivolatile Organic Compounds (SVOCs) [d]	**µg/L**	**µg/L**	**µg/L**
Acenaphthene	NE		960
Acenaphthylene	NE		NE
Aniline		7.68	
Anthracene	NE		2,400
Benzo(a)anthracene [e]	See note e	0.012	
Benzo(a)pyrene [e]	0.1	0.012	
Benzo(b)fluoranthene [e]	See note e	0.012	
Benzo(g,h,i)perylene	NE		NE
Benzo(k)fluoranthene [e]	See note e	0.012	
Benzoic Acid	NE		64,000
Benzyl Alcohol	NE		4,800
bis(2-Chloroethoxy) Methane	NE		NE
bis-(2-Chloroethyl) Ether	NE	0.0398	
bis(2-Ethylhexyl)phthalate	NE	6.25	320.00
4-Bromophenyl-phenylether	NE		NE
Butylbenzylphthalate	NE		3,200
Carbazole	NE	4.38	
Chrysene [e]	See note e	0.012	
4-Chloroaniline	NE	64	
4-Chloro-3-methylphenol	NE		NE
2-Chloronaphthalene	NE		1,280
2-Chlorophenol	NE		80
4-Chlorophenyl-phenylether	NE		NE
Dibenz(a,h)anthracene [e]	See note e	0.012	
Dibenzofuran	NE		NE
1,2-Dichlorobenzene	NE		720
1,3-Dichlorobenzene	NE		NE
1,4-Dichlorobenzene	NE	1.82	
3,3'-Dichlorobenzidine	NE	0.194	

TABLE 3-2 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN GROUNDWATER

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Groundwater	Carcinogen	Non-Carcinogen
2,4-Dichlorophenol	NE		48
di-n-Butylphthalate	NE		1,600
Diethylphthalate	NE		12,800
2,4-Dimethylphenol	NE		320
Dimethylphthalate	NE		16,000
4,6-Dinitro-2-methylphenol	NE		NE
2,4-Dinitrophenol	NE		32
2,4-Dinitrotoluene	NE		32
2,6-Dinitrotoluene	NE		16
Di-n-Octyl phthalate	NE		320
Fluoranthene	NE		640
Fluorene	NE		640
Hexachlorobenzene	NE	0.0547	12.8
Hexachlorobutadiene	NE	0.561	1.6
Hexachlorocyclopentadiene	NE		96
Hexachloroethane	NE	6.25	16
Indeno(1,2,3-cd)pyrene [e]	See note e	0.012	
Isophorone	NE	92.1	3,200
2-Methylnaphthalene	160 [f]		NE
2-Methylphenol	NE		800
4-Methylphenol	NE		800
Naphthalene	160 [f]		160
2-Nitroaniline	NE		NE
3-Nitroaniline	NE		NE
4-Nitroaniline	NE		NE
Nitrobenzene	NE		8.0
2-Nitrophenol	NE		NE
4-Nitrophenol	NE		NE
N-Nitroso-di-N-propylamine	NE	0.0125	
N-Nitrosodiphenylamine	NE	17.9	
2,2'-Oxybis(1-chloropropane)	NE	1.25	
Pentachlorophenol	NE	0.729	480
Phenanthrene	NE		NE
Phenol	NE		9,600
Pyrene	NE		480
1,2,4-Trichlorobenzene	NE		80
2,4,5-Trichlorophenol	NE		1,600
2,4,6-Trichlorophenol	NE	7.95	

TABLE 3-2 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN GROUNDWATER

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Groundwater	Carcinogen	Non-Carcinogen
Polychlorinated Biphenyls (PCBs)[g]	µg/L	µg/L	µg/L
Aroclor 1016	NE		1.12
Aroclor 1221	NE		NE
Aroclor 1232	NE		NE
Aroclor 1242	NE		NE
Aroclor 1248	NE		NE
Aroclor 1254	NE		0.16
Aroclor 1260	NE		NE
Total PCBs [h]	0.1		NE
Total Petroleum Hydrocarbons	mg/L	mg/L	mg/L
Gasoline Range	0.8 / 1.0 [j]		NE
Diesel Range [l]	0.5		NE
Oil Range	0.5		NE
Purgeable Aromatic Hydrocarbons	µg/L		µg/L
Benzene	5		0.795
Ethylbenzene	700		800
Toluene	1,000		1600
m,p-Xylene	1,000		16,000
o-Xylene	1,000		16,000
Metals (Dissolved and Total)	mg/L	mg/L	mg/L
Arsenic	0.005	0.0000583	4.8
Barium	NE		0.56
Beryllium	NE		0.032
Cadmium	0.005		0.008
Cadmium	0.005		0.008
Chromium	0.05		24 (Cr^{+3}), 0.048 (Cr^{+6})
Cobalt	NE		NE
Copper	NE		0.592
Cyanide	NE		0.32
Lead	0.015		NE
Lead	0.015		NE
Manganese	NE		2.24
Mercury	0.002		0.0048
Molybdenum	NE		0.08
Nickel	NE		0.32
Selenium	NE		0.08
Silver	NE		0.08
Silver	NE		0.08

TABLE 3-2 (CONTINUED)
RI REFERENCE CONCENTRATIONS IN GROUNDWATER

Parameter	MTCA 2001[a]		
	MTCA Method A Cleanup Levels	MTCA Method B Cleanup Levels	
	Groundwater	Carcinogen	Non-Carcinogen
Strontium	NE		9.6
Thallium	NE		0.00112
Tin	NE		9.6
Vandium	NE		0.112
Zinc	NE		4.8

[a] Model Toxics Control Act Cleanup Regulation, WAC 173-340 Method A values are from Ecology Publication 94-06 amended February 12, 2001. Method B values are from Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) Version 3.0, Ecology Publication #94-145, updated August 2001.

[b] MDLs and RLs will vary based on purge volume (water) or sample weight (solids/sediments). Limits shown are for 20 mL purge (water) and 5 g sample weight (solids/sediments).

[c] A modification to the standard method is necessary for this analyte. A low-level standard (100 µg/L) is analyzed directly prior to each sample analytical batch if cyclohexanone is requested.

[d] MDLs will vary based on extraction method. Values shown are for extraction by separatory funnel (water) and microtip sonication (soil).

[e] Carcinogenic PAHs - Cleanup levels under 1996 MTCA are for total carcinogenic PAHs: groundwater 0.1 µg/L, residential soil 1,000 µg/kg, industrial soil 20,000 µg/kg. Cleanup levels for carcinogenic PAHs under 2001 MTCA are based on a total value of 0.1 µg/L for groundwater, 100 µg/kg for unrestricted land use, and 2,000 µg/kg for industrial land.

[f] Cleanup level based on total of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

[g] MDLs will vary based on extraction method. Values shown are for liquid/liquid extraction (water) and microtip sonication (soil).

[h] Cleanup level is for total PCBs.

[i] The NWTPH-Dx method will be modified to report Jet A fuel in soils, accumulated solids, surface water and groundwater where appropriate. The MDLs shown are based on diesel.

[j] If benzene is present, cleanup level is 800 µg/L. If there is no detectable benzene, cleanup level is 1,000 µg/L.

Notes:
(R) - Residential under MTCA 1996, unrestricated land use under MTCA 2001.
(I) - Industrial
MDL - method detection limit
NA - not applicable or not available
NE - not established
RL - reporting level