

**RRD PROGRAM REDESIGN
DRAFT STATUTORY LANGUAGE FOR THE SOIL CLEAN-UP CRITERIA
September 24, 2009**

Section XXXX. Soil cleanup criteria based on combined ingestion, dermal contact, and ambient air inhalation exposures to soil hazardous substances.

Section XXXX (1) The department shall develop residential and nonresidential soil cleanup criteria that are based on the combined ingestion, dermal contact, and inhalation exposure pathways. Ingestion of and dermal contact with contaminated soil along with the inhalation of hazardous substance emissions in ambient air from soil shall be considered reasonable and relevant pathways for all facilities. The criteria shall be calculated for the residential and nonresidential land use categories in accordance with the algorithms in this section.

(2) The residential and nonresidential soil cleanup criteria shall be calculated by combining an ingestion and dermal component with an inhalation component. The algorithm for both carcinogenic and noncarcinogenic hazardous substances is shown below:

$$SCC = \frac{1}{\left[\left(\frac{1}{IngDer} \right) + \left(\frac{1}{Inh} \right) \right]} \quad \text{(Equation 1)}$$

where,

Parameter	Definition	Units	Default
SCC	Soil clean-up criteria	µg/kg	Chemical-specific
IngDer	Ingestion and dermal component	µg/kg	Chemical-specific
Inh	Inhalation component	µg/kg	Chemical-specific

(3) The residential soil cleanup criteria for both carcinogenic and noncarcinogenic hazardous substances shall be calculated using the following algorithms.

(a) The ingestion and dermal component shall be calculated as shown below. The lowest of the IngDer component produced from the equations in (i), (ii) or (iii), where appropriate, shall be the final IngDer component used for derivation of the soil cleanup criterion to be protective of the most sensitive effect.

(i) for carcinogens (Equation 2)

$$IngDer_{ca} = \frac{TR \times AT_{ca} \times CF}{SF \times \left[(EF_{ing} \times IF_{ing} \times AE_{ing}) + (EF_{der} \times DF_{adj} \times AE_{der}) \right]}$$

(ii) for noncarcinogens

(Equation 3)

$$\text{IngDer}_{nc} = \frac{\text{THQ} \times \text{AT}_{nc} \times \text{CF} \times \text{RSC}}{\left[\left(\frac{1}{\text{RfD}_{oral}} \times \text{EF}_{ing} \times \text{IF}_{adj} \times \text{AE}_{ing} \right) + \left(\frac{1}{\text{RfD}_{der}} \times \text{EF}_{der} \times \text{DF}_{adj} \times \text{AE}_{der} \right) \right]}$$

where,

Parameter	Definition	Units	Default
IngDer _{ca}	Ingestion and dermal component, carcinogen	µg/kg	Chemical-specific
TR	Target risk level	no units	10 ⁻⁵
AT _{ca}	Averaging time, carcinogen	days	25,550 (70 yrs x 365 days/yr)
CF	Conversion factor	µg/kg	10 ⁹
SF _{oral}	Oral cancer slope factor	(mg/kg-day) ⁻¹	Chemical-specific
SF _{der}	Dermally adjusted cancer slope factor	(mg/kg-day) ⁻¹	Chemical-specific
EF _{ing}	Ingestion exposure frequency	days/yr	350
IF _{adj}	Age-adjusted soil ingestion factor	mg-year/kg-day	74 (under evaluation)
AE _{ing}	Ingestion absorption efficiency	no units	chemical-specific or default
EF _{der}	Dermal exposure frequency	days/year	250
DF _{adj}	Age-adjusted soil dermal factor	mg-year/kg-day	353
AE _d	Dermal absorption efficiency	no units	chemical-specific or default
IngDer _{nc}	Ingestion and dermal component, noncarcinogen	µg/kg	Chemical-specific
THQ	Target hazard quotient	no units	1
AT _{nc}	Averaging time, noncarcinogen	days	10,950 (30 years x 365 days/year)
RSC	Relative source contribution	no units	1
RfD _{oral}	Oral reference dose	mg/kg-day	Chemical-specific
RfD _{der}	Dermally adjusted reference dose or default RfD _{oral}	mg/kg-day	Chemical-specific

(iii) for chemicals with developmental effects:

(Equation 4)

$$\text{IngDer}_{dev} = \frac{\text{THQ} \times \text{AT}_{age1-6} \times \text{RfD}_{dev} \times \text{BW}_{age1-6} \times \text{CF} \times \text{RSC}}{\text{ED}_{age1-6} \times \left[\left(\text{EF}_{ing} \times \text{SIR}_{age1-6} \times \text{AE}_{ing} \right) + \left(\text{EF}_{der} \times \text{SA}_{age1-6} \times \text{AF}_{age1-6} \times \text{AE}_{der} \right) \right]}$$

where,

Parameter	Definition	Units	Default
IngDer _{dev}	Ingestion and dermal component, chemicals with developing effect	µg/kg	Chemical-specific
THQ	Target hazard quotient	no units	1
AT _{age1-6}	Averaging time, child	days	10,950 (30 years x 365 days/year)
RfD _{dev}	Reference dose based on development effect	mg/kg-day	Chemical-specific
BW _{age 1-6}	Body weight, child	Kg	15
CF	Conversion factor	µg/kg	10 ⁹
RSC	Relative source contribution	no units	1
ED _{age 1-6}	Exposure duration, child	years	6
EF _{ing}	Ingestion exposure frequency	days/yr	350
SIR _{age1-6}	Soil ingestion rate, child	mg-year/kg-day	100 (under evaluation)
AE _{ing}	Ingestion absorption efficiency	no units	Chemical-specific or default
EF _{der}	Dermal exposure frequency	days/year	250
AE _{der}	Dermal absorption efficiency	no units	Chemical-specific or default

- (b) The age-adjusted ingestion factor shall be calculated using the following equation:
(Equation 5)

$$IF_{adj} = \left(\frac{SIR_{age1-6} \times ED_{age1-6}}{BW_{age1-6}} \right) + \left(\frac{SIR_{adult} \times ED_{adult}}{BW_{adult}} \right)$$

- (c) The age-adjusted dermal factor shall be calculated using the following equation:
(Equation 6)

$$DF_{adj} = \left(\frac{SA_{age 1-6} \times EV \times AF_{age1-6} \times ED_{age 1-6}}{BW_{age 1-6}} \right) + \left(\frac{SA_{adult} \times EV \times AF_{adult} \times ED_{adult}}{BW_{adult}} \right)$$

where,

Parameter	Definition	Units	Default
SIR _{age 1-6}	Soil ingestion rate, child	mg/day	100 (under evaluation)
ED _{age 1-6}	Exposure duration, child	years	6
BW _{age 1-6}	Body weight, child	Kg	15
SIR _{adult}	Soil ingestion rate, adult	mg/day	100
ED _{adult}	Exposure duration, adult	years	24
BW _{adult}	Body weight, adult	Kg	70
SA _{age 1-6}	Skin surface area, child	cm ² /event	2,670
EV	Event frequency	event/day	1

AF _{age 1-6}	Soil adherence factor, child	mg/cm ²	0.2
SA _{adult}	Skin surface area, adult	cm ² /event	5,800
AF _{adult}	Soil adherence factor, adult	mg/cm ²	0.07

(d) Absorption efficiencies used to calculate the default soil cleanup criteria are as follows:

- (i) Chemical-specific data may be submitted to the department to support development of an updated default absorption efficiency and shall be used in this section to develop the soil cleanup criteria if determined by the department to be the best available information.
- (ii) If chemical-specific data are not available, then the following default absorption efficiencies shall be used:
 - a. AE_{ing} shall be 50% for organic hazardous substances which exhibit a log octanol-water partitioning coefficient greater than 5 and a molecular weight greater than 200 grams per mole or which are not ionizing organic compounds, and 100% for all other organic hazardous substances.
 - b. AE_{ing} shall be 50% for inorganic hazardous substances
 - c. AE_{der} shall be 10% for organic hazardous substances.
 - d. AE_{der} shall be 1% for inorganic hazardous substances.

(e) The Inhalation component shall be calculated as shown below:

(i) for carcinogens:

$$Inh_{ca} = \frac{TR \times AT_{ca}}{EF \times ED \times AIR_{adj} \times IURF \times \left(\frac{1}{VF} + \frac{1}{PEF} \right)} \quad \text{(Equation 7)}$$

(ii) for noncarcinogens:

a. ITSLs with annual averaging times

$$Inh_{nc} = \frac{THQ \times AT_{nc}}{EF \times ED \times AIR_{adj} \times \frac{1}{ITSL} \times \left(\frac{1}{VF} + \frac{1}{PEF} \right)} \quad \text{(Equation 8)}$$

b. ITSLs with non-annual averaging times

$$Inh_{nc} = \frac{THQ \times AT_{nc}}{EF \times ED \times AIR_{adj} \times \frac{1}{ITSL} \times \left(\frac{1}{VF} + \frac{1}{PEF/2} \right)} \quad \text{(Equation 9)}$$

where,

Parameter	Definition	Units	Default
Inh _{ca}	Inhalation component, carcinogen	µg/kg	Chemical-specific
TR	Target risk level	no units	10 ⁻⁵
AT _{ca}	Averaging time, carcinogen	days	25,550 (70 years x

IURF	Inhalation unit risk factor	$(\mu\text{g}/\text{m}^3)^{-1}$	365 days/yr Chemical-specific
EF	Exposure frequency	days/yr	350
ED	Exposure duration	years	30
AIR _{adj}	Age-adjusted air inhalation rate adjustment factor	no units	2
VF	Soil to air volatilization factor	m^3/kg	Chemical-specific
PEF	Soil to air particulate emission factor	m^3/kg	Chemical-specific
Inh _{nc}	Inhalation component, noncarcinogen	$\mu\text{g}/\text{kg}$	Chemical-specific
THQ	Target hazard quotient	no units	1
AT _{nc}	Averaging time, noncarcinogen	days	10,950 (30 years x 365 days/year)
ITSL	Initial threshold screening level	$\mu\text{g}/\text{m}^3$	Chemical-specific
PEF/2	Adjusted PEF (for ITSLs with non-annual averaging times)	m^3/kg	Chemical-specific

(4) The soil cleanup criteria for nonresidential restricted land uses for both carcinogenic and noncarcinogenic hazardous substances shall be calculated using the equations presented below:

(a) The ingestion and dermal component shall be calculated as shown below. The lowest of the IngDer component produced from the equations in (i), (ii) or (iii) shall be the final IngDer component to be used in the derivation of the soil cleanup criterion to be protective of the most sensitive effect.

(i) for carcinogens:

(Equation 10)

$$\text{IngDer}_{ca} = \frac{\text{TR} \times \text{AT}_{ca} \times \text{BW} \times \text{CF}}{\text{ED} \times \left[(\text{SF}_{oral} \times \text{EF}_{ing} \times \text{SIR} \times \text{AE}_{ing}) + (\text{SF}_{der} \times \text{EF}_{der} \times \text{SA} \times \text{EV} \times \text{AF} \times \text{AE}_{der}) \right]}$$

(ii) for noncarcinogens

(Equation 11)

$$\text{IngDer}_{nc} = \frac{\text{THQ} \times \text{AT}_{nc} \times \text{BW} \times \text{CF} \times \text{RSC}}{\text{ED} \times \left[\left(\frac{1}{\text{RfD}_{oral}} \times \text{EF}_{ing} \times \text{SIR} \times \text{AE}_{ing} \right) + \left(\frac{1}{\text{RfD}_{der}} \times \text{EF}_{der} \times \text{SA} \times \text{EV} \times \text{AF} \times \text{AE}_{der} \right) \right]}$$

where,

Parameter	Definition	Units	Default
IngDer _{ca}	Ingestion and dermal component, carcinogen	$\mu\text{g}/\text{kg}$	Chemical-specific
TR	Target risk level	no units	10^{-5}
AT _{ca}	Averaging time, carcinogens	days	25,550 (70 years x 365 days/year)

			365 days/yr)
BW	Body weight	kg	70
CF	Conversion factor	µg/kg	10 ⁹
SF _{oral}	Oral cancer slope factor	(mg/kg-day) ⁻¹	Chemical-specific
SF _{der}	Dermally adjusted cancer slope factor	(mg/kg-day) ⁻¹	Chemical-specific
EF _{ing}	Ingestion exposure frequency	days/yr	250
SIR	Soil ingestion rate	mg/day	100
EF _{der}	Dermal exposure frequency	days/year	250
ED	Exposure duration	years	21
SA	Skin surface area	cm ² /event	5,800
AF _{adult}	Soil adherence factor	mg/cm ²	0.07
EV	Event frequency	event/day	1
AE _{der}	Dermal absorption efficiency)	no units	Chemical-specific or default
IngDer _{nc}	Ingestion and dermal component, noncarcinogen	µg/kg	Chemical-specific
THQ	Target hazard quotient	no units	1
AT _{nc}	Averaging time	days	7,665 (21 years x 365 days/year)
RSC	Relative source contribution	no units	1
RfD _{oral}	Oral reference dose	mg/kg-day	Chemical-specific
RfD _{der}	Dermally adjusted reference dose	mg/kg-day	Chemical-specific

(iii) for chemicals with developmental effects:

(Equation 12)

$$\text{IngDer}_{\text{dev}} = \frac{\text{THQ} \times \text{RfD}_{\text{dev}} \times \text{AT}_{\text{dev}} \times \text{BW}_{\text{dev}} \times \text{CF} \times \text{RSC}}{\text{ED}_{\text{dev}} \times \text{EF}_{\text{dev}} \times \left[(\text{SIR}_{\text{adult}} \times \text{AE}_{\text{ing}}) + (\text{SA}_{\text{dev}} \times \text{AF}_{\text{dev}} \times \text{AE}_{\text{der}}) \right]}$$

where,

Parameter	Definition	Units	Default
IngDer _{dev}	Ingestion and dermal component for chemicals with developing effects	µg/kg	Chemical-specific
THQ	Target hazard quotient	no units	1
RfD _{dev}	Reference dose based on development effect	(mg/kg-day) ⁻¹	Chemical-specific
AT _{dev}	Averaging time, developmental	day	1
BW _{dev}	Female body weight, adult	kg	62
RSC	Relative source contribution	no units	1
ED _{dev}	Exposure duration, developmental	year	1
EF _{dev}	Exposure frequency, developmental	day/year	1
SIR _{adult}	Soil ingestion rate, adult	mg/day	100

AE_{ing}	Ingestion absorption efficiency	no units	Chemical-specific or default
SA_{dev}	Skin surface area, female adult	$cm^2/event$	5,100
AF_{adult}	Soil adherence factor, adult	mg/cm^2	Chemical-specific
AE_{der}	Dermal absorption efficiency	no units	Chemical-specific or default

(b) The inhalation component shall be calculated using the equations shown below:

(i) for carcinogens:

$$Inh_{ca} = \frac{TR \times AT_{ca}}{IURF \times ED \times EF \times ET \times \left(\frac{1}{VF} + \frac{1}{PEF} \right)} \quad \text{(Equation 13)}$$

(ii) for noncarcinogens:

a. ITSLs with annual averaging times:

$$Inh_{nc} = \frac{THQ \times ITSL \times AT_{nc}}{ED \times EF \times ET \times \left(\frac{1}{VF} + \frac{1}{PEF} \right)} \quad \text{(Equation 14)}$$

b. ITSLs with non-annual averaging times:

$$Inh_{nc} = \frac{THQ \times ITSL \times AT_{nc}}{ED \times EF \times ET \times \left(\frac{1}{VF} + \frac{1}{PEF/2} \right)} \quad \text{(Equation 15)}$$

where,

Parameter	Definition	Units	Default
Inh_{ca}	Inhalation component, carcinogen	$\mu g/kg$	Chemical-specific
TR	Target risk level	no units	10^{-5}
AT_{ca}	Averaging time, carcinogen	days	25,550 (70 years x 365 days/yr)
IURF	Inhalation unit risk factor	$(\mu g / m^3)^{-1}$	Chemical-specific
ED	Exposure duration	years	21
EF	Exposure frequency	days/yr	250
ET	Exposure time	no units	0.33 (8 hrs-day/24 hrs-day)
VF	Soil to air volatilization factor	m^3/kg	Chemical-specific

PEF	Soil to air particulate emission factor	m ³ /kg	Chemical-specific
Inh _{nc}	Inhalation component, noncarcinogen	µg/kg	Chemical-specific
THQ	Target hazard quotient	no units	1
AT _{nc}	Averaging time, noncarcinogen	days	7,665 (21 years x 365 days/year)
ITSL	Initial threshold screening level	µg /m ³	Chemical-specific
PEF/2	Adjusted PEF for some noncarcinogens (for ITSL values with non-annual averaging times)	0.5	Chemical-specific

(iii) The Volatilization Factor (VF) relates the concentration of a contaminant in the soil to the concentration of volatilized contaminant in the ambient air. The non-residential flux (J_s^{ave}) shall be calculated using the Jury flux model for infinite source. If the vertical extent of the contaminant source has been adequately characterized throughout the facility, then the flux may be calculated using the EMSOFT model.

$$VF = (Q/C) \times (1/J_s^{ave}) \quad \text{(Equation 16)}$$

$$J_s^{ave} = \rho_b (4D_A / \pi t)^{1/2} \times 10^4 \text{ cm}^2 / \text{m}^2 \quad \text{(Equation 17)}$$

$$D_A = \frac{[(\theta_a^{3.33} D_a (H' \times TAF) + \theta_w^{3.33} D_w) / n^2]}{\rho_b K_d + \theta_w + \theta_a (H' \times TAF)} \quad \text{(Equation 18)}$$

where,

Parameter	Definition	Units	Default
VF	Soil to air volatilization factor	m ³ /kg	Chemical-specific
J_s^{ave}	Normalized average flux from soil	g/m ² -second	Chemical-specific
D _A	Apparent diffusivity	cm ² /second	Chemical-specific
Q/C	Dispersion factor	g/m ² -second per kg/m ³	
t	Exposure time	seconds	ED x 3.1536E+7 seconds/yr
θ_a	Soil air-filled porosity	(L _{air} /L _{soil})	0.28
n	Total soil porosity	(L _{pore} /L _{soil})	0.43
θ_w	Soil water-filled porosity	(L _{water} /L _{soil})	0.15
ρ_b	Dry soil bulk density	g/cm ³	1.5
D _a	Diffusivity in air	cm ² /second	Chemical-specific

D _w	Diffusivity in water	cm ² /second	Chemical-specific
H'	Dimensionless Henry's law constant	no units	Chemical-specific
HLC	Henry's law constant at 25° C	atm·m ³ /mol	Chemical-specific
TAF	Michigan-specific temperature adjustment factor	0.5	0.5
K _d	Soil-water partition coefficient For organic compounds (K _d = K _{oc} × f _{oc})	cm ³ /g	Chemical-specific
K _{oc}	Soil organic carbon partition coefficient	cm ³ /g	Chemical-specific
f _{oc}	Organic carbon content of soil	g/g (%)	0.006 (0.6%)

- (iv) The particulate emission factor (PEF) relates the concentration of a particulate contaminant in the soil to the concentration of contaminant in ambient air. The PEF shall be calculated as follows:

$$PEF = Q/C \times \frac{1}{(E_w + E_v)} \quad \text{(Equation 19)}$$

where,

Parameter	Definition	Units	Residential (32 acre)	Non-residential (100 acre)
PEF	Particulate emission factor for ITSLs with annual averaging time	m ³ /kg	4.31E+7	8.69E+6
PEF/2	Particulate emission factor for ITSLs with non-annual averaging time	m ³ /kg	2.15E+7	4.35E+6
Q/C	Dispersion factor	g/m ² -sec per kg/m ³	31.9 (32 acres)	27.0 (100 acres)
E _w	Particulate emission due to wind erosion	g/m ² -sec	6.9E-8	1.2E-7
E _v	Particulate emission due to vehicle traffic	g/m ² -sec	6.7E-7	3.0E-6

- a. The particulate emissions due to wind erosion (E_w) shall be calculated using the following equations:

(Equation 20)

$$E_w = 0.036 \times (1 - V) \times \left(\frac{U_m}{U_{t_{adj}}} \right)^3 \times \frac{F(x)}{3600 \text{ sec/hr}}$$

(Equation 21)

$$U_m = U_{mz} \times \left(\frac{H}{z}\right)^{0.15}$$

(Equation 22)

$$U_{t_{adj}} = \left(\frac{U_t \times CF}{0.4}\right) \times \ln\left(\frac{H}{z_0}\right)$$

(Equation 23)

$$x = 0.886 \times \left(\frac{U_{t_{adj}}}{U_m}\right)$$

where,

Parameter	Definition	Units	Default
E _w	Particulate emissions due to wind erosion	g/m ² -s	
0.036	Respirable fraction emission rate	g/m ² -s	0.036
V	Fraction of vegetative cover:	%	
	– Residential		50% (0.5)
	– Non-residential		10% (0.1)
U _m	Michigan mean annual windspeed adjusted to H	m/s	4.16
H	Default height	m	7
U _{mz}	Michigan measured annual average windspeed	m/s	3.94
Z	Wind speed measurement height	m	10.0
U _{t_{adj}}	Adjusted threshold friction velocity at 7 m height	m/s	9.51
U _t	Equivalent threshold friction velocity for a 0.35 mm mode soil aggregate size	m/s	0.42
z ₀	Roughness height	m	0.005
CF	Correction factor to account for non-erodible elements	no units	1.25
X	U _{t_{adj}} /U _m derived using Cowherd et al. (1985)		2.136
F(x)	Function dependent on Um/Ut derived using Cowherd et al. (1985)	no units	0.194

b. The particulate emissions due to vehicle traffic (E_v) shall be calculated using the following equation:

(Equation 24)

$$E_v = \frac{E_{10} \times VT \times DL \times T \times CF_1}{A \times CF_2 \times CF_3}$$

where,

Parameter	Definition	Units	Residential	Non-residential
Ev	Emissions due to vehicle	g/m ² -s	7.38E-07	1.05E-05
A	Area of site excluding house or building	m ²	1,965 (½-acre)	3930 (1 acre)
CF ₁	Conversion factor	g/kg	1,000	1,000
E ₁₀	PM ₁₀ emissions in kg/vehicle-km travel	Kg/V-km	0.326	1.155
VT	Number of vehicle trips (one way) /day	unitless	20	50
DL	Length of unpaved driveway	m	20	45
T	Time duration	days/year	350	250
CF ₂	Conversion factor	m/Km	1,000	1,000
CF ₃	Conversion factor	sec/yr	3.2E+07	3.2E+07

c. The PM₁₀ emission factors (E₁₀) shall be calculated using the following equation:

(i) for residential land use

(Equation 25)

$$E_{10} = \frac{\left[k \times \left(\frac{s}{12} \right)^a \times \left(\frac{S}{30} \right)^d \times \left(\frac{365 - p}{365} \right) \times CF \right]}{\left(\frac{M}{0.5} \right)^c} - C$$

where,

Parameter	Definition	Units	Default
E ₁₀	PM ₁₀ emissions in kg/vehicle-km travel	Kg/V-km	0.326
CF	Conversion factor	Kg/V-Km per lb/VM	0.2819
K	Particle size multiplier for PM-10	lb/VM	1.8
s	Surface material silt content	%	15
S	Mean vehicle speed	m/hr	20
W	Mean vehicle weight	tons	3
A	Constant for PM-10	unit less	1
c	Constant for PM-10	unit less	0.2
d	Constant for PM-10	unit less	0.5
M	Surface material moisture content	%	5
P	Mean number of days with 0.01 in precipitation	days	135

(ii) for non-residential land use

(Equation 26)

$$E_{10} = k \times \left(\frac{s}{12}\right)^a \times \left(\frac{W}{3}\right)^b \times \left(\frac{365 - p}{365}\right) \times CF$$

where,

Parameter	Definition	Units	Default
E ₁₀	PM ₁₀ emissions in kg/vehicle-km travel	Kg/V-km	1.15
CF	Conversion factor	Kg/V-Km per lb/VM	0.2819
K	Particle size multiplier for PM-10	lb/VM	1.8
s	Surface material silt content	%	15
W	Mean vehicle weight	tons	50
a	Constant for PM-10	unit less	0.9
b	Constant for PM-10	unit less	0.45
p	Mean number of days with 0.01 inch precipitation	days	135

d. The Source Size, Dispersion Factors (Q/C) and Modifiers are provided in the following table:

DISPERSION FACTOR (Q/C) TABLE
(using AERMOD dispersion model and 2002-2006 Michigan meteorological data)

Source Size (sq. ft. or acres)	90th percentile concentration (C) (ug/m3)	Q (0.001*10 ⁹)	Q/C (g/m ² -s kg/m ³)	Modifier Residential	Modifier Non- residential
100 sq ft	2276.77	1000000	439.22	13.78	16.27
400 sq ft	5382.24	1000000	185.8	5.83	6.88
1000 sq ft	7900.83	1000000	126.57	3.97	4.69
2000 sq ft	9634.81	1000000	103.79	3.26	3.84
1/2 acre	16058.02	1000000	62.27	1.95	2.31
1 acre	18170.45	1000000	55.03	1.73	2.04
5 acres	23859.4	1000000	41.91	1.31	1.55
10 acres	26289.45	1000000	38.04	1.19	1.41
32 acres	31364.84	1000000	31.88	1	1.18
100 acres	37032.4	1000000	27	0.85	1
200 acres	40847.42	1000000	24.48	0.77	0.91
300 acres	43183.64	1000000	23.16	0.73	0.86
500 acres	46297.16	1000000	21.6	0.68	0.80
1000 acres	51319.68	1000000	19.49	0.61	0.72
1500 acres	54528.26	1000000	18.34	0.58	0.68

(5) To demonstrate compliance with the residential and nonresidential soil cleanup criteria, the criteria shall be applied without regard to the depth of the contaminated soil.

(6) Site-specific (restricted) soil criteria may be developed by replacing the following default values with site-specific values: exposure frequency; exposure duration. Both values must be representative of site-specific conditions. Soil parameters that may be modified to reflect site-specific conditions are: soil bulk density; organic carbon content; and silt fraction. All three soil parameters must be modified to represent site-specific conditions. The other parameters that may be modified to reflect site-specific conditions are: dispersion factor; E_w parameters (fraction of vegetative cover; average wind speed; and threshold friction velocity); average flux (J) parameters (use of EMSOFT model for sites with a well-defined vertical extent of contamination); and E_v parameters (unpaved road length; number of vehicles or trips/day; average weight of vehicles).